DEGREES

The Georgia Institute of Technology at present offers curricula leading to the following degrees which are shown in the order of the establishment of the school in which the work is given:

**Undergraduate Degrees**
- Bachelor of Mechanical Engineering
- Bachelor of Electrical Engineering
- Bachelor of Civil Engineering
- Bachelor of Textile Engineering
- *Bachelor of Science in Textile Chemistry*
- Bachelor of Science in Textiles
- Bachelor of Chemical Engineering
- Bachelor of Science in Chemistry
- *Bachelor of Architecture*
- Bachelor of Ceramic Engineering
- Bachelor of Aerospace Engineering
- Bachelor of Science in Industrial Management
- Bachelor of Science in Physics
- Bachelor of Industrial Engineering
- Bachelor of Science in Applied Mathematics
- *Bachelor of Science in Building Construction*
- *Bachelor of Science in Industrial Design*
- Bachelor of Science in Engineering Mechanics
- *Bachelor of Science in Applied Psychology*
- *Bachelor of Science in Applied Biology*

To graduates who have completed their courses under the Cooperative Plan, the degree is awarded with the designation “Cooperative Plan.”

**Graduate Degrees**
The degree of Master of Science (with or without designation) is offered in all fields shown above (with the exception of those marked*) and also in:
- Information Science
- Metallurgy
- Nuclear Engineering
- Nuclear Science
- Public Health
- Public Health Engineering
- Safety Engineering
- Sanitary Engineering

Also offered are the degrees:
- Master of Architecture
- Master of City Planning

The degree of Doctor of Philosophy is offered in:
- Aerospace Engineering
- Chemical Engineering
- Chemistry
- Civil Engineering
- Electrical Engineering
- Engineering Mechanics
- Industrial Engineering
- Mechanical Engineering
- *Nuclear Engineering*
- Physics
- Sanitary Engineering
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### Calendar 1964-65

#### Summer Quarter 1964
- **June 26**: New students report for orientation.
- **June 29**: Registration.
- **June 30**: Classes begin.
- **July 1**: Late registration fees apply.
- **July 3**: Last day for registration. Last day for adding a subject.
- **July 4**: Holiday.
- **July 6**: Last day for payment of tuition and fees.
- **July 20**: Last day for dropping a subject without penalty.
- **Aug. 7**: End of deficiency report period.
- **Sept. 11**: End of term.
Calendar of Events

June 14  Summer Surveying Course, first session starts.
July 11  Summer Surveying Course, first session ends.
July 12  Summer Surveying Course, second session starts.
Aug. 8  Summer Surveying Course, second session ends.

Fall Quarter 1964
Sept. 21  All entering freshmen report for orientation.
Sept. 24  Transfer students report for schedule conferences.
Sept. 25  Registration of first quarter freshmen.
Sept. 28  Registration of upperclassmen and transfer students.
Sept. 29  Classes begin.
Sept. 30  Late registration fees apply.
Oct.  2  Last day for registration. Last day for adding a subject.
Oct.  5  Last day for payment of tuition and fees.
Oct. 19  Last day for dropping a subject without penalty.
Nov.  7  End of deficiency report period.
Nov. 26-29  Thanksgiving recess.
Dec. 18  End of term.
Dec. 15 —
Jan.  3  Christmas recess.

Winter Quarter 1965
Jan.  4  Registration.
Jan.  5  Classes begin.
Jan.  6  Late registration fees apply.
Jan.  8  Last day for registration. Last day for adding a subject.
Jan. 11  Last day for payment of tuition and fees.
Jan. 25  Last day for dropping a subject without penalty.
Feb. 13  End of deficiency report period.
Mar. 19  End of term.
Mar. 20-28  Spring recess.

Spring Quarter 1965
Mar.  29  Registration.
Mar.  30  Classes begin.
Mar.  31  Late registration fees apply.
Apr.  2  Last day for registration. Last day for adding a subject.
Apr.  5  Last day for payment of tuition and fees.
Apr. 19  Last day for dropping a subject without penalty.
May  8  End of deficiency report period.
June 11  End of term.
June 12  Commencement.

Summer Quarter 1965
June 28  Registration.
June 29  Classes begin.
Sept. 10  End of term.
June 13  Summer Surveying Course, first session starts.
July 10  Summer Surveying Course, first session ends.
July 11  Summer Surveying Course, second session starts.
Aug. 7  Summer Surveying Course, second session ends.
The University System of Georgia

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HISTORICAL SKETCH

A May, 1882, conversation between two Confederate veterans initiated the drive to open a technological school in Georgia. The two men were Major J. F. Hanson, a publisher and manufacturer who became president of a great railroad, and Nathaniel E. Harris, a Macon attorney who eventually became Governor of Georgia. Hanson had the vision for the need for such a school and he called on Harris to make the dream a reality. Harris immediately ran for the State Legislature on the need for a technological school. He was elected and during the next three years all of his efforts were directed toward getting a bill creating such a school passed by the Legislature. After several failures, the bill was finally passed by the narrowest of margins in the summer of 1885.

In April, 1888, Dr. Isaac Hopkins, then president of Emory College at Oxford, Georgia, and a rare combination of a physicist and theologian, was chosen Tech's first president by the Board of Trustees, headed by founder Harris.

Two buildings, both financed by the State, were erected during the Hopkins administration. The Administration Building, which cost $43,250, was completed in 1888 and was the major academic building of the early Georgia Tech. It was used for teaching and administrative offices until December, 1959, when it became purely an administrative office building. The Old Shop Building was also completed in 1888 at an initial cost of $20,000. In 1892 it was badly damaged by fire but was rebuilt the same year at a cost of $10,000. It is still used for classes, laboratories, and offices by the School of Applied Biology and the Department of Social Sciences.

Dr. Lyman Hall, professor of mathematics and a West Point graduate, succeeded Hopkins in 1896. Hall was well-known as a tough disciplinarian. But, he was also a dedicated man who literally worked himself to death in nine years trying to build a decent physical plant for the struggling young school.

In 1896, he added two small temporary dormitories at a cost of $4,000 from State funds.

First major building in his administration was Knowles Dormitory, completed in 1897 at a cost of $20,000, of which $15,000 came from the State. Named for Clarence Knowles, Fulton County legislator who worked so diligently to secure the funds from the Legislature, the building now houses administrative offices.

Next building erected under Hall was the A. French Textile Building, completed in 1898 at a cost of $20,000. Funds for this building and its equipment came from the State ($10,000), Aaron French, Pennsylvania manufacturer for whom the building and Textile Department were named, and from textile manufacturers throughout the State. This building now houses the School of Industrial Engineering.

By late 1901 both the Electrical Building and Swann Dormitory were added to the growing plant. Money for the Electrical (now called the old EE Building) Building came from the State ($16,000) and from private contributions ($2,500), and Swann Hall was financed by a grant of $20,000 from Mr. James
Swann providing Hall could raise an additional $15,000 and would name the dormitory for Swann’s late wife. Both conditions were met by Hall within a year. The Electrical Building now houses several research groups, and Swann Hall is headquarters for the Engineering Extension Division and the Modern Languages Department.

Hall’s last act was securing a matching grant for a Chemistry Building in 1905. The State had given $10,000 for the building in 1904 and Hall managed to secure the additional $10,000 before he died in August, 1905. The building—named for Lyman Hall—was completed in 1906 and is still used for the teaching of chemistry and for offices.

Dr. Kenneth G. Matheson, professor of English, was named chairman of the faculty on August 23, 1905. Less than a year later, he was named president.

Matheson was the founder of a school library for Tech, operating it in his office and finally expanding it into three rooms in the Administration Building. It came as no surprise then that the new president’s first move was toward a library building for the campus. On March 12, 1906, Andrew Carnegie donated $20,000 for a building providing that the school guarantee an annual appropriation of at least $2,000 a year to support the library. The terms were met and by September, 1907, the Carnegie Building, now an administrative office building, was open for student and faculty use.

In November, 1909, Mrs. Joseph Whitehead made an initial gift of $5,000 towards an infirmary for Tech. Within a year, other gifts brought the total of this fund up to $15,000 and construction began on the Joseph Brown Whitehead Memorial Hospital, now called the Dean of Students Building.

Matheson followed this with his February, 1910, announcement that John D. Rockefeller had offered Tech $50,000 for a YMCA Building if the school could raise $25,000. Less than a year later, a fund drive met these terms and in June, 1912, the YMCA Building was dedicated. The building is still in use.

In August, 1910, the Legislature appropriated $35,000 for a Mechanical Engineering Building on the omnipresent condition that $15,000 be raised by the school. Through the aid of the Atlanta Chamber of Commerce, $22,000 was subscribed within two months. The first three units of this building were completed in 1912. After the Legislature appropriated $100,000 in 1919, the remaining units of the Mechanical Engineering Building were completed.

Matheson also initiated the first Greater Georgia Tech campaign of 1914 to raise money to build a Power Plant to house $100,000 worth of equipment donated by manufacturers. The Power Plant Building was completed in 1917.

During Matheson’s administration, several important parcels of land were added to the school’s property. Included was the land that now holds Grant Field, Tech’s 52,000-seat football stadium. This land was purchased in two segments, the first two-thirds in 1906 for $16,000 and the remainder in 1913. The State furnished the money for the initial purchase, while two gifts from John W. Grant were used for the second parcel and to build the West stands in 1913 and 1915. The field was named for Grant’s son. The East and South stands were erected during the 1924-25 year through the use of Athletic Association funds. Since then there have been four additions to the stadium all of them built without the use of state money.
The pressures of running Tech finally began to break down Matheson's health and on orders of his physician, he resigned in October, 1921 (effective April, 1922) to accept the less-taxing position of president of Drexel Institute. For four months after Matheson's departure, N. P. Pratt, chairman of the executive committee of the Trustees, ran the school as administrative executive ad interim.

On July 14, 1922, the Trustees selected Dr. Marion Luther Brittain, the state superintendent of schools, as Tech's fourth president. Brittain's first goal as president was to rebuild the faculty decimated by World War I and the financial crisis in Georgia that followed it. The politically astute Brittain went to the Legislature for more money for Tech and managed to convince the politicians to push through a deficiency bill of $39,000 which he used to raise salaries.

He then approached the Carnegie Foundation for the $150,000 it had pledged to Tech providing the Greater Georgia Tech campaign of 1918-1921 had reached over $1,500,000 in pledges. He received the grant even though less than 40% of the campaign pledges had been paid. With this money and the Greater Tech money, he began construction on the Physics Building which was completed in 1923. It was this building that set the architectural style for the Tech campus for the next 20 years.

The next building on the list was a Ceramic Engineering Building. Brittain, with the help of the State's top ceramics industrialists, raised $500,000 for this new department in less than six months. The building was completed in November, 1924.

Then Brittain's building program began to pick up steam. In 1925, Brown Dormitory was completed at a cost of $85,000 with the funds coming from the Brown Estate and the Greater Georgia Tech campaign. The same year, the $100,000 Emerson addition to the Chemistry Building and Harris Dormitory were completed with the funds again coming from the campaign.

With the help of the money still left from the campaign, federal monies from various agencies (including the WPA and PWA), private donations, and a stronger State support, Brittain managed to add a total of 22 buildings to the growing Tech campus. Included in this group were the Army Headquarters Building (1927), the Brittain Dining Hall (1928), Rose Bowl Field (1929), Cloudman Dormitory (1931), the Naval Armory (1934), Techwood Dormitory (1935), another addition to the Chemistry Building (1936), the Old Gym (1937), the Civil Engineering Building (1938), the Engineering Drawing Building (1938), the Clark Howell Dormitory (1939), the George W. Harrison, Jr. Dormitory (1939), the Engineering Experiment Station Building (1939), the Athletic Office Building (1941), and the Chemistry Annex (1942). At the close of Brittain's term in 1944, the entire campus was valued at $4,500,000 with over $3,460,000 of that being vested in buildings.

But Marion Luther Brittain's proudest accomplishment was the securing of the Guggenheim award in 1930 which made possible the establishment of the Guggenheim School of Aeronautics.

When Dr. Brittain retired in 1944 at the age of 78 after setting a longevity record of 22 years for a Tech president, the Board of Regents (Tech became
part of Georgia's University System in 1933) named Colonel Blake R. Van Leer as his successor. One of Van Leer's first projects was the expansion of Tech. In his 11 years as president, Van Leer saw the campus expand from 50 acres of land to over 130 and the physical plant value rise from $4,500,000 to over $25,000,000.

First new buildings added during the Van Leer administration were the Burge and Callaway Apartments for the faculty and married students. Both were completed during the 1946-47 year and were financed by bonds amortized by rentals. Still more housing followed in September, 1947, when Glenn and Towers dormitories were opened. They, too, were made possible through a self-liquidating bond issue.

First of the major academic structures to go up during the Van Leer administration was the Harrison Hightower Textile Building named for one of the school's great alumni benefactors. The building, financed by the State and equipped by the Textile Education Foundation, Inc., was started in October, 1947, and completed two years later. During 1949, Van Leer's continuing efforts to expand the campus paid off with a $65,000 remodeling of Brittain Dining Hall, another dormitory (Smith), and a new campus lighting system (paid for by the City of Atlanta, Fulton County, and the State of Georgia).

In 1951, the Thomas P. Hinman addition to the Research Building was completed and ground was broken for the Price Gilbert Memorial Library. In September, 1952, the new Architecture Building, funded by the University System Building Authority, was dedicated. In November, 1953, the new library, costing $2,200,000 of the Building Authority money and initiated through a gift from the late Judge Price Gilbert, was dedicated. The Building Authority also financed Tech's $1,000,000 modernization of the heating and electrical switching plant and the $800,000 modernization of the Carnegie Building in 1954.

By 1955, the Rich Electronic Computer Center — financed by the Rich Foundation, the State of Georgia, and the Georgia Tech Research Institute — was in operation.

On January 23, 1956, Van Leer died suddenly in an Atlanta hospital and Dean of Faculties Paul Weber was named acting president while the Regents searched for a successor. During Weber's 17 months in office, the Joint Research and Laboratory Building of the State Highway Department and Georgia Tech was dedicated (February 29, 1956) and the Alexander Memorial Building, financed by gifts from the alumni and friends of the school and by Radio Station WGST and the Georgia Tech Athletic Association, was dedicated (November, 1956).

Dr. Edwin D. Harrison became Tech's sixth president on August 15, 1957. On January 7, 1959, Tech's Radioisotopes and Bioengineering Laboratory was dedicated. The $500,000 building was financed by State funds, National Institutes of Health, and the Atomic Energy Commission which provided $250,000 worth of equipment.

In November of the same year, Tech accepted the $2,300,000 New Classroom Building which was financed by the University System Building Authority.
The new Joseph Brown Whitehead Memorial Infirmary financed by the estate of Lettie Pate Evans, was dedicated on June 23, 1960. It was followed by five new dormitories which were dedicated in August, 1961. They were Field, Hanson, Hopkins, Matheson, and Perry. During May of 1962, Southern Technical Institute's $2,000,000 campus near Marietta, funded by the State, the City of Marietta, and Cobb County, was dedicated.

In the summer of 1961, the new Physical Plant Building was opened. It was built with funds from the State as was the Crenshaw Field House, opened in the fall.

In January, 1962, the new $3,300,000 Electrical Engineering Building which was funded by the University System Building Authority was occupied by the School of Electrical Engineering. This building was named for Tech's fifth president, the late Blake Ragsdale Van Leer, in special ceremonies held on February 18, 1964. During 1963 dedication services were held for the largest single building project in Tech's history, the Frank H. Neely Nuclear Research Center which was supported by grants from the State of Georgia, the National Science Foundation, and national loans from the Atomic Energy Commission.

One major building still under construction on the campus is the new Chemical Engineering—Ceramic Engineering Building which should be completed in 1964. It was also financed by the University System Building Authority. New buildings authorized and now in the planning stage are the new Physics Building and the Electronics Research Building.
GENERAL INFORMATION

The Georgia Institute of Technology operates on the quarter plan with the fall, winter, and spring quarters normally constituting the academic year. A summer quarter is also offered and many students accelerate their program by attending four quarters per year. The requirements for a degree may be completed at the end of any quarter, although only one annual commencement is held.

Courses are offered in Aerospace, Ceramic, Chemical, Civil, Electrical, Industrial, Mechanical, and Textile Engineering; Engineering Mechanics; Applied Biology, Applied Mathematics; Applied Psychology; Architecture; Building Construction; Industrial Design; Chemistry; Physics; Industrial Management; Textile Chemistry; and Textiles. The curricula in these various fields are listed on the following pages and work submitted for credit must be checked against these basic requirements.

ADMISSION REQUIREMENTS

If you are interested in applying for admission to Georgia Tech you should write to the Director of Admissions, Georgia Tech, Atlanta, Ga., and request application forms. Freshman students are accepted at Georgia Tech for the quarters beginning in September, March, and June. Transfer students are accepted for the quarters beginning in September, January, March, and June. An application cannot be considered until the application blank has been properly executed and returned to the Institute. The application form, together with a transcript of the applicant's previous academic work, must be submitted to the Director of Admissions at least 35 days before the registration date for the quarter for which the applicant wishes to enroll. It is advisable for candidates to the freshman class to make application not earlier than one year or later than six months prior to the date of the beginning of the quarter for which he is applying.

The Institute reserves the right to refuse to accept applications at any time when it appears that students already accepted for the quarter which the applicant wishes to enroll will fill the Institute to its maximum capacity. The Institute also reserves the right to reject an applicant who is not a resident of the State of Georgia.

FRESHMEN

The Georgia Institute of Technology has two different sets of requirements insofar as high school units are concerned; one for students planning to major in engineering or science (Group I), and one for those planning to major in architecture, industrial management, or textiles (Group II).
Georgia Institute of Technology

Group I (Engineering or Science)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>4</td>
</tr>
<tr>
<td>Algebra</td>
<td>2</td>
</tr>
<tr>
<td>Plane Geometry</td>
<td>1</td>
</tr>
<tr>
<td>Trigonometry</td>
<td>½</td>
</tr>
<tr>
<td>Advanced Algebra</td>
<td>½</td>
</tr>
<tr>
<td>History</td>
<td>1</td>
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<td>Chemistry</td>
<td>1</td>
</tr>
<tr>
<td>Physics</td>
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<tr>
<td>Optional Units</td>
<td>5 to 7</td>
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</table>

Group II (Arch., I.M., Textiles)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>English</td>
<td>4</td>
</tr>
<tr>
<td>Algebra</td>
<td>2</td>
</tr>
<tr>
<td>Plane Geometry</td>
<td>1</td>
</tr>
<tr>
<td>History</td>
<td>1</td>
</tr>
<tr>
<td>&quot;Science&quot;</td>
<td>2</td>
</tr>
<tr>
<td>Optional Units</td>
<td>6 to 8</td>
</tr>
</tbody>
</table>

*Science units may be met with courses in General Science, Biology, Chemistry and/or Physics.

Georgia Tech does not require a foreign language for admission, but recommends two years of study of a modern language in high school. Other recommended courses for high school study include extra courses in mathematics and science. Students planning to major in an engineering field will find a mechanical drawing course helpful. The total number of high school units presented should be sufficient to insure graduation under local requirements. Students who have been unable to schedule required courses should write to the Director of Admissions for information regarding entrance by examination or for other ways of making up missing high school credits. Ordinarily not more than three units will be allowed from the group including drawing, commerce, agriculture, military and shop work.

Special attention is called to the required one-half unit in advanced algebra in Group I. Suggested topics to be included in this course include the following: the system of real numbers, functions, complex numbers, theory of equations, systems of equations, permutations, combinations, and the binomial theorem. More detailed information regarding these suggested topics may be secured on request. Solid geometry is not an acceptable substitute for this algebra requirement but honors programs or other advanced courses including mathematical analysis or analytic geometry will be acceptable.

The Institute reserves the right to reject the credits from any high school or other institution notwithstanding its accredited status, where the Institute determines from investigation that the quality of instruction available at such high school or institution is for any reason deficient or unsatisfactory.

In addition to the scholastic units mentioned above, Georgia Tech uses the following criteria to judge its high school applicants:

1. The applicant must have graduated from an accredited school with a record high enough to indicate that he is prepared for college work.

2. The applicant must take the College Entrance Examination Board Tests. All applicants must take the Scholastic Aptitude Tests and the Achievement Tests in English and mathematics (intermediate or advanced). In addition those students planning to major in engineering or science (Group I) must take the Achievement Test in either chemistry or physics.
(3) All applicants must be at least 16 years of age and of established good moral character. The Institute reserves the right to examine and investigate the moral worth, character, and personality of the applicant.

(4) The applicant must have a predicted grade-point average which indicates that he has the potential to pursue effectively the educational program of the Institute.

Each applicant will be required to take a physical examination and forms for this purpose will be sent with the notice of acceptance. (Additional information regarding physical examinations may be found on page 29.)

A deposit of $25.00 (in addition to the $25.00 dormitory room deposit mentioned on page 32) is required of each accepted applicant for admission to the Fall Quarter within two weeks after notification of acceptance has been issued. After enrollment, this fee will be credited to the student's fee account. If the applicant decides not to enter, his deposit may be refunded by application to the Director of Admissions not later than June 1st. Thereafter, the deposit is forfeited except for instance of an act of Providence.

Advanced Placement and Honors Programs
Superior students entering Georgia Tech may receive college credit for courses completed in high school if their grades and scores on the advanced placement tests or the achievement tests of the College Board indicate a satisfactory knowledge of college course work. In addition, honors programs, some of which excuse a student from basic freshman courses, are available. Departments which offer advanced placement credit and/or honors programs include mathematics, English, chemistry, physics, modern languages, and social sciences. Participation in the honors programs is voluntary.

Mathematics Credit by Examination
Matriculating freshmen who do not qualify for the Honors Program in mathematics (see page 134) may nevertheless have had special mathematical training in high school. If they can show to the satisfaction of the School of Mathematics that they have had such training and if their previous test scores (Scholastic Aptitude, etc.) are high enough, they may take an examination for advanced standing from 6:00 to 9:00 p.m. on the first day of classes. Arrangements to do so must be made with the School of Mathematics at least twenty-four hours in advance. The examination will not normally be given at any other time in the fall quarter. Transfer students who have had training which cannot be accepted without further validation may also apply to the School of Mathematics for an examination at the same hour. Such applications must also be made at least twenty-four hours in advance.

TRANSFER STUDENTS
Applicants who have made satisfactory records in scholarship and in conduct at other colleges may be considered for admission with advanced standing. Transfer students wishing to enter the School of Architecture are generally confronted with a difficult problem because of the highly specialized nature of the curriculum in this school (starting with the first quarter of the fresh-
man year). These specialized courses may not ordinarily be obtained in other colleges unless in a School of Architecture.

(1) All regulations applicable to students entering college for the first time shall be applicable to students transferring from other colleges, insofar as the regulations are pertinent to the applications of transfer students.

(2) A student transferring from another college shall ask the Registrars of the colleges that he has previously attended to send official transcripts to the Director of Admissions. A transcript of high school work is not ordinarily needed but may be required in certain cases.

(3) The Institute reserves the right to deny admission to any transfer student when, in the opinion of the Director of Admissions, the academic standards or the admission procedures of the institution(s) previously attended are not equivalent or comparable to those existing at this institution.

(4) Courses completed in other colleges must have an over-all average of "C" or better and grades must be satisfactory for the last term prior to transferring. Credit for specific courses will not be allowed unless grades received are above the lowest passing grade. It is ordinarily impossible to give an official statement regarding transfer credit without having an interview with the applicant.

(5) Courses used as credits for a degree must have been completed in a period of ten years, counted from the time the first credits were acquired until the time all requirements for the degree have been met. Courses not falling within this time limit may be validated by examination. Transfer students should realize that credits six years (or more) old at the time of transferring are in danger of being voided by this regulation.

(6) The basic policy regarding the acceptance of courses by transfer is to allow credit for courses completed with satisfactory grades in other accredited colleges providing the courses correspond in general in time and content to courses in the curriculum they expect to enter at the Georgia Institute of Technology.

(7) Transfer students must take the College Entrance Examination Board Achievement Tests in English composition, advanced mathematics, and either chemistry or physics. (Applicants for Architecture, Industrial Management, or Textiles, may omit the test in chemistry or physics.) Candidates for admission to the fall quarter should plan to take the required Achievement Tests within six months of the planned date of enrollment. Other standardized aptitude tests and/or achievement tests may be required prior to admission. The tests required will depend upon the level at which the transfer is being made and the program which the applicant desires to enter.

(8) Transfer students must comply with such other procedures, including personal interviews and psychological or other tests, as may be necessary to determine the applicants sense of social responsibility, adjustment of personality, sturdiness of character, and general fitness for admission to the Institute.

**TRANSIENT STUDENTS**

A student who has taken work in another college or university may apply for the privilege of temporary registration in the Georgia Institute of Technology.
Such registration is generally for the summer quarter and the student will ordinarily be one who expects to return to the institution in which previously enrolled.

(1) An applicant for admission as a transient student must present a statement from the Dean or Registrar of the institution that he last attended stating that the student is in good standing. A transcript is not ordinarily required.

(2) An applicant will be accepted as a transient student only when it appears that the applicant's previous academic work is of a satisfactory or superior quality. The Director of Admissions shall have the right to require the applicant to submit a transcript of his previous college work.

(3) The Director of Admissions must have evidence that the institution the student previously attended was an accredited or approved institution.

(4) Even though the institution that the student last attended is accredited, the Director of Admissions may reject the application if he has reason to believe that the quality of the educational program of the institution that the applicant last attended is mediocre or unsatisfactory.

(5) In case of doubt about the qualifications of an applicant who seeks admission as a transient student, the Director of Admissions may classify the applicant as a transfer student and require the applicant to comply with all regulations regarding the admission of transfer students.

(6) Applicants for admission as transient students are not normally required to take the College Entrance Examination Board Tests.

(7) Since the primary obligation of the Georgia Institute of Technology is to its regularly enrolled students, it will consider the acceptance of transient students only when the acceptance will cause no hardship or inconvenience to the Institute or its regularly enrolled students.

GRADUATE STUDENTS
All correspondence relative to admission to graduate study should be directed to the Dean of the Graduate Division. Necessary application forms may be obtained from his office. These forms, together with letters of recommendation and official transcripts of previous academic work, should be on file in the office of the Dean at least four weeks before the beginning of the quarter for which the applicant plans to register if he is to be assured consideration for acceptance. The Graduate Bulletin may be obtained on request.

AUDITORS
A regularly enrolled student at the Georgia Institute of Technology may be permitted to audit a course providing permission is obtained from the instructor in charge of the course and the student's College Dean. The audited course will count at one-half value in computation of the student's schedule load. A student auditing a course will not be placed on the rolls, and no report will be made to the Registrar.

Members of the faculty or staff of the Georgia Institute of Technology may audit a course providing permission is obtained from the Department concerned and the Registrar.
SEMINARS, SHORT COURSES, AND INSTITUTES

Applicants seeking admission to seminars, short courses, and institutes with programs of work that carry academic credit shall be required to meet all requirements prescribed for admission of students to undergraduate or graduate programs of work.

Applicants who wish to enroll in non-credit seminars, short courses, and institutes shall present evidence to prove:

1. That the applicant has the educational background and the ability to pursue successfully the program of work that he or she wishes to take.

2. That the applicant is of good moral character; that he or she possesses a sense of social responsibility, and that he or she has a capacity for growth and development in the program for which he or she seeks admission.

In the case of an applicant who is seeking admission to a non-credit seminar, short course, or institute, the Georgia Institute of Technology shall have the right to prescribe the types of evidence that an applicant must submit in order to establish qualifications for admission.

IRREGULAR STUDENTS OR SPECIAL STUDENTS

Irregular students and special students shall be required to meet all requirements prescribed for admission to undergraduate or graduate programs of work as the case may be and to meet any additional requirements that may be prescribed by the Institute.

INSTITUTE POLICIES REGARDING ADMISSIONS

When the application, necessary transcripts, College Board scores, and any other required information on an applicant are found to be complete and in order, the applicant will be evaluated in terms of his test scores and grades, scholastic aptitude, social and psychological adjustment, and the probability of his completing the requirements for the desired degree. The Institute reserves the right, in every case, to reject any applicant whose general records and attitude do not indicate a probability of success in college in the Institute environment, notwithstanding the satisfaction of other requirements. Applicants must comply with such other procedures, including personal interviews and psychological or other tests, as may be necessary to determine the applicants’ sense of social responsibility, adjustment of personality, sturdiness of character, and general fitness for admission to the Institute.

In order that the appraisal of a student’s ability and fitness for college work may be as nearly accurate as possible, officials of the Institute will study carefully all the information, including biographical data that is submitted by the applicant. The officials of the Institute shall have the right to require each applicant for admission to appear for an interview before his application is finally accepted or rejected. If an interview is required, the Director of Admissions will notify the applicant of the time and place at which the interview will be conducted.

The ultimate decision as to whether an applicant shall be accepted or rejected will be made by the Director of Admissions, subject to the applicant’s right of appeal as provided by the bylaws of the Institute and of the Board of Regents of the University System.
Admission of Women
By action of the Board of Regents, April 9, 1952, women were ruled eligible for admission in the schools of engineering, architecture, and applied mathematics. The requirements for admission and the regulations governing students apply alike to men and women but for certain exceptions as listed below:

Physical Training. Women students will not be required to schedule physical training and will not have to make up the credit hours.

ROTC. Women students will be exempted from taking ROTC but will have to make up six quarter hours in other subjects.

Residence Accommodations. See page 32. Due to the very limited residence hall facilities on the campus for women, incoming freshmen students should make reservations with the Housing Office as early as possible prior to registration.

Special Students. Women students will be enrolled as full time degree candidates only.

College Entrance Examination Board Tests
During the academic year 1964-65, the College Entrance Examination Board will hold tests on each of the following dates: December 5, 1964, January 9, March 6, May 1, and July 14, 1965.

The Bulletin of Information obtainable without charge from the College Entrance Examination Board, contains rules regarding applications, fees, reports, and the conduct of the tests; lists of examination centers; and an application blank bound in. This application blank may be used for any College Board examination.

Candidates applying for examination should write to College Entrance Examination Board, P. O. Box 592, Princeton, N. J., or P. O. Box 1025, Berkeley, Calif. Each application submitted for registration must be accompanied by the appropriate examination fee. All applications and fees should reach the appropriate office of the Board at least 30 days before the examination date for those living in the United States, Canada, Alaska, Hawaii, The Canal Zone, Mexico, or the West Indies, and 60 days before for those in Europe, Asia, Africa, Central and South America, and Australia.

The Board will report the results of the tests to Georgia Tech and other institutions indicated on the candidates' applications. The college will in turn notify the candidates of the action taken upon their applications for admission. Candidates will not receive reports upon their tests from the Board.

Veteran's Program
Any veteran desiring to further his education under veterans benefits at the Georgia Institute of Technology should first be accepted as a student of Georgia Tech by the Director of Admissions. This acceptance has no direct connection whatsoever with the Veterans' Administration. After being accepted by Georgia Tech, the new veteran student must secure from the Registrar instructions on how to register on registration day. The veteran who is a resident of Georgia will pay resident fee costs, and the veteran who is a resident of another state will pay non-resident fee costs.
At least one month before entering Georgia Tech, the veteran should go in person to the nearest Veterans' Administration Office to make application under the Public Law 894 (disabled veterans bill), or Public Law 550 (Korean Bill of Rights). He should carry with him photostatic and/or certified copies of separation papers. He should also furnish the Veterans' Administration with public record copy of marriage, if applicable. This evidence may be obtained from the courthouse in the county where married. In case of children, a public record copy of birth of one child is also necessary. This may be obtained from the Bureau of Vital Statistics of the Health Department in the state where the child was born.

The Veterans' Administration will issue to the veteran a certificate for educational training. The certificate should be brought by the veteran at the time he registers at Georgia Tech and surrendered to the institution on registration day. Since the new veteran student must be in school for at least a month before being allowed to fill out his first monthly report for payment, he must not expect any money from the Veterans' Administration earlier than sixty days after he enters Georgia Tech as a veteran student.

The Georgia Institute of Technology is assisting the incoming veteran in his transition from the service to college. On the campus are a Co-ordinator of Veterans' Affairs, and administrative officials, located in the office of the Dean of Students, to counsel and aid the veteran student.

Public Law 634 provides a special type of educational assistance for sons and daughters of deceased veterans.

The 3-2 Plan of Engineering Education

With more and more engineers occupying positions of leadership in the business, manufacturing, and governmental fields, there has developed a need for a plan of engineering education that will provide more courses in liberal arts, physical sciences, and mathematics than is possible under the regular engineering curriculum. Recognizing this need, the Georgia Institute of Technology in 1954 arranged a combined plan with a limited number of outstanding liberal arts colleges in the South to offer to qualified prospective engineers a more complete and well-rounded form of training for the world of today and tomorrow.

Under this plan the student may attend one of these liberal arts colleges for three years and then one of the nine engineering schools of the Georgia Institute of Technology for two years. Upon satisfactory completion of his two years at the school of engineering, he is eligible for the appropriate bachelor's degree from his original college and the bachelor of engineering in his particular field from the Georgia Institute of Technology.

Colleges and universities associated with the Georgia Institute of Technology in offering the 3-2 Plan of Engineering Education include:

The University of The South—Sewanee, Tennessee

The University of the South, founded in 1856 and popularly called Sewanee, is a small institution, with an enrollment of approximately 700 men students. Sewanee is under the jurisdiction of 22 dioceses of the Protestant Episcopal Church in the Southeast, but it welcomes men of all faiths. For further information, including admission requirements, write to Director of Admissions, The University of the South, Sewanee, Tennessee.
Davidson College—Davidson, North Carolina

Davidson College, founded in 1837 by Presbyterians, is a liberal arts college with an enrollment of about 1,000. It is a church-related college without being narrowly sectarian. Since enrollment is limited, an applicant should request necessary information and forms from the Director of Admissions as early as possible.

University of Chattanooga—Chattanooga, Tennessee

The University of Chattanooga is a privately controlled and endowed university for men and women. A successor to two older institutions founded in 1866 and 1886, it today through its various colleges and divisions has an enrollment of over 2,500. For further information, write to Dean of Admissions, Scholarships and Guidance.

Southwestern at Memphis—Memphis, Tennessee

Southwestern at Memphis, with an enrollment of about 800, originated in 1848 at Clarksville, Tenn., and in 1900 was relocated in Memphis. Identified with the Presbyterian Church for almost a hundred years, it provides a Christian liberal education program. Complete information is available from the Registrar.

University of Georgia—Athens, Georgia

The nation’s oldest state-chartered university, the University of Georgia was chartered in 1785. Like Georgia Tech it is a member of the State’s University System. Today, through its 11 schools and colleges it has a total enrollment of 10,000 students. For further information, write to the Director of Admissions.

Special Information for International Students

Over the years, the Georgia Institute of Technology, more popularly known as Georgia Tech, has been fortunate in having students from countries all over the world. The number of international students enrolled at Georgia Tech is one of the largest of any engineering and scientific college in the United States.

In order for a student from outside the United States to attend Georgia Tech, certain requirements must be met. These are as follows:

1. As a student at Georgia Tech, you must have a good, basic knowledge of the English language, both written and spoken, in order to attend the classes which are conducted in English. It is suggested that before coming to Georgia Tech you study English in your own country or at a school in the United States. International students whose native language is Spanish are urged to enroll in the special, non-credit, intensive review course in English which is offered by the Department of Modern Languages each summer. Classes are limited to 15, and the minimum enrollment required for establishing a class is 10. Inquiries concerning this special course should be addressed directly to the Department of Modern Languages. If after beginning your studies at Georgia Tech it is determined by the faculty that you need further training in the language, you will be given an opportunity to broaden your knowledge of the English language the first two years through special English courses 131, 132, 133, 231, 232, 233. These courses not only give you extra credit towards graduation, but also a greater understanding of American life and ideals.

2. Make application on or before March first for admission to Georgia
Tech for the Fall Quarter as per instructions in this Bulletin. With the application, the student is required to submit official documents covering work taken in high school as well as any taken in a college or university. If accepted, the Registrar will send you a Letter of Acceptance bearing the official seal of the Georgia Institute of Technology.

(3) Obtain a passport from your country giving you permission to go abroad.

(4) Make application for a visa at the local office of the American Consul. One of the requirements for such visa is the Letter of Acceptance from Georgia Tech. If you are coming as an Exchange Student, apply for visa through the agency handling your particular program.

(5) The applicant must submit the results of College Entrance Examination Board Tests. All applicants must take the Scholastic Aptitude Tests and the Achievement Tests in English and mathematics (intermediate or advanced). In addition those students planning to major in engineering or science (Group I) must take the Achievement Test in either chemistry or physics.

International students will only be accepted for initial admission to Fall Quarter classes starting in September.

If there are any other details on which information is desired, please write to: International Student Advisor, Georgia Institute of Technology, Atlanta, Georgia, U.S.A.

Definition of Legal Residence

To be considered a bona fide legal resident of Georgia for the purpose of registering at an institution of the University System of Georgia a student must establish the following facts to the satisfaction of the registering officer:

1. A student who is under 21 years of age at the time he seeks to register or re-register at the beginning of any quarter will be accepted as a resident student only upon a showing by him that his supporting parent or guardian has been legally domiciled in Georgia for a period of at least twelve months immediately preceding the date of registration or re-registration.

2. In the event that a legal resident of Georgia is appointed as guardian of a non-resident minor, such minor will not be permitted to register as a resident student until the expiration of one year from the date of appointment, and then only upon proper showing that such appointment was not made to avoid payment of the non-resident fee.

3. If a student is over 21 years of age, he may register as a resident student only upon a showing that he has been domiciled in Georgia for at least twelve months prior to the registration date. Any period of time during which a person is enrolled as a student in any educational institution in Georgia may not be counted as a part of the twelve months' domicile and residence herein required when it appears that the student came into the State and remained in the State for the primary purpose of attending a school or college.

4. A full-time faculty member in an institution of the University System, his wife, and minor children may register for courses on the payment of resident fees, even though the faculty member has not been in residence in Georgia for a period of twelve months.

5. If the parents or legal guardian of a minor changes residence to another state following a period of residence in Georgia, the minor may continue
to take courses for a period of twelve consecutive months on the payment of resident fees. After the expiration of the twelve months' period the student may continue his registration only upon the payment of fees at the non-resident rate.

6. Military personnel stationed in Georgia, and their dependents, may become eligible to enroll in institutions of the University System as resident students provided they file with the institution in which they wish to enroll the following materials:
(a) A statement from the appropriate military official as to the applicant's "home of record";
(b) Evidence that applicant, if over 21 years of age, is eligible to vote in Georgia;
(c) Evidence that applicant, if under 21 years of age, is the child of parents who are eligible to vote in Georgia;
(d) Evidence that applicant, or his parents filed an income tax return in Georgia during the preceding year;
(e) Other evidence showing that a legal domicile has been established in Georgia.

7. Foreign students who attend institutions of the University System under the sponsorship of recognized civic or religious groups may be enrolled upon the payment of resident fees, provided the number of such foreign students in any one institution does not exceed the quota approved by the Board of Regents for that institution.

8. All aliens shall be classified as non-resident students; provided, however, that an alien who is living in this country under a visa permitting permanent residence or who has filed with the proper federal immigration authorities a Declaration of Intention to become a citizen of the United States shall have the same privilege of qualifying for resident status for fee purposes as has a citizen of the United States.

9. Teachers in the public schools of Georgia and their dependents may enroll as students in University System institutions on payment of resident fees, when it appears that such teachers have resided in Georgia for nine months, that they were engaged in teaching during this nine months' period, and that they have been employed to teach in Georgia during the ensuing school year.

10. In the event that a woman who is a resident of Georgia and who is a student in an institution of the University System marries a non-resident of the State, the woman will continue to be eligible to attend the institution on payment of resident fees, provided that her enrollment is continuous.

11. If a woman who is not a resident of Georgia marries a man who is a resident of Georgia, the woman will not be eligible to register as a resident student in a University System institution until she has been domiciled in the State of Georgia for a period of twelve months immediately preceding the date of registration.

12. Non-resident graduate students who hold assistantships that require at least one-third time service may register as students in the institution in which they are employed on payment of resident rates.

PLEASE NOTE: In order to avoid delay and inconvenience upon arrival...
for registration, if there is any question in your mind concerning your residence status, application for clarification should be made immediately or not later than two weeks prior to the registration date. Applications should be addressed to Residence Committee, Office of the Controller, Georgia Institute of Technology, Atlanta, Georgia.

**Tuition and Fees**

_The rates for fees, board and room are subject to change at the end of any quarter._

<table>
<thead>
<tr>
<th>Matriculation Fee per Quarter</th>
<th>Tuition Fee per Quarter</th>
<th>Student Activity Fee per Quarter</th>
<th>Medical Fee per Quarter</th>
<th>Total Fees per Quarter</th>
<th>Total Fees Per Academic Year</th>
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<tr>
<td>Resident of Georgia $80.00</td>
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<td>Non-Resident of Georgia 80.00</td>
<td>230.00</td>
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<td>12.00</td>
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</tr>
</tbody>
</table>

**NOTE:**

(a) An extra fee may be charged in special courses.

(b) A deposit of $25.00 (in addition to the $25.00 dormitory room deposit mentioned on page 32) is required of each accepted applicant for admission to the Fall Quarter within two weeks after notification of acceptance has been issued. After enrollment, this fee will be credited to the student's fee account. If the applicant decides not to enter, he may be refunded his deposit by application to the Director of Admissions not later than June 1. Thereafter, the deposit is forfeited except for instance of an act of Providence.

(c) Any student who withdraws during the first quarter of his attendance shall have his admission deposit deducted before any computation is made of the refund to which he may be entitled.

**Summary of Expenses**

_(Estimated for Academic Year)_

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<th>Matriculation, Tuition and Fees</th>
<th>Resident of Georgia $309.00</th>
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<td>Board, Room, and Laundry</td>
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<td>Books and Equipment</td>
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</table>

Total for Academic Year $1,284.00 $1,974.00

**Other Fees**

Each member of the Senior Class must pay a diploma fee of $5.00 before graduating.

Examinations at other than regular examination times will be granted in exceptional cases only and by Faculty action. A fee of $2.00 will be charged in all such cases.

**A LATE REGISTRATION FEE OF NOT MORE THAN SIXTEEN DOLLARS ($16.00) IS CHARGED AT THE RATE OF TEN DOLLARS ($10.00) FOR THE FIRST DAY AFTER REGULAR REGISTRATION, AND AN ADDITIONAL TWO DOLLARS ($2.00) FOR EACH OF THE NEXT THREE DAYS.**
Refund of Fees
Refunds of tuition and other educational fees may be made only upon written application for withdrawal. Student activity and medical fees are not refundable.

Students who formally withdraw during one week following the scheduled registration date are entitled to a refund of 80% of the fees paid for that quarter.

Students who formally withdraw during the period between one and two weeks after the scheduled registration date are entitled to a refund of 60% of the fees paid for that quarter.

Students who formally withdraw during the period between two and three weeks after the scheduled registration date are entitled to a refund of 40% of the fees paid for that quarter.

Students who formally withdraw during the period between three and four weeks after the scheduled registration date are entitled to a refund of 20% of the fees paid for that quarter.

Students who withdraw after a period of four weeks has elapsed from the scheduled registration date will be entitled to no refund of any part of fees paid for that quarter.

Student Motor Vehicles
No freshman living within the defined campus area will be permitted to operate any motor vehicle unless given special permission by the Dean of Students in case of extreme hardship. No freshman or sophomore living within the defined campus area will be allowed campus parking privileges.

Any student (day, evening, graduate, or co-operative) who drives a vehicle to the campus must register it for either ON CAMPUS or OFF CAMPUS parking. ON CAMPUS registration will allow student parking in institutionally-owned areas. OFF CAMPUS registration will allow student parking in areas not institutionally controlled nor restricted.

An annual registration fee of $6.00 must be paid to register each vehicle for ON CAMPUS parking. This fee is applicable regardless of which quarter the vehicle is registered and will cover an entire academic year from September until registration the following September.

Freshmen and upperclassmen granted student parking permits are required to observe all parking regulations on the campus. The Georgia Institute of Technology reserves the right to limit in any way whatsoever the issuance of student parking privileges at the beginning of any quarter.

Physical Examinations
Entrance physical examination forms are mailed to students with the notice of their acceptance for enrollment. These forms are to be completed by the prospective student and his personal physician and mailed to the Director of Health in sufficient time to be received prior to the date of initial registration. After review of the medical history and physical examination report, the school physicians determine the assignments to ROTC and physical training. Any student who desires special consideration because of mental or physical disability should have his physician write an explanatory letter to the Director of Health.
giving full details of the disability and any desired limitations on physical activity. This letter is to be attached to the physical examination form. Any special examinations or reports needed to determine eligibility for enrollment or assignment are at the expense of the student, not the school. Any student who fails to submit the required physical examination and immunization record prior to registration will have the examination ordered by the school at the expense of the student.

**ROTC**

All male freshmen and sophomores, except aliens, veterans under G. I. Bill of Rights and other veterans with at least 12 months service since August 1947, and those physically unfit, are required to complete the basic Military, Naval or Air training on a college level. Successful completion of the course is a prerequisite to graduation. Students transferring to this institution with sophomore standing are required to take one year of ROTC and may elect a second year if desired. Newly entering students in Army and Air ROTC are required to purchase a new uniform from Georgia Tech.

Each applicant for formal enrollment in the basic course of the Air Force, Army or Navy ROTC shall be required to execute a Certificate of Loyalty Oath in such form as shall be prescribed by the Secretary of Defense.

Students who have successfully completed the basic course on a college level (senior division) and who are selected, may pursue the advanced course in the junior and senior years. However, not more than 9 hours of advanced ROTC may be used as elective credit towards a degree. Completion of the advanced course then becomes a requirement for graduation, unless the student is relieved of his contractual obligation by the Department of the Army, Navy, or Air Force.

A student who is exempt from the basic course or any part thereof must elect additional subjects not regularly included in his course and equalling in credit hours the ROTC work from which he is exempt. However, in no case must such a student elect more than six hours of additional subjects. Veterans with at least 6 months active duty may receive credit toward a degree for ROTC courses for which exempted.

For further details regarding the Army ROTC, see page 150, the Naval ROTC, see page 167, and for Air ROTC, see page 42.

**Selective Service Deferments**

Any student enrolled at the Georgia Institute of Technology, who is subject to the provisions of the Selective Service Act and who is called for induction during the academic year, is probably eligible for deferment from induction until the end of his academic year only or until such time as he is dropped from the rolls of the institution if that time is sooner.

A student who is qualified for and enrolled in the ROTC while matriculating at Georgia Tech may be deferred from induction until after his graduation provided he possesses certain qualifications and meets the prescribed requirements. Such an individual, if required to report for active duty, would report as an officer after having received his reserve commission through the ROTC.

Any student who is not eligible for the ROTC deferment may apply for a II-S deferment (student deferment) when he is classified or ordered for a physical by his local board.
Dormitory Accommodations

It is Institutional policy to require all single freshmen, men and women, who do not reside with their parents, near relatives, or bona fide guardians, to live in the dormitories. All Freshmen are given FIRST PRIORITY in making dormitory assignments, as follows:

1st Priority—Freshmen 4th Priority—Senior
2nd Priority—Sophomore 5th Priority—Night School Students and Co-ops on work period
3rd Priority—Junior

TRANSFER STUDENTS will be placed according to class status, as above. (Class status should not be taken for granted, as this is determined after credits have been evaluated by the Registrar's Office.) Sophomore classification requires 50 acceptable credit hours.

GRADUATE STUDENTS are placed in reserved sections of Matheson and Perry Dormitories. In addition, a limited number of single rooms are available for graduate students, on a first come—first serve basis, in Harrison and Howell Dormitories.

FRESHMEN and SOPHOMORE dormitories consist of BROWN, CLOUDMAN, GLENN, HARRIS, HARRISON, HOWELL, SMITH, and TOWERS, rent is $75.00 per quarter. (Limited number single rooms in Harrison and Howell reserved for Graduate Students.) TECHWOOD is reserved for students in the Co-operative Plan — rent is $75.00 per quarter. Junior and Senior dormitories (all double rooms) consist of FIELD, HANSON, HOPKINS, MATHESON and PERRY, rent is $85.00 per quarter. (One section of Matheson and Perry Dormitories reserved for Graduate Students.)

Each Georgia Tech dormitory is staffed with: a mature Graduate Student as Resident Advisor, who is assisted by a Senior Counselor and a staff of upperclass Student Counselors, who advise and counsel student residents. The dormitory organization and operation is intended to express the individual student's personal responsibility for the development of social competence, the values of group living and practice in democratic processes, the elevation of scholastic standards and the fostering of a high academic atmosphere.

The Dormitories provide housing for 2,742 students. Most of the rooms accommodate two students. There are a few three-man rooms, also some four-man rooms consisting of two connecting rooms. Students are encouraged to indicate their roommate preference and it is usually possible to grant such requests. However, your application is for accommodations in the Dormitories and NOT for a specific room or roommate.

Changes between dormitories are not permitted after registration day. However, room changes may be made within the dormitory, to which assigned PROVIDED the change has been APPROVED by the Resident Advisor of that dormitory and then officially arranged in the Housing Office BEFORE the change is made.

All rooms are equipped with beds, study desks, dressers, clothes locker, book cases, chairs, mirrors and waste baskets. The student should provide himself with a mattress pad or cover, blankets, bedspreads, sheets (39” fitted), pillow and pillow cases, towels, and a good study lamp.

Dormitory regulations prohibit the installation and use of such electrical appliances as hot-plates, toasters, irons, coffee makers, heaters, radio transmit-
itors and television. The only electrical appliances permitted are electric razors, radios, clocks and a fan not to exceed 2.5 amp. power rating.

DORMITORY APPLICATIONS should be sent to the Controller's Office. The Registrar will supply the necessary blank when you receive your Notification of Acceptance.

A $25.00 Room Deposit (in addition to the admission deposit mentioned on page 28) must be returned with the dormitory application. No dormitory application will be honored except when accompanied by the required deposit. This deposit may be refunded at the end of the school year, or at such time a student leaves school, provided the resident checks out properly, the key is returned, and there is no damage for which a resident is responsible. The refund must be requested, it is not automatically refunded.

ASSIGNMENTS: Dormitory Room Assignments are mailed a minimum of forty (40) days prior to the first day of registration, for the quarter applied for. Those applying after the beginning of this 40-day period, will receive a room assignment, as available, and be held responsible for acceptance. If it is too late to mail the assignment, it may be secured at the Housing Office upon arrival at Tech.

THE HOUSING OFFICE will send instructions as to shipment of baggage and other information with the ROOM ASSIGNMENT.

CANCELLATIONS: If, for any reason, the Dormitory application, or an assignment to a room, is to be cancelled, it should be done as soon as possible. If Notification of Cancellation is not received in the HOUSING OFFICE at least thirty (30) days prior to the first day of registration, the $25.00 Room Deposit is forfeited.

A receipt for the key and security deposit will be promptly returned to the student, along with helpful preliminary instructions. Dormitory keys are issued at the Key Office in Smith Dormitory.

DORMITORY RENT is payable as follows:
(a) On or before the last day of scheduled registration, for assignments made before the beginning of a quarter, unless otherwise indicated on assignment notice.
(b) Within two (2) days from date the room is assigned (when assignment is made after the beginning of a quarter).

A penalty fee will be charged for failure to pay rent on or before the last date due. The penalty fee will be five dollars ($5.00) for the first day following the date due, and one dollar ($1.00) for each of the next three days, the total not to exceed eight dollars ($8.00).

Students who fail to pay their room rent, including penalty fees, according to the conditions in above paragraphs (a) and (b), will be reported to the proper authority for disciplinary action, four days after the deadline stated in the notice of assignment.

Residents once having paid rent, will receive no refund of room rent should they decide to move from the dormitories during any given quarter, UNLESS disenrolling from school in good standing.

COED DORMITORY ACCOMMODATIONS: The Girls' Dormitory, located at 171 Fifth St., N. W., has six bedrooms, two baths, a large living room and a study room. Quarterly rent is $90.00. The housemother lives in the dormitory at all times, and she will make your room assignment upon your arrival.
The $25.00 deposit is refundable upon request at the end of the school year, or at such time a student may leave school, provided the key is turned in and there is no damage for which she is responsible.

Any student who withdraws from school and is in good academic and disciplinary standing should receive a dormitory rent refund in accordance with the Institution tuition refund policy.

Any student who moves from a dormitory to an apartment, fraternity house, private home, or is removed from the dormitory for disciplinary reasons, or leaves the Institution without proper notification should not receive a room rent refund and should forfeit his room deposit.

Apartments
The school has approximately 220 apartments for married students. These apartments range in size from efficiency to three-bedroom units and in monthly rental from $50.50 to $94.25. Detailed information and the apartment application blanks will be supplied upon request to the Housing Office. It is not necessary to be accepted as a student before application may be made. As apartments are vacated they are reassigned according to the date of application in the following order: 1. Freshmen, 2. Sophomores, 3. Juniors, 4. Seniors, 5. Graduate Students.

Brittain Dining Hall
Cafeteria style food service is offered at Brittain Dining Hall. Here you have a wide choice of foods. The cost of the meal is determined by the items and quantity selected.

The "T" Room and O.D.K. Room are open for lunch and dinner with restaurant-style food service. A great many students prefer this relaxed dining atmosphere.

The students at Georgia Tech are at liberty to choose or reject any of these food services. Brittain Dining Hall is operated by the school on a non-profit basis solely for the benefit and convenience of the students.

Public Relations and Placement
The Department of Public Relations is a service organization handling public relations, placement, press relations and publications.

For the benefit of the seniors and graduate students, continuous contact is maintained with industrial concerns throughout the nation. An accurate knowledge of the personnel needs of these industries enables this office to be of great assistance in placing students upon their graduation. Many industries send representatives to the Georgia Tech campus for individual interviews. A similar service is provided for alumni who desire to change positions.

The Office of Publications is responsible for publishing all official publications of the Institute including the Engineering Experiment Station.

Other Information
Class Attendance: Students are expected to attend all of the classes on their official schedules unless exemptions are granted under specific provisions of the Student Rules and Regulations. Students may be dropped from the class rolls in any course when they neglect their studies to the extent that they can-
not possibly earn credit in the course. No fees are refunded under such circumstances.

Examinations and Grade Reports: Final examinations are scheduled during the last week in each quarter and reports of the student's academic progress are issued after the close of the quarter.

Constitution and History Examinations: A Georgia law, amended March 4, 1953, requires all students to pass examinations on United States and Georgia history and the United States and Georgia constitutions or pass comparable courses before graduation. Courses which may be substituted for the United States and Georgia constitutions examination are S.S. 113 or S.S. 323; courses which may be substituted for the United States and Georgia history examination are: S.S. 319, S.S. 324, S.S. 325, S.S. 327, or S.S. 328.

Limitations on credit for ROTC courses: Twelve (12) quarter hours in Basic ROTC courses and nine (9) quarter hours in Advanced ROTC courses is the maximum credit allowed toward meeting the requirements for any degree.

Grading System:
A—excellent (4 quality points)
B—good, above average (3 quality points)
C—satisfactory (2 quality points)
D—unsatisfactory, but passing (1 quality point)
F—failure, must be repeated if in a required course (no quality points)
S—Credit by transfer, examination for advanced standing, or satisfactory completion of a non-credit course (not included in calculation of scholastic average).

A grade of D is passing in a single subject but a general average of C is required for graduation.

More detailed information regarding the academic regulations of the Institute is contained in the handbook of student rules and regulations which is available to all students in the Public Relations Office.

Curricula
In the following pages there will be found in alphabetical order a tabulation of the work required for degrees in the curricula offered by the Georgia Institute of Technology.

At least 24 credit hours of humanities and social science must be included in all curricula leading to an undergraduate degree. The following courses have been approved as meeting this requirement:


I.M. 201, 202, 203, 204, 486, 487, 490.
Music 201, 202, 203.
Psy. 303, 304, 402, 410.

From time to time additional courses may be added to this list.
School of Aerospace Engineering
(Daniel Guggenheim School of Aeronautics)
(Established in 1930)


General Information
The School of Aerospace Engineering includes the Daniel Guggenheim School of Aeronautics that was established in 1930, by a gift from the Guggenheim Foundation, to establish opportunities at the Georgia Institute of Technology for study and research of the highest order in the field of aeronautics. The inclusion of space in the name indicates the broadening of the school’s activities into this area. The scope of the work extends from the field of hydrodynamics to the area of rarified gasdynamics and the design of vehicles to operate in the oceans, in the air, or in outer space. The rapidly expanding fields of aircraft and missile aerodynamics; high temperature phenomena both in the gasdynamics field and the structural dynamics and materials field; propulsion; and aircraft, missile and space vehicle design make the courses in aerospace engineering especially significant.

The number of students accepted as candidates for the Aerospace Engineering degree is limited. The selection will be made at the beginning of the junior year on the basis of the student’s ability as demonstrated during his previous two-years’ work.

Satisfactory completion of the four-year curriculum leads to the degree Bachelor of Aerospace Engineering. Students with marginal background preparation will probably find it necessary to spend more than twelve quarters. It is usually possible for applicants who already possess the degree of Bachelor of/or Bachelor of Science in Mechanical, General, Electrical, or Civil Engineering to complete the additional work toward the degree of Bachelor of Aerospace Engineering in one additional year if they so desire.

The School offers work leading to both the Master of Science degree and the Doctor of Philosophy degree and these programs prepare the student for research, high-level design, or teaching.

Equipment
The School of Aerospace Engineering is well equipped for offering laboratory work to augment and lend interest to the theoretical courses. Most of this equipment is also suitable for research projects conducted by graduate students and members of the staff. The School is housed in three buildings; a three-
story structure, erected in 1930; a one-story temporary annex, completed in 1947; and a new two-story permanent annex, completed in 1957. The principal building contains, in addition to classrooms and offices, a nine-foot wind tunnel, a two- and a half-foot wind tunnel, an instrument laboratory, a dark room, a large drafting room, and structural exhibit room for the use of design students, and a reference library on aerospace subjects. The annex houses the School’s own machine and wood-working shop, in which all its models and special apparatus for research and routine programs are constructed; an aircraft structural testing laboratory, containing electric strain-gauge equipment, a fatigue testing machine, and a special universal testing machine; a low turbulence wind tunnel. The permanent annex houses the expanded compressible flow laboratory including a water table, smoke flow tunnel, supersonic wind tunnel, and the associated air compressors, dryers and storage tanks.

Freshman Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
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<td>Chem. 101-2-3</td>
<td>Inorganic Chemistry</td>
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<td>Draw. 113-14-15</td>
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<td>Eng. 101-Z</td>
<td>Composition and Rhetoric</td>
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<td>Eng. 105</td>
<td>Introduction to Literature</td>
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<td>Math. 100</td>
<td>Algebra and Trigonometry</td>
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<td>Analytical Geometry and Calculus</td>
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<td>M.L. *</td>
<td>Modern Language OR</td>
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<td>S.S. 111-12-13</td>
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<td>Gen. 101</td>
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Totals 18-14-20 17-14-20 17-14-20

NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit. Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish. Three quarters of either M.L. or S.S. are required. A student having had two years of language in high school and wishing to continue work in this language must schedule courses in the 200 series. **For course numbers, see the course descriptions under the appropriate ROTC sections in this Bulletin.

Sophomore Year

<table>
<thead>
<tr>
<th>Course No.</th>
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<td>A.E. 322</td>
<td>Aerodynamics of the Airplane</td>
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<td>Eng. 201-2-3</td>
<td>Survey of the Humanities</td>
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<td>Math. 202-3</td>
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<td>Math. 304</td>
<td>Differential Equations</td>
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<td>M.E. 207</td>
<td>Engineering Materials and Processes</td>
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<td>Mech. 305</td>
<td>Statics</td>
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<td>Phys. 207-8-9</td>
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<td>P.T. 201-2-3</td>
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Totals 18-11-20 19-8-20 19-8-20

*For course numbers, see the course descriptions under the appropriate ROTC sections.
### Junior Year

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<tr>
<td>A.E. 325</td>
<td>Aero and Hydro Mechanics</td>
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<tr>
<td>A.E. 331</td>
<td>Theory of Structures I</td>
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<td>3-0-3</td>
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<tr>
<td>A.E. 421</td>
<td>Aerodynamics—Elementary Supersonics</td>
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<tr>
<td>A.E. 424</td>
<td>Aerodynamics—Perfect Fluids</td>
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<td>A.E. 430</td>
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<tr>
<td>E.E. 325</td>
<td>Electric Circuits and Fields</td>
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<td>E.E. 326</td>
<td>Elementary Electronics</td>
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<td>Math. 412</td>
<td>Advanced Engineering Mathematics</td>
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<td>Math. 443</td>
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<td>M.E. 322-23</td>
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<td>Mech. 308</td>
<td>Dynamics</td>
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<td>Phys. 319</td>
<td>Modern Physics for Engineers</td>
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### Senior Year

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<tr>
<td>A.E. 323</td>
<td>Aerodynamics of the Airplane II</td>
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<td>A.E. 428</td>
<td>Experimental Methods</td>
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<td>A.E. 435-37</td>
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<td>Mech. 421</td>
<td>Mechanical Vibrations</td>
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<td>Electives *</td>
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<td>3-0-3</td>
<td>6-0-6</td>
<td>9-0-9</td>
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<tr>
<td>Totals</td>
<td></td>
<td>12-12-16</td>
<td>14-12-18</td>
<td>14-6-16</td>
</tr>
</tbody>
</table>

*NOTE: 1) At least 6 hours must be in the Humanities. See list on p. 34.
2) Not more than 9 hours of ROTC may be counted.
3) At least 9 hours must be selected from A.E. Electives list.
4) Remaining hours are free electives.
Courses of Instruction

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

A.E. 322. Aerodynamics of the Airplane I.
3-0-3. Prerequisites: Math. 203 and Physics 209 or concurrently.

Applied aerodynamics including properties of air, airfoil theory, Reynolds Number, airfoil characteristics, induced drag and downwash, aspect ratio corrections, effects of wing platform, and auxiliary lift devices.

A.E. 323, Aerodynamics of the Airplane II.

Drag; horsepower; basic performance; special performance problems; load factors and maneuvers; compressibility effects.

A.E. 325. Aero and Hydro Mechanics
3-0-3. Prerequisites: A.E. 322 or consent of instructor; Math. 412 or concurrently.

Fluid mechanics, hydrodynamics, including continuity, circulation and curl, irrotational flow, velocity potential, vortex theorems, Euler equations, momentum theory, Bernoulli equation.

A.E. 331. Theory of Structures I.

Basic theory of aircraft and missile structural design including: a review of plane stress and strain theory; loads, shears, and moments in wings and fuselages; inertia loads and load factors; section properties of aircraft components, space structures; bending of beams; materials properties and testing.
Text: Peery, *Aircraft Structures; Mil HNBK-5.* Staff.

A.E. 401-23. Aeronautical Research
I, II, III.
0-9-3. Prerequisites: Third Quarter Junior or Senior Standing and approval of A.E. School Director.

A clearly stated program prepared by the student describing in detail the nature, purpose and scope of the proposed problem, carrying the endorsement of the sponsoring A.E. staff member, must be submitted to the A.E. School Director for approval. Library, experimental, or theoretical work will be considered.
Text: None. Staff.

A.E. 410. Thermal Stresses
3-0-3. Prerequisites: A.E. 435, or consent of instructor.

Origin of thermal stress; external constraints; determination of temperatures—the heat transfer problem; fundamental equations of uncoupled isotropic thermoelasticity; some solutions of typical thermoelastic problems; properties of materials at high temperatures; problems in creep analysis.

A.E. 415. Missile Aerodynamics

The aerodynamics of airborne missiles including slender body theory at subsonic and supersonic speeds. Wing-body-tail interference and extended study of drag with particular application to slender body configurations. Mathematical methods and general formulas are emphasized.
Text: None. Staff.
A.E. 419. Hypersonic Flow
3-0-3. Prerequisite: A.E. 421.

General flow equations, the hypersonic similarity law; slender body theory; approximate methods; methods using shock and simple wave relations; leading edge bluntness effects.

A.E. 421. Aerodynamics—Elementary Supersonics
3-0-3. Prerequisite: A.E. 325, M.E. 323.

The equations of motion, energy and continuity, thermodynamic principles, one-dimensional flow. Mach waves, shock waves, Prandtl-Meyer flow.

A.E. 424. Aerodynamics—Perfect Fluids
5-0-5. Prerequisites: A.E. 325, Math. 412.

Flow about a body; finite thickness airfoils and three-dimensional wing theory; complex variable theory; conformal mapping and transformations.

A.E. 426. Viscous Flow
3-0-3. Prerequisites: A.E. 421, A.E. 430.

A study of the momentum and energy equations as applied to viscous flows with applications. Boundary layer equations with applications.

A.E. 428. Experimental Methods

The methods, equipment, and instrumentation used in experimental aerospace engineering. The technique of recording and interpreting experimental data from selected laboratory tests is emphasized.
Text: None. Staff.

A.E. 430. Theory of Structures II
3-3-4. Prerequisites: A.E. 331, Math. 412.

Stress relations for an arbitrary continuous body; strain-displacement and compatibility relations; introduction to the theory of isotropic elasticity; strain gauges and strain measurements; illustrative elasticity solutions for beams; application to thin sheet-stringer aircraft structures; shear centers; unsymmetrical bending; tapered sections; shear flows in closed box beams.

A.E. 435. Theory of Structures III
3-3-4. Prerequisite: A.E. 430.

General discussion of strain energy in elastic structures; application to rods, webs, beams, and shafts; virtual work and generalized virtual work; structural deflections by virtual work, Rayleigh-Ritz, and double integration; introduction to stability analysis; use of energy methods; long and short columns; elastic and plastic buckling of plates; the pure tension field beam; the semi-tension field beam.

A.E. 437. Theory of Structures IV
3-3-4. Prerequisite: A.E. 435.

Statically indeterminate structures by energy methods and special methods; torsion on multicell sections; elastic axis of multicell sections; elastic axis of wing sections, warping of box beams; correlation of theory and practice by experiments in laboratory.

A.E. 439. Advanced Structures
3-0-3. Prerequisites: A.E. 435.

Detailed study of beam columns, shear webs with cut-outs; shear lag, bending in the plastic range; miscellaneous thin metal structural problems.

**A.E. 440. Airplane Design I.**

Design of stressed skin type airplane in accordance with the U. S. Civil Aeronautics Administration or Air Force requirements including a stress analysis for several important loading conditions. Three view, weight and balance, performance report, and structural loading report. Text: *Lecture notes*. Staff.

**A.E. 441. Airplane Design II.**

Continuation of A.E. 440 to a stress of the basic wing components. Text: *Lecture notes; Mil HNBK-5*. Staff.

**A.E. 442. Airplane Design III.**
0-9-3. Prerequisites: A.E. 441 and A.E. 437.

Continuation of A.E. 441 to unit and critical loadings on other parts of the structure. Text: *Lecture notes; Mil HNBK-5*. Staff.

**A.E. 456. Vibration and Flutter**


**A.E. 457. Static and Dynamic Stability**


**A.E. 467-468. Seminar**

Scheduled meetings at which individual students present technical papers on important current aeronautical developments, the reading of each paper being followed by group discussion. Text: None. Staff.

**A.E. 471. Internal Aerodynamics**
3-0-3. Prerequisites: A.E. 421.


**A.E. 473. Introduction to Propeller and Rotor Theory**
3-0-3. Prerequisites: A.E. 323.

A study of the theory and equations used in the design of propellers and helicopter rotors. Text: None. Staff.

**A.E. 481. Jet Propulsion**
3-0-3. Prerequisite: A.E. 471.


**A.E. 482. Jet Propulsion and Rocketry**
3-0-3. Prerequisite: A.E. 481.

Continuation of A.E. 481. Component matching and off-design performance of air-breathing, jet-propulsion engines, Rocket engine performance characteristics. Rocket multi-staging principles and the dy-
Aircrafts and orbital motion. Text: To be selected. Staff.

A.E. 495. Engineering Analysis

Introduction to programming for digital computer; numerical analysis for digital computation; problem solution on an analog computer; applications to problems in aerospace engineering. Students have the opportunity to work with both analog and digital computers.

Text: Notes. Staff.

Graduate Courses Offered

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.E. 615</td>
<td>Kinetic Theory of Gases</td>
<td>3-0-3</td>
</tr>
<tr>
<td>A.E. 621</td>
<td>Elements of Viscous Fluid Theory</td>
<td>3-0-3</td>
</tr>
<tr>
<td>A.E. 622</td>
<td>Elements of Compressible Flow Theory</td>
<td>3-0-3</td>
</tr>
<tr>
<td>A.E. 630</td>
<td>Elasticity</td>
<td>3-0-3</td>
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<tr>
<td>A.E. 631</td>
<td>Advanced Structural Analysis I</td>
<td>3-0-3</td>
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<tr>
<td>A.E. 632</td>
<td>Advanced Structural Analysis II</td>
<td>3-0-3</td>
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<td>A.E. 633</td>
<td>Advanced Structural Analysis III</td>
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<td>A.E. 634</td>
<td>Advanced Structural Analysis IV</td>
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<td>A.E. 635</td>
<td>Advanced Structural Analysis V</td>
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<td>A.E. 657</td>
<td>Aerodynamics of Aeroelasticity</td>
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<td>A.E. 659</td>
<td>Structural Dynamics of Aeroelasticity</td>
<td>3-0-3</td>
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<td>A.E. 676</td>
<td>Aerodynamics of the Helicopter I</td>
<td>3-0-3</td>
</tr>
<tr>
<td>A.E. 677</td>
<td>Aerodynamics of the Helicopter II</td>
<td>3-0-3</td>
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<td>A.E. 680</td>
<td>Rocket Propulsion Principles I</td>
<td>3-0-3</td>
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<td>A.E. 682</td>
<td>Jet Propulsion Principles</td>
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<td>A.E. 683</td>
<td>Rocket Propulsion Principles II</td>
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<td>A.E. 684</td>
<td>Rocket Propulsion Principles III</td>
<td>3-0-3</td>
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<td>A.E. 690</td>
<td>Aerospace Engineering Analysis I</td>
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<td>A.E. 691</td>
<td>Aerospace Engineering Analysis II</td>
<td>3-0-3</td>
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<tr>
<td>A.E. 692</td>
<td>Aerospace Engineering Analysis III</td>
<td>3-0-3</td>
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<td>A.E. 700</td>
<td>Master's Thesis</td>
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<tr>
<td>A.E. 704, 5, 6</td>
<td>Special Problems in Aerospace Engineering</td>
<td>(Credit to be arranged)</td>
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<tr>
<td>A.E. 710</td>
<td>Aerodynamic Heating</td>
<td>3-0-3</td>
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<tr>
<td>A.E. 715</td>
<td>Flow of Rarefied Gases</td>
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<td>A.E. 717</td>
<td>Three-Dimensional Vortex Theory</td>
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<td>A.E. 718</td>
<td>Turbulent Flow</td>
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<td>Hypersonic Flow Theory</td>
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<td>Advanced Viscous Flow Theory</td>
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<tr>
<td>A.E. 725</td>
<td>Introduction to Theory of Turbulence</td>
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<td>A.E. 726</td>
<td>Advanced Compressible Flow Theory I</td>
<td>3-0-3</td>
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<tr>
<td>A.E. 729</td>
<td>Advanced Compressible Flow Theory II</td>
<td>3-0-3</td>
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<td>A.E. 755</td>
<td>Applied Aeroelasticity</td>
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<tr>
<td>A.E. 800</td>
<td>Doctor's Thesis</td>
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Department of Air Science
(Established in 1950)

Commandant and Professor of Air Science—Lt. Colonel Alexander K. Johnson; Assistant Professors—Major William A. Howington, Major Joseph L. McCarter, Major Wallace C. Ryan, Captain George R. Fessler, Jr., Captain Harold W. Holady, Jr., Captain Gordon J. Milliken; Staff—Master Sergeant Howard W. Voigt, Technical Sergeant Herbert H. Davis, Staff Sergeants, Robert C. Daniel, Jere L. Lewis, James B. Pollan, Paul M. Richardson; Mrs. Elizabeth W. Cerulli, Secretary.

Air Force Reserve Officers' Training Corps
The Department of Air Science was established in 1950 to select and prepare students, through a permanent program of instruction, to serve as officers in the Regular and Reserve components of the United States Air Force. The department also assists in discharging the institution's obligation to offer instruction in military training.

The curriculum emphasizes the uniformly high level of military understanding and knowledge required to all junior Air Force officers. Four years are required to complete the course of instruction; two years for the basic course and two for the advanced course. Satisfactory completion of the basic course is a prerequisite for entry into the advanced, except that honorably discharged veterans of six to twelve months service may be given credit for one year of the basic course, all those who have had over one year of service may be given credit for the entire basic course. Students who have satisfactorily completed three years of high school Army ROTC may be given credit for the laboratory portion of the first year basic AFROTC.

The Advanced Course
Enrollment in the advanced course is by selection. Applicants must: (1) be able to fulfill all requirements for a commission prior to their 28th birthday; (2) have two years of academic training remaining in order to obtain a degree; (3) sign a written contract agreeing to complete the course; (4) be a citizen of the United States; (5) pass certain screening tests; (6) pass the officer physical examination; (7) terminate membership (if member) in any Reserve organization other than the Air Force Reserve; and finally (8) be accepted by a board of Air Force officers.

Advanced course cadets receive a monetary allowance for subsistence amounting to about $550 for the course. This is in addition to the pay received at summer training (between the junior and senior year), about $78. Cadets going to summer training receive compensation for traveling expenses for the round trip to an Air Force Base at five cents per mile. Cadets at summer training are furnished food, housing, uniform, medical and dental care.

Completion of the advanced course, including summer training and receipt of a college degree makes a cadet eligible for a commission as a second lieutenant in the United States Air Force Reserve. Cadets receiving commissions will be ordered to active duty shortly after graduation. The active duty requirement for those who enter and satisfactorily complete pilot training is four years after graduation from the flying school. For others, the requirement is four years after initial call to active duty.
Students who have successfully completed the basic course and who are selected for further training may enroll in the advanced course. The advanced course is a recognized elective in all departments at Georgia Tech to the extent that nine hours of credit may be applied toward a degree providing the entire advanced course is completed. If the student does not complete the entire advanced program, ROTC credits may not be used as electives unless the student has been relieved of his contractual obligations by the Secretary of the Air Force.

**Uniforms**

The Air Force ROTC uniform is identical to the regulation Air Force uniform except for insignia, thus it may be worn on active duty with the Air Force after completion of Air Force ROTC.

Newly entering students in the Air Force ROTC are required to purchase a new uniform through Georgia Institute of Technology. The cost for the basic uniform is approximately $75.00. The advanced uniform costs $108.00.

A cadet receives reimbursement for the basic uniform while he remains enrolled in AFROTC at Georgia Tech. Upon completion of Freshman year he receives $25, and Sophomore year an additional $25.

A cadet who transfers to another institution prior to completion of the basic course will be governed by the gaining institution's uniform system as to whether or not he will receive reimbursement for the remainder of the basic course.

An additional $100 allowance is provided for the advanced cadet upon his completion of the course or upon discharge without prejudice.

**Texts**

Textbooks are furnished by the Air Force (except for those subjects of the regular curriculum which may be substituted in lieu of Air Force subjects).

**Grading System**

Letter grades are awarded as in other departments. However, the grade is not based entirely on classroom recitations, oral or written, but includes aptitude and ability as a leader during leadership laboratory periods. A cadet's potential value as a leader is demonstrated to an important degree by his response to the entire scope of military instruction and military procedure, as portrayed by his interest, conduct, alertness, neatness, attendance and similar related matters. Final grades for each quarter will be based on evidence of those attributes combined with his academic standing.

**Academic Credit**

Academic credit is granted for the completion of Air Science courses as indicated in the sections that follow, however, not more than 9 hours in Advanced AFROTC courses may be applied toward a degree.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Basic 1st year</th>
<th>Basic 2nd year</th>
<th>Advanced 1st year</th>
<th>Advanced 2nd year</th>
<th>Credit Hrs.</th>
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<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td></td>
<td></td>
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<td></td>
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</table>
Courses of Instruction

NOTE: 2-1-2 means 2 hours class, 1 hour laboratory, 2 hours credit.

BASIC COURSE


A.S. 131—Laboratory
0-1-0.

Basic instruction and practice in military formation and drills. No outside preparation is required and no quizzes will be given. The grade of “S” will be given for satisfactory completion.

A.S. 132—Laboratory
0-1-0.

Continuation of A.S. 131 and in addition instruction and practice in parades, reviews and ceremonies. No outside preparation is required and no quizzes will be given. The grade of “S” will be given for satisfactory completion.

A.S. 133—Aerospace Power and its Vehicles
2-1-2.

A brief introduction to Air Force ROTC followed by study of the fundamentals of air power, to include military air power, research and development, civilian air industries, airlines and airways, and general aviation. The basic elements of aircraft and space vehicles are covered, with emphasis on theories of aerodynamics, guidance and propulsion.


A.S. 231—Free World Land, Naval, and Air Force
2-1-2.

A comparison of the mission, organization, functions and characteristics of the land, naval, and air forces of the free world.

2-1-2.

A study of the mission, organization, functions and characteristics of Communist land, naval, and air forces. Exploration of the trends in the development and employment of military power and their impact on world affairs.

A.S. 233—Laboratory
0-1-0.

Continuation of previous laboratory work and in addition training in leadership, military customs and courtesies to develop cadet officers who can be given command responsibility for the administration and operation of the Cadet Wing during Advanced ROTC. No outside preparation is required and no quizzes will be given. The grade of “S” will be given for satisfactory completion.

NOTE: Before being eligible for the Advanced Course, each student must satisfactorily complete Air Science I and II. In addition, he must satisfactorily complete any two of the following courses during his Freshman year and one of the remaining courses during his Sophomore year: S.S. 111, 112, 113, Modern Languages, Eng. 101, 102, 103, 105, 131, 132, 133, 201, 202, and 203.

ADVANCED COURSE —

AIR SCIENCE III — The Growth and Development of Aerospace Power.

A.S. 311—Growth of U.S. Aerospace Power
4-1-3.

A detailed study of the nature of war with emphasis on the Air Force role. Mission and Organization of the Department of Defense; development of Air Power in the United States; the Air Force mission, concepts, doctrine and employment.

A.S. 312—Astronautics and Space Operations—1
4-1-3.

The national organization for the conduct of space operations. Division
of responsibilities and the joint responsibilities between the NASA and the Air Force with regard to the designs, development, and operation of space vehicles.

A.S. 313—Astronautics and Space Operations—2
4-1-3.
Characteristics of present day systems including the vehicle and associated ground support equipment. Concepts of space operations and their application to future aerospace power.

AIR SCIENCE IV—Global Relations.
A.S. 411—Weather and Navigation
4-1-3.
Operational factors encountered in flight; Command positions in leadership laboratory.

A.S. 412—International Relations
(See A.S. 422 and S.S. 347 below, given in lieu of A.S. 412)

A.S. 422—Laboratory
(Must be scheduled concurrently with Social Science 347)
0-2-0.
Air Force exercises designed to train senior cadets to perform as Commanders, staff officers, instructors, and supervisors, and to gain extensive understanding of the organization of the Air Force. No outside preparation is required and no quizzes will be given. The grade of “S” will be given for satisfactory completion.

S.S. 347—Foundations of National Power and International Relations
3-0-3. Prerequisites: Junior and Senior standing.

This course is designed to acquaint the student with the United States' power position in world affairs, relative to that of other powers, and with the events in the world today which have an impact on that position. International relations are emphasized. Text for S.S. 347: Haas and Whiting, Dynamics of International Relations.

A.S. 413—Military Aspects of World Political Geography; The Air Force Officer (Briefing for Commissioned Service)
4-1-3.
The relationship of geographical factors to national strength and national policy. Preparation for active duty as an officer.
School of Applied Biology

(Established 1960)

Director—Robert S. Ingols; Professor-emeritus—Hugh A. Wyckoff; Professor—Thomas W. Kethley; Associate Professors—Allen B. Eschenbrenner, Robert Fetner, Peter E. Gaffney, Carlyle J. Roberts; Assistant Professors—Hong Min, Evan Dwain Porter, Nancy W. Walls; Instructor—Ralph E. Sharp; Secretary—Mrs. Norma W. Trudel.

General Information

The purpose of the School of Applied Biology is principally to prepare students for a career in Biology with emphasis on the basic sciences and applications of Biology. The Biology courses in the curriculum stress the functioning of organisms as dynamic systems and the physical and chemical changes resulting from interaction with their environment. The intensity of the biological studies coupled with a broad background in the other sciences prepares the graduates for professional careers in Biology with employment opportunities in government (Public Health, or related medical fields, agriculture, space systems, food and drug) or in industry (pharmaceutical, food, fermentation).

Completion of the curriculum with the degree of Bachelor of Science in Applied Biology also prepares students who wish to continue their studies in graduate schools in advanced biological specialties or in medicine. Pre-Medical students have the guidance of a special committee of the faculty.

The School also offers programs leading to the Masters Degree in Public Health or Public Health Engineering.

Since the faculty are actively engaged in research in such fields as radiobiology, cytology, microbiology, aerobiology, limnology, waste treatment, and water pollution, student majors will be encouraged to realize the challenges and opportunities in these and related areas of interest.

In addition, the courses in the Biology curriculum are offered as an integral part of the broad technical background of students in the other sciences or engineering curricula at Georgia Tech.
## Curriculum in Applied Biology

### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
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<tr>
<td>Chem.</td>
<td>101-2-3</td>
<td>General Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<td>Draw.</td>
<td>113</td>
<td>Engineering Graphics</td>
<td>0-6-2</td>
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<tr>
<td>Eng.</td>
<td>101-2</td>
<td>Composition and Rhetoric</td>
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<td>Eng.</td>
<td>105</td>
<td>Introduction to Literature</td>
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<tr>
<td>Math.</td>
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<td>Algebra-Trigonometry</td>
<td>5-0-5</td>
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<tr>
<td>Math.</td>
<td>104</td>
<td>Analytical Geometry-Calculus</td>
<td>5-0-5</td>
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<tr>
<td>Math.</td>
<td>201</td>
<td>Calculus</td>
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<td>M.L.</td>
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<td>Modern Language or</td>
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<td>S.S.</td>
<td>111-12-13</td>
<td>Social Science</td>
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<td>Physical Training</td>
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<td>3-1-2</td>
<td>3-1-2</td>
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<tr>
<td>Gen.</td>
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<td>Orientation</td>
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</table>

**Totals**: 18-14-20 17-8-18 17-8-18

**NOTE**: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish. Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language in college must schedule courses in the 200 series.

**For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
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<tbody>
<tr>
<td>Bio.</td>
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<td>Introduction to Biology</td>
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<td>Phys.</td>
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<td>Physics</td>
<td>5-3-6</td>
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**Totals**: 16-17-20 16-17-20 17-15-20

*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

### Junior Year

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<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
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<th>2nd Q.</th>
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<tr>
<td>Bio.</td>
<td>407</td>
<td>Bacteriology or</td>
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**Totals**: 12-9-19 12-9-19 11-16-23

*At least six quarters of Modern Language and/or Social Science shall be taken during Freshman and Junior year.

**Not more than 9 hours of Electives in the Junior and Senior Years may be advanced ROTC. The remaining electives must be chosen from acceptable courses in Biology, Mathematics, Physics, Chemistry, Chemical Engineering, or Civil Engineering. The courses must be chosen in conference with a staff advisor to provide a sequence or group of courses which is interrelated to a specific field of interest.
Senior Year

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<td>9-9-19</td>
<td>6-6-18</td>
<td>8-9-18</td>
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*Not more than 9 hours of Electives in the Junior and Senior Years may be advanced ROTC. The remaining electives must be chosen from acceptable courses in Biology, Mathematics, Physics, Chemistry, Chemical Engineering, or Civil Engineering. The courses must be chosen in conference with a staff advisor to provide a sequence or group of courses which is interrelated to a specific field of interest.

Courses of Instruction

**NOTE:** 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

**Bio. 201. Introduction to Biology**
3-3-4. Prerequisite: None.
Fundamental principles and theories of biology. Study of cells and the plant kingdom.

**Bio. 202. Introduction to Biology**
3-3-4. Prerequisite: Bio. 201.
Study of invertebrate and vertebrate animal forms.

**Bio. 203. Comparative Anatomy**
Study of the comparative anatomy of the vertebrates with laboratory dissection of several vertebrate forms.
Text: To be selected. Staff.

**Bio. 204. Introduction to Biology**
A review of animal physiology and the various disciplines in Biology.

**Bio. 307. General Bacteriology**
3-4-4. Prerequisite: Bio. 201.
An elementary course to familiarize the student with the characteristics of bacteria and their relation to disease and sanitation, and the place they occupy in everyday life.

**Bio. 316. Industrial Hygiene**
3-0-3. Prerequisite: None.
Problems of health in industry; industrial poisons, occupational hazards and diseases, industrial fatigue, ventilation, and accident prevention.
Text: Cannon, *Outline of Industrial Hygiene*.
References. Mr. Eschenbrenner.

**Bio. 333. Biostatistics**
3-3-4. Prerequisites: Math. 201, Bio. 204.
An introduction to statistical methods and their use in the preparation and interpretation of biological experiments.

Mr. Kethley.

**Bio. 334. Genetics**
3-3-4. Prerequisite: Bio. 333 or consent of instructor.
The effect of hereditary units in dynamic interplay with the environment on the development and function of organisms.
Text: Srb and Owens, *General Genetics*.

Mr. Fetner.

**Bio. 407. Advanced Microbiology**
3-4-4. Prerequisite: Bio. 307, Chem. 341.
Advanced discussion and laboratory procedures in Mycology, Virology, and bacterial Physiology.

Text: To be selected. Mr. Gaffney.

Bio. 411. Sanitation
3-0-3. Prerequisite: Bio. 307.
The principles of sanitation, water supplies, sewage and refuse disposal, food sanitation and inspection methods.

Bio. 413. Air and Water Pollution
An introduction to the technical and legal problems of air and water pollution by industry and its control, for those engineers working in industry (for non-Sanitary Engineers).

Text: References. Mr. Gaffney.

Bio. 415. Introductory Radiation Biology
3-3-4. Prerequisite: Consent of instructor.

A general survey of biological systems and their responses to various kinds of radiations.
Text: Bacq and Alexander, Fundamentals of Radiobiology. Mr. Fetner.

Bio. 420. Water and Sewage Analysis
1-6-3. Prerequisite: Chem. 103.
A laboratory course to acquaint the Sanitary Engineer with the techniques of standard methods for the analysis of water and sewage.
Text: Committee—A.P.H.A. Standard Methods for the Examination of Water and Waste Water; Sawyer, Chemistry for Sanitary Engineers. Mr. Ingols.

Bio. 425. Microbiological Fermentations
3-0-3. Prerequisites: Bio. 307 and/or Chem. 342.
A study of the nutritional and environmental requirements for, and the mechanisms involved in the production of useful chemicals, foods and drugs by microbiological agencies.

Text: Steel, Biochemical Engineering. Mr. Gaffney.

Bio. 428. Survey of Sanitary Microbiology
2-6-4. Prerequisite: None.
A lecture and laboratory course to acquaint the sanitary engineer with the agents of disease and with the agents of sewage treatment.
Text: Kreuger, Principles of Microbiology. Mr. Gaffney.

Bio. 431. Cytology
3-6-5. Prerequisite: Bio. 204.
A synthesis of the most important aspects of modern cytology emphasizing the morphologic, functional, and cytochemical organization of the cell. Principles and techniques in light, phase and electron microscopy, and photomicrography are emphasized together with preparative techniques in cytology.

Text: DeRobertis, Nowinski, and Saez, General Cytology.

Bio. 435, 436. Applied Biology
3-0-3. Prerequisite: Bio. 307.
A course dealing with the methods of applying basic biological principles and techniques to contemporary problems in the fields of public health and bioengineering with emphasis on their economic and environmental importance.

Text: References. Gaffney and Visiting Lecturers.

Bio. 440, 441, 442. General Physiology
3-3-4, 3-6-5, 3-6-5. Prerequisites: Bio. 307, Chem. 342.
The chemical, physical and biological responses and functions of living systems. The study of cellular biochemistry and metabolism, tissue and organ function, interrelationship of organ systems and the response of the whole organism to its environment.

Text: Giese, Cell Physiology; Other texts to be selected. Mr. Min.
### Graduate Courses Offered

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<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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<tr>
<td>Bio. 605, 6</td>
<td>Sanitary Bacteriology</td>
<td>2-4-3</td>
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<tr>
<td>Bio. 607</td>
<td>Parasitology</td>
<td>2-3-3</td>
</tr>
<tr>
<td>Bio. 617</td>
<td>Industrial Hygiene</td>
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<td>Bio. 618</td>
<td>Industrial Hygiene Field Investigations</td>
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<td>Bio. 620</td>
<td>Water Treatment</td>
<td>2-3-3</td>
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<tr>
<td>Bio. 621</td>
<td>Sewage Treatment</td>
<td>2-3-3</td>
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<tr>
<td>Bio. 623</td>
<td>Industrial Wastes &amp; Stream Pollution</td>
<td>2-6-4</td>
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<tr>
<td>Bio. 630</td>
<td>Biological Effects of Radiation</td>
<td>3-3-4</td>
</tr>
<tr>
<td>Bio. 702</td>
<td>Public Health Engineering Field Practices</td>
<td>0-6-2</td>
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<tr>
<td>Bio. 704, 5, 6</td>
<td>Special Problems</td>
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</table>

(Complete details about these courses are contained in the Graduate Bulletin, a copy of which is available upon request.)
School of Architecture  
(Established in 1908)


General Information

The School of Architecture was established as a degree granting department of the Institute in 1908 and now offers the following courses of study—(1) the five-year curricula in Architecture with options in Architectural Design or Structural Design both leading to the degree Bachelor of Architecture, (2) a four-year curriculum in Building Construction leading to the degree Bachelor of Science in Building Construction and (3) a four-year curriculum in Industrial Design leading to the degree Bachelor of Science in Industrial Design. In addition, the graduate program in Architecture* prepares for the degree Master of Architecture, and the graduate program in City Planning* leads to the degree Master of City Planning.

Architecture

The original objective and first aim of the School is to prepare students for the profession of Architecture. The scope of the field is of such breadth in current practice that need is felt not only for men who are strong in design but for others whose interests will be closely integrated with design in structural and mechanical techniques. The training in Architecture is uniform for the first four years with two areas of specialization, Architectural Design and Structural Design, strongly emphasized in the final year. The central core of the curriculum in Architecture is the study of design, with related exercises in drawing, graphics, visual composition and model building. The student is given an opportunity in these courses to develop his creative as well as his analytical powers by finding solutions to programs employing the requirements of contemporary buildings and paralleling the conditions to be encountered in later practice. Instruction is generally in the form of guidance and suggestion on the part of the instructor to each student individually, accompanied by group discussions, lectures, and demonstrations. Solutions are submitted as drawings or models for review and judgment by a jury of teachers, practicing architects, and such designers or specialists as the occasion may require.

Closely allied to design and, insofar as possible, integrated with it are the courses in construction which, in turn, are dependent on the basic requirements of mathematics, physics, and mechanics. Courses in the history and theory of

*For the graduate program in Architecture and City Planning, see Graduate Bulletin.
architecture supply a fuller understanding of our architectural heritage, its meaning and impact on contemporary problems. Work of technical importance is offered in building materials, mechanical plant (plumbing, heating, air-conditioning and electrical installations), office and field practice.

The National Architectural Accrediting Board has officially accredited the five-year course leading to the degree Bachelor of Architecture at the Georgia Institute of Technology.

The National Council of Architectural Registration Boards and the Georgia State Board for the Examination, Qualification and Registration of Architects, recognize the Bachelor of Architecture degree at the Georgia Institute of Technology as adequate preparation for practice, with the exception of experience requirements. After three years internship in the office of a registered architect, Bachelor of Architecture graduates may apply for examination and registration as licensed architects.

All work executed in classes administered by the School becomes the property of the School and will be retained, or returned at the discretion of the faculty.

The faculty reserves the right to refuse for credit any project executed outside the precincts of the School of Architecture, or otherwise executed without proper coordination with the instructor.

Standards for Advancement

All students entering the School of Architecture are required during the first term of residence to take interest and aptitude tests with the Office of Guidance and Testing.

Curriculum in Architecture

In order for students to obtain the greatest benefit from courses offered concurrently in the curriculum, progress will be noted at several intervals as follows:

a) Averages in drawing and design will be checked at the end of each year group of three courses (151-52-53; 251-52-53, etc.). A student will not be permitted to enter a more advanced group until his record in the previous group equals 2.0 or better.

b) Admission to the third year of architecture will be based on Faculty approval plus the completion of all required and prerequisite courses, both academic and departmental, in the first two years of the curriculum. A point average in design of 2.0 and an overall average not less than 1.9 are required. The student on entering the third year must be prepared to schedule his primary subjects concurrently (Arch. 351, 361, 371).

c) Admission to the 5th year of Architecture will be based on Faculty approval plus the completion of all required and prerequisite courses, both academic and departmental, in the first four years of the curriculum. A point average of 2.0, both overall and in design courses is required. The student must be prepared to schedule his primary subjects concurrently (Arch. 551 or 554, 561 and C.E. 400); in addition he must present an affidavit confirming at least three months practical experience in the office of a registered architect or approved construction company.
d) Admission to the thesis in architecture requires Faculty approval and a minimum average of 2.0 in Arch. 551-52 (Option I) or 554-55 (Option II).

**Curriculum in Building Construction**

a) Requirements for the first two years are identical with those for architectural students.

b) Admission to the third year of Building Construction will be based on Faculty approval plus the completion of all required and prerequisite courses, both academic and departmental, in the first two years of the curriculum. An overall average not less than 1.9 is required. The student must be prepared to schedule his primary subjects concurrently (Arch. 322, 337, 371).

c) To become a candidate for a degree, the student must present an affidavit confirming at least three months practical experience with an approved construction or materials concern.

**Curriculum in Industrial Design**

a) Requirements for the first four quarters are identical with those for architectural students.

b) Averages in Industrial Design will be checked at the end of each year's group of courses (I.D. 202-3, I.D. 301-2-3, etc.). A student will not be permitted to enter a more advanced group until his record in the previous group equals 2.0 or better.

**ARCHITECTURE**

**Freshman Year**  
*(Uniform for Architecture, Building Construction and Industrial Design)*

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
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<th>3rd Q.</th>
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<td>Arch.</td>
<td>151-52-53</td>
<td>Arch. Drawing</td>
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<td>Arch.</td>
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</table>

**Totals** | | | 16-17-19 | 16-17-19 | 16-17-19 |

**NOTE:** Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*MChemistry is required in place of M.L. for the curricula in Building Construction and Industrial Design.*

**For course numbers, see the course descriptions under the appropriate ROTC sections in this Bulletin.**
### Sophomore Year

*(Uniform for Architecture and Building Construction)*

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
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<td>Eng.</td>
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<td>Phys.</td>
<td>211-12-13</td>
<td>Mech.; Elec.; Heat, Light &amp; Sound</td>
<td>4-0-4</td>
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<td>P.T.</td>
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<td>Physical Training</td>
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*Arch. 351 is required in place of Arch. 253 for the curriculum in Building Construction.

**For course numbers, see the course descriptions under the appropriate ROTC sections in this Bulletin.

### Junior Year

<table>
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<th>Course</th>
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<td>Arch.</td>
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<td>History and Theory</td>
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<td>Arch.</td>
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<td>Arch.</td>
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<td>S.S.</td>
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*Electives: 8 hours must be chosen from the restricted list of the School of Architecture, Group I or Group II corresponding to option.

9 hours must be chosen from the list of general electives approved by the School of Architecture.

9 hours may be used as free electives. If advanced military is elected, 9 hours only will be credited toward a degree.

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
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<th>3rd Q.</th>
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<td>Arch.</td>
<td>451-52-53</td>
<td>Arch. Design</td>
<td>0-18-6</td>
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<td>Arch.</td>
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<td>History and Theory</td>
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<tr>
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<td>Structures</td>
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<td>C.E.</td>
<td>306, 406</td>
<td>Structural Analysis, Reinforced Concrete</td>
<td>3-3-4</td>
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<td>M.E.</td>
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<td>Mech. Equip. Bldgs.</td>
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<td>12-18-18</td>
<td>11-21-18</td>
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</table>

*Electives: 8 hours must be chosen from the restricted list of the School of Architecture, Group I or Group II corresponding to option.

9 hours must be chosen from the list of general electives approved by the School of Architecture.

9 hours may be used as free electives. If advanced military is elected, 9 hours only will be credited toward a degree.
Fifth Year  
*(Option I—Architectural Design)*

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
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<tr>
<td>Arch.</td>
<td>561-62-63</td>
<td>Seminar</td>
<td>2-0-2</td>
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<tr>
<td>Arch.</td>
<td>581-82-83</td>
<td>Professional Practice</td>
<td>3-0-3</td>
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<tr>
<td>C.E.</td>
<td>400</td>
<td>Reinforced Concrete</td>
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<td>8-27-17</td>
<td>9-27-18</td>
<td>9-27-18</td>
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</table>

*Electives: 8 hours must be chosen from the restricted list of the School of Architecture, Group I or Group II corresponding to option. 9 hours must be chosen from the list of general electives approved by the School of Architecture. 9 hours may be used as free electives. If advanced military is elected, 9 hours only will be credited toward a degree.

Fifth Year  
*(Option II—Structural Design)*

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
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<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
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<tr>
<td>Arch.</td>
<td>554-55-56</td>
<td>Structural Design</td>
<td>0-27-9</td>
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<td>Arch.</td>
<td>561</td>
<td>Seminar</td>
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<tr>
<td>Arch.</td>
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<tr>
<td>Arch.</td>
<td>522</td>
<td>Structural Design: Integration</td>
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<td>3-3-4</td>
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<td>C.E.</td>
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<td>Reinforced Concrete</td>
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<td>*Electives</td>
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<td>8-27-17</td>
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</table>

*Electives: 8 hours must be chosen from the restricted list of the School of Architecture, Group I or Group II corresponding to option. 9 hours must be chosen from the list of general electives approved by the School of Architecture. 9 hours may be used as free electives. If advanced military is elected, 9 hours only will be credited toward a degree.

Building Construction

As one of the major industries in the country, Construction has need of many men who are trained in the field of materials, products, manufacture, sales and general contracting. The Building Construction curriculum at Georgia Tech is designed to supply graduates for these varied building activities which, with the architect and engineer, help to coordinate all building projects. The course parallels the curriculum in Architecture for the first two years, then specializes in technical studies in construction, materials, personnel and management problems. The degree, Bachelor of Science in Building Construction, is awarded on the completion of four years of study.
## Freshman and Sophomore years—see Architecture.

### Junior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
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<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch. 322-23-24</td>
<td>Building Materials</td>
<td>2-0-2</td>
<td>2-0-2</td>
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<tr>
<td>Arch. 337-38-39</td>
<td>Arch. History</td>
<td>2-0-2</td>
<td>2-0-2</td>
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<tr>
<td>Arch. 371-72-73</td>
<td>Structures</td>
<td>3-0-3</td>
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<td>C.E. 204</td>
<td>Elem. Surveying</td>
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<td>C.E. 306</td>
<td>Structural Analysis</td>
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<td>Eng. 320</td>
<td>Tech. Writing</td>
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<tr>
<td>I.M. 204</td>
<td>Economics</td>
<td>3-0-3</td>
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<td>I.M. 336</td>
<td>Accounting Survey</td>
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<td>M.E. 355</td>
<td>Materials Laboratory</td>
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</table>

**Totals**: 19-0-19 16-6-18 17-3-18

*Electives: 12 hours must be chosen from the approved list of the School of Arch. 9 hours may be used as free electives. If advanced military is elected, 9 hours only will be credited toward a degree.

### Senior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<th>3rd Q.</th>
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<tbody>
<tr>
<td>Arch. 471</td>
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<tr>
<td>Arch. 581-82-83</td>
<td>Professional Practice</td>
<td>3-0-3</td>
<td>3-0-3</td>
<td>3-0-3</td>
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<tr>
<td>Arch. 584</td>
<td>Cost Analysis</td>
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<td>C.E. 406, 400</td>
<td>Reinforced Concrete</td>
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<td>M.E. 334-35</td>
<td>Mech. Plant</td>
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<td>E.E. 315</td>
<td>Mech. Plant (Elec.)</td>
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<td>I.M. 316-17</td>
<td>Fin. Survey; Ind. Mkt.</td>
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<tr>
<td>I.M. 329</td>
<td>Survey of Bus. Law</td>
<td>3-0-3</td>
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<tr>
<td>I.M. 443</td>
<td>Principles of Investment</td>
<td>3-0-3</td>
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</table>

**Totals**: 18-0-18 15-9-18 18-0-18

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## Industrial Design

Industrial Design deals with the development of those products of industry with which man, in utilizing them, has direct visual physical relationship, such as utensils, appliances, equipment, and furnishings for the home, industry, commercial and public places.

The specialized curriculum in Industrial Design begins with the second term of the Sophomore Year. It is comprised of two design series which are taken concurrently.

The Industrial Design Series deals with the nature of objects, the design processes, the different fields of design, and the types and groups of objects. In this series the student deals with the actual design and execution of test models as well as with the theoretical aspect of design for mass-production.
The Material and Technique Series covers the relationship of design to various industrial materials and processes. In this series the student designs and executes objects, but is limited in each assignment to specific materials and/or processes.

The degree, Bachelor of Science in Industrial Design, is awarded on the completion of four years of study.

**Freshman year—see Architecture.**

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tbody>
<tr>
<td>Arch. 251</td>
<td>Arch. Design</td>
<td>0-15-5</td>
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<tr>
<td>Arch. 254-55</td>
<td>Color Theory</td>
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<td>I.D. 202-3</td>
<td>Design</td>
<td>1-12-5</td>
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<td>I.D. 215-16</td>
<td>Material and Technique</td>
<td>3-0-3</td>
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<td>Eng. 201-2-3</td>
<td>Survey of the Humanities</td>
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<tr>
<td>Math. 202</td>
<td>Calculus</td>
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<td>Phys. 211-12-13</td>
<td>Physics</td>
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*For course numbers, see the course descriptions under the appropriate ROTC sections in this Bulletin.

**Junior Year**

<table>
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<th>Subject</th>
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<tr>
<td>Arch. 354-55</td>
<td>Arch. Rendering</td>
<td>0-3-1</td>
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<tr>
<td>Arch. 337-38-39</td>
<td>Arch. History</td>
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<td>I.D. 301-2-3</td>
<td>Design</td>
<td>1-12-5</td>
<td>1-12-5</td>
<td>1-15-6</td>
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<td>I.D. 314-15-16</td>
<td>Material and Technique</td>
<td>1-3-2</td>
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<td>Met. 325</td>
<td>General Metallurgy</td>
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<td>I.E. 311</td>
<td>Manufacturing Processes</td>
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<td>M.L. or S.S.</td>
<td>Electives</td>
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*Electives: 14 hours must be chosen from the approved list of the School of Arch. 9 hours may be used as free electives. If advanced military is elected, 9 hours only will be credited toward a degree.

**Senior Year**

<table>
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<tr>
<th>Course No.</th>
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<tr>
<td>Arch. 530</td>
<td>Art History</td>
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<tr>
<td>I.D. 401-2-3</td>
<td>Design</td>
<td>1-15-6</td>
<td>1-18-7</td>
<td>1-21-8</td>
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<td>I.D. 414</td>
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<td>Legal and Ethical Phases of Engr.</td>
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<td>Problems of Public Opinion</td>
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ELECTIVES

General Electives: See humanities list on page 34 plus the following: C.E. 201 or 204; Eng. 315, 320; Geol. 101, 201; I.D. 215, 216; I.M. 316, 317, 329, 443; Math. 203, 304; Text. 231, 232.

Restricted Electives: Group I: Arch. 254, 255, 354, 355, 416, 430, 444, 510, 511, 512, 522, 530, 540, 541. Group II: Arch. 540, 541, 584; C.E. 201 or 204, 409; I.M. 443; M.E. 353.

Courses of Instruction: Architecture

Note: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Arch. 151, 152, 153. Architectural Drawing 0-9-3.
Introductory studies in drawing and the principles of visual expression; includes one laboratory period per week in freehand drawing.
Texts: Ramsey and Sleeper, Architectural Graphic Standards; Martin, Architectural Graphics; and Collier, Form, Space, and Vision. 
Mr. Rabun, Mr. Greene, Staff.

Arch. 162, 163. Orientation 1-0-0.
An introduction to the field of architecture and design; a requirement for all students in the School of Architecture.
Mr. Beckum, Mr. Wilson.

Arch. 171, 172, 173. Graphics 1-3-2.
Lectures and laboratory exercises in descriptive geometry; shades and shadows; perspective.

Arch. 251, 252, 253. Design 0-15-5. Prerequisites: Arch. 153, 163, 173.
Basic composition, architectural problems and presentation methods; includes one laboratory period per week in freehand drawing.
Text: Collier, Form, Space, and Vision. Mr. Beckum, Mr. Greene, Mr. Norris, Mr. Shipley.

Arch. 254, 255. Color Theory 1-3-2. Prerequisite: Arch. 251 or Soph. Standing.
Lecture and laboratory experiments on the properties of color and its use in design.
Text: None. Mr. Greene.

Arch. 310, 311, 312. Freehand Drawing 0-3-1.
For non-architects and architects entering under catalogs previous to June, 1961. Freehand drawing from compositions by students.
Text: None. Mr. Harris, Mr. Beattie.

Arch. 322, 323, 324. Building Materials 2-0-2. Prerequisite: Arch. 253 or consent.
A study of materials of construction, their properties and use in modern construction, with special attention to their effect upon architectural design.
Text: Hornbostel, Materials for Architecture. Mr. Gailey or Mr. Polychrone.

Arch. 337, 338, 339. Architectural History 2-0-2. Prerequisite: Arch. 252 or consent.
A survey course in architectural history for non-architectural students. In non-technical language, it covers architectural development from ancient times to the present. Lectures, supplemented by slide projection, notes and reading assignments.
Arch. 351, 352, 353. Design
0-15-5. Prerequisites: Arch. 253 and admission to the third year curriculum.
Elementary problems in architectural design and presentation methods; includes one laboratory period per week in freehand drawing.
Text: Dietz, *Dwelling House Construction.*
Mr. Saporta, Mr. Grady, Mr. Smith.

Arch. 354, 355. Architectural Rendering
0-3-1. Prerequisite: Arch. 251.
Rendering of architectural subjects in various media.
Text: None
Mr. Rabun.

Arch. 361, 362, 363. History and Theory
3-0-3. Prerequisite: Admission to the third year curriculum or consent.
History of architecture in ancient Egypt and Mesopotamia, Greece and Rome; Medieval Europe; the Renaissance in continental Europe.
Mr. Beckum, Mr. Shipley.

Arch. 371, 372, 373. Structures
3-0-3. Prerequisites: Mech. 343 and admission to the third year curriculum.
Introduction to methods of construction, proportioning and qualitative explanation of behavior; theory and design of ordinary timber structures; theory and design of metal structures (Part I).
Mr. Gailey, Mr. Polychrone.

Arch. 381, 382. Design and Graphic Presentation
1-12-4. Prerequisite: Senior standing.
A basic course in drawing and design for students preparing for the Master's program in City Planning. Not open to architectural students.
Text: None
Mr. Rabun.

Arch. 410. Freehand Drawing
0-6-2.
For non-architects, and architects entering under catalogs previous to June, 1961.
Pencil sketching.
Text: None
Mr. Beattie, Mr. Wilson.

Arch. 411. Freehand Drawing
0-3-1.
For non-architects, and architects entering under catalogs previous to June, 1961.
Pen and ink sketching.
Text: None
Mr. Wilson.

Arch. 412. Freehand Drawing
0-6-2.
For non-architects, and architects entering under catalogs previous to June, 1961.
Water color sketching.
Text: None
Mr. Beattie or Mr. Rabun.

Arch. 416. Introduction to Landscape Architecture
2-0-2. Prerequisites: Arch. 451 and Arch. 461.
A brief history of landscape architecture followed by a study of the principles of landscape design as applied to contemporary problems.
Text: None
Mr. Byrd.

Arch. 430. Art History
2-0-2. Prerequisite: Junior standing.
A short history of Pre-Columbian and Oriental art and architecture.
Text: None
Mr. Shipley.

Arch. 435. Art History
2-0-2. Prerequisite: Junior standing.
A survey course in the history of artistic manifestations from primitive times to our own day.
Text: Janson, *History of Art.*
Mr. Harris.

Arch. 444. Housing Seminar
2-0-2. Prerequisite: Junior standing.
Lecture and discussion broadly covering the housing field and the home building industry, housing
needs, housing markets and financing, standards of design and construction, the Government and housing. 
Text: Bayer, Housing, A Factual Analysis. Mr. Saporta.

Arch. 451, 452, 453. Design 0-18-6. Prerequisites: Arch. 353 and advancement standard. 
Intermediate problems in architectural design and presentation methods; includes one laboratory period per week in freehand drawing and modeling. 
Text: None. Mr. Wilson.

Arch. 461, 462, 463. History and Theory 3-0-3. Prerequisite: Arch. 363 and advancement standard. 
Renaissance architecture in England and America; the 19th and 20th centuries; history of town and city planning in Europe and America. 
Text: Richards, Modern Architecture. Gallion, The Urban Pattern. Mr. Grady, Mr. Saporta.

Arch. 471. Structures 3-0-3. Prerequisite: Arch. 373. 
Theory and design of metal structures (Part II). 
Mr. Gailey, Mr. Polychrone.

Arch. 510, 511, 512. Freehand Drawing: Advanced 0-3-1. Prerequisite: Arch. 453. 
Freehand drawing of varied subjects and in various media. 
Text: None. Mr. Beattie, Mr. Hardy.

Arch. 513, 514. Freehand Drawings: Advanced 0-3-1, 0-6-2. Prerequisite: Arch. 453. 
Freehand drawing from live models. 
Text: Albert and Seckler, Figure Drawing Comes to Life. 
Mr. Beattie, Mr. Hardy.

Arch. 522. Structural Design: Integration 3-3-4. Prerequisites: Arch. 373 and C.E. 400 or concurrent.

This course brings together the information obtained in previous courses in Structural Design and presents the subject matter as an integrated whole. 
Text: None. Mr. Polychrone.

Arch. 530. Art History 2-0-2. Prerequisites: Arch. 339, 462 or consent.
A survey of 19th and 20th century art in Europe and the United States. 
Text: None. Mr. Grady.

Arch. 540, 541. Research 0-6-2, 0-9-3 or 1-9-4.
A clearly stated program by the student describing in detail the nature, purpose and extent of the proposed problem must be submitted for approval. The major portion of the work will be conducted in library, drafting room, or shop. 
Text: None. Staff.

Group I. Advanced problems in architectural design with emphasis on the solution of complex building programs and site planning, terminating in an independent major problem submitted as a thesis for the degree Bachelor of Architecture (Option I). 
Text: None. Mr. Heffernan, Mr. Polychrone, and Staff.

Group II. Advanced Problems in architectural design with emphasis on structural solutions, computations and details, terminating in an independent problem submitted as a thesis for the degree Bachelor of Architecture (Option II). 
Text: None. Mr. Heffernan, Mr. Polychrone, and Staff.

Arch. 561, 562, 563. Seminar 2-0-2. Prerequisites: Arch. 453, 463. 
Preparation of thesis programs and research; lectures and discus-
sions of current problems in architecture and design. Text: None. Staff.

Arch. 581, 582, 583. Professional Practice
3-0-3. Prerequisites: Arch. 453, 463 or Senior standing.

Conduct of architectural practice, office organization, competitions, contracts, legal and ethical problems; specification writing; estimating and supervision of construction.

Arch. 584. Cost Analysis
2-3-3. Prerequisite: Senior standing.

Principles and methods of cost analysis in the construction industry. Methods of compiling and analyzing material, labor and equipment production costs. Exercises in office and field management procedures.
Text: Clough, Construction Contracting.
Mr. Polychrone, Mr. Gailey.

Courses of Instruction: Industrial Design
All Courses conducted by Mr. Bredendieck and Mr. Seay.

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

I.D. 202. Design
1-12-5. Prerequisite: Arch. 251. Concurrent with I.D. 215.
Introduction to Industrial Design.
A series of abstract problems dealing with the elements of a design process.
Text: None.

I.D. 203. Design
Introduction to design analysis.
Design of simple objects.
Text: None.

I.D. 215. Material and Technique
1-3-2. Prerequisite: Arch. 153 or consent.
The standard joints and hand operated machines. Exercises, execution and development of joints.
Text: None.

I.D. 216. Material and Technique
1-3-2. Prerequisite: I.D. 215 or consent.
Continuation of I.D. 215, hand operated machines—wood and metal turning, spinning, bending, laminating, etc. Assembly techniques. Demonstration, exercises, field trips, and design of objects for manufacturing processes.
Text: None.

I.D. 301. Design
1-12-5. Prerequisite I.D. 203. Concurrent with I.D. 314.
Continuation of the design-analysis of I.D. 203 in regard to the different groups of objects. Design of objects from different groups.
Text: None.

I.D. 302. Design
1-12-5. Prerequisite I.D. 301. Concurrent with I.D. 315.
Design of objects (such as seating, simple storage, etc.) which have no engineered parts, for home, commercial and public places.
Text: None.

I.D. 303. Design
Design of equipment and appliances incorporating such engineered units as heating-coils, fans, motors, etc.
Text: None.

I.D. 314. Material and Technique
1-3-2. Prerequisite: I.D. 216.
Casting and fabricating techniques—plaster, plastic-casting, blowing, sand casting, ceramics, paper, rubber, etc. Demonstration exercises, field trips
and design of objects for the various techniques.
DuMond, *Fabricated Materials and Parts.*

I.D. 315. Material and Technique
1-3-2. Prerequisite: I.D. 314.

The industrial pre-formed materials—extrusion, rolled and drawn profiles, mouldings, etc.
Demonstration, exercises, field trips, and design of objects for the various techniques.
DuMond, *Fabricated Materials and Parts.*

I.D. 316. Material and Technique
1-3-2. Prerequisite: I.D. 315.

Semi-automatic and mass-production techniques—forging, stamping, heading, screw machining, wire forming.
Demonstration, field trips, and design of objects for various techniques.
DuMond, *Fabricated Materials and Parts.*

I.D. 401. Design

Design of appliances and equipment for the commercial, industrial and public fields (such as machines, store and office appliances). Design of packaging for industrial products.
Text: None.

I.D. 402. Design
1-18-7. Prerequisite: I.D. 401.

Design of groups of objects which comprise larger functional units.
Text: None.

I.D. 403. Design
1-21-8. Prerequisite: I.D. 402.

Continuation of I.D. 402 comprising more complex units such as home, public, and commercial interiors, exhibitions and displays.
Text: None.

I.D. 414. Material and Technique
1-3-2. Prerequisite: I.D. 316.

The mass-production techniques—die casting, impact extrusion, compression — transfer — injection — molding, etc.
Demonstration, field trips, and design of objects for each technique.
DuMond, *Fabricated Materials and Parts.*

**GRADUATE COURSES**

(Complete details about graduate courses in Architecture and City Planning are contained in the *Graduate Bulletin,* a copy of which is available upon request.)
School of Ceramic Engineering

(Established 1924)

Director—Lane Mitchell; Professors—Willis E. Moody, Harrison W. Straley, III; Associate Professors—William C. Hansard, John E. Husted, Charles E. Weaver, Charles F. Wysong; Special Lecturers—Jerry Johnson, Jas. Neiheisel, R. A. Young; Principal Secretary—Thelma Saggus; Laboratory Mechanic—Thomas Mackrovitch.

General Information

A four-year curriculum leads to the degree of Bachelor of Ceramic Engineering. Graduate work leading to the Master of Science in Ceramic Engineering is also offered. A broad basic training is given in the fundamental and engineering courses, thus preparing the student to enter successfully any division of ceramic engineering. However, the necessary cultural courses are included. The classroom, laboratory and library work are coordinated to combine theoretical and practical knowledge. Periodic contracts with the non-metallic mineral and clay-working industries of the State enlarge the practical viewpoint of the student.

The school is vitally concerned with future development of the ceramic and mineral industries in the South. Through research, the use of Georgia minerals has been extended so that almost every ceramic industry may find the greater proportion of its raw materials within the state boundaries. Demonstration of a stable market and the many industrial advantages of Georgia are encouraging the establishment of new industries. In this program the School is using its facilities to aid proper development.

The school also offers to non-ceramic majors a survey course in Ceramics and service courses in Geology and Geography. The courses in Geology are designed to give the student a thorough grounding in the basic principles of Geology and Mineralogy and their application to the particular field of engineering the student is preparing to enter. The school has type collections for Mineralogy and Geology; a collection of building stones, ceramic clays and fossils; maps and folios; and the usual Mineralogy laboratory equipment. Those students majoring in Ceramic Engineering and Civil Engineering and the Geophysical option in Physics are required to take Geology subjects. Students in other major curricula may elect Geology courses. A degree offering in Geological Engineering is contemplated in the near future.

Students wishing to emphasize geology and geological processes in their ceramic training or in their training in other branches of engineering might arrange for certain substitutions of courses in the program, after conference with the Director.
# Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
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<th>3rd Q.</th>
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<tbody>
<tr>
<td>Chem*</td>
<td>101-2-3</td>
<td>General Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<tr>
<td>Draw.</td>
<td>113-14-15</td>
<td>Engineering Graphics</td>
<td>0-6-2</td>
<td>0-6-2</td>
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<tr>
<td>Eng.</td>
<td>101-2</td>
<td>Composition and Rhetoric</td>
<td>3-0-3</td>
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<tr>
<td>Eng.</td>
<td>105</td>
<td>Introduction to Literature</td>
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<tr>
<td>Math.</td>
<td>100</td>
<td>College Algebra and Trigonometry</td>
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<tr>
<td>Math.</td>
<td>104</td>
<td>Analytical Geometry and Calculus</td>
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<td>5-0-5</td>
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<tr>
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<td>201</td>
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<td></td>
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<tr>
<td>M.L.</td>
<td>**</td>
<td>Modern Language OR</td>
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<tr>
<td>S.S.</td>
<td>111-12-13</td>
<td>Social Science</td>
<td>3-0-3</td>
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<tr>
<td>P.T.</td>
<td>101-2-3</td>
<td>Physical Training</td>
<td>0-4-1</td>
<td>0-4-1</td>
<td>0-4-1</td>
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<td>3-1-2</td>
<td>3-1-2</td>
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<td>Orientation</td>
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</table>

**Totals** | 18-14-20 | 17-14-20 | 17-14-20 |

**Note:** Under Quarters, 3-3-4 means 3 hours class, 3 hours lab, 4 hours credit.

*Chem. 107-108-109 is a recommended substitution for Chem. 101-2-3. A grade of C or better in Chem. 102 is a prerequisite for Chem. 214.

**Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish. Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

***For course numbers, see the course descriptions under the appropriate ROTC sections in this Bulletin.

# Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
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<th>3rd Q.</th>
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<tbody>
<tr>
<td>Cer.E.</td>
<td>202</td>
<td>Products and Materials</td>
<td></td>
<td>2-3-3</td>
<td></td>
</tr>
<tr>
<td>Cer.E.</td>
<td>203</td>
<td>Equipment and Tests</td>
<td></td>
<td></td>
<td>2-3-3</td>
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<tr>
<td>Cer.E.</td>
<td>208</td>
<td>Ceramic Survey</td>
<td>2-0-2</td>
<td></td>
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<tr>
<td>Cer.E.</td>
<td>209</td>
<td>Ceramic Survey Laboratory</td>
<td>0-3-1</td>
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<td>214</td>
<td>Analytical Chemistry</td>
<td>2-6-4</td>
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<td>Geol.</td>
<td>202</td>
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<tr>
<td>Phys.</td>
<td>207-8-9</td>
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<td>5-3-6</td>
<td>5-3-6</td>
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**Totals** | 17-17-21 | 18-14-21 | 18-11-20 |

**For course numbers, see the course descriptions under the appropriate ROTC sections in this Bulletin.**
### Junior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tr>
<td>Cer.E. 305</td>
<td>Phase Equilibria for Ceramists</td>
<td>3-0-3</td>
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<tr>
<td>Cer.E. 311</td>
<td>Processing and Forming</td>
<td>3-3-4</td>
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<tr>
<td>Cer.E. 315</td>
<td>Solid State Ceramics</td>
<td></td>
<td>1-3-2</td>
<td>3-0-3</td>
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<tr>
<td>Cer.E. 318</td>
<td>Pyrometry and Instruments</td>
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<td>2-3-3</td>
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<td>Cer.E. 320</td>
<td>Glass</td>
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<td>Cer.E. 409</td>
<td>Microscopy</td>
<td>3-0-3</td>
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<td>Mech. 334</td>
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<td>17-9-20</td>
<td>14-9-17</td>
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*If Advanced Air or Military is the elective, credit will be 4-1-3. If Advanced Navy is the elective, credit will be 3-2-3.

### Senior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tbody>
<tr>
<td>Cer.E. 418</td>
<td>Drying and Psychrometry</td>
<td>2-0-2</td>
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<tr>
<td>Cer.E. 419</td>
<td>FIRING and Combustion</td>
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<td>2-3-3</td>
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<tr>
<td>Cer.E. 422-23-12</td>
<td>Thesis</td>
<td>1-0-1</td>
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<td>Cer.E. 425-26</td>
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<td>3-3-4</td>
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<tr>
<td>Cer.E. 431-32-34</td>
<td>Design and Construction</td>
<td>1-3-2</td>
<td>0-6-2</td>
<td>0-3-1</td>
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<tr>
<td>Cer.E. 440</td>
<td>Glaze and Enamel Coatings</td>
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<tr>
<td>E.E. 325</td>
<td>Electric Circuits and Fields</td>
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<tr>
<td>Met. 325</td>
<td>General Metallurgy</td>
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<td>Hum. **</td>
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<tr>
<td>I.E. 416</td>
<td>Motion and Time Study</td>
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<td>M.E. 320</td>
<td>Thermodynamics</td>
<td>4-0-4</td>
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<td>17-6-19</td>
<td>14-18-20</td>
<td>9-15-14</td>
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*Not more than 9 hours electives may be in advanced ROTC.

**At least 6 hours electives must be in Humanities from approved list on page 34.
**Recommended Electives**

<table>
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<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>Hours</th>
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<td>Cer.E.</td>
<td>406-7-8</td>
<td>Seminar</td>
<td>2-0-2</td>
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<td>Cer.E.</td>
<td>421</td>
<td>Cements</td>
<td>2-3-3</td>
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<tr>
<td>Cer.E.</td>
<td>450</td>
<td>Engineering Materials in Nuclear Engineering</td>
<td>2-3-3</td>
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<td>C.E.</td>
<td>204</td>
<td>Elementary Surveying</td>
<td>1-3-2</td>
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<td>C.E.</td>
<td>438</td>
<td>Elementary Aerial Photogrammetry</td>
<td>2-3-3</td>
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<td>Geol.</td>
<td>305</td>
<td>Historical Geology</td>
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<td>307</td>
<td>Historical Geology Laboratory</td>
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<tr>
<td>Geol.</td>
<td>310</td>
<td>Crystallography and Tests</td>
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<td>311</td>
<td>Economic Geography</td>
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<td>418</td>
<td>Petrography</td>
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<td>Geological Processes</td>
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<td>Structural Geology</td>
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<td>Advanced Engineering Geology</td>
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<td>445</td>
<td>Mining of Ceramic Materials</td>
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</tbody>
</table>

*Check quarterly schedule of course offerings to determine if offered. Ordinarily a request for a course by eight or more students will be honored. Also, check prerequisites required.

**Courses of Instruction**

**Note:** 3-4-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

**Cer.E. 202. Products and Materials**
2-3-3. Prerequisites: Chem. 103, Cer.E. 208.

An engineering survey of ceramics; relationship between industrial service requirements and the properties of ceramic products. The common ceramic materials are classified according to mineralogical character; their influence on each other, the effects of size, and the physical properties of particles are stressed. Text: Norton, *Elements of Ceramics*. Mr. Mitchell and Mr. Wysong.

**Cer.E. 203. Equipment and Tests**
2-3-3. Prerequisite: Chem. 103, Cer.E. 208.

Testing of ceramic raw materials and products; requirements of proper test methods and practical applications to industry.

Interpretation of results and writing of formal reports. Uses, operation, and calibration of machinery, apparatus, and equipment for ceramic manufacture of testing. Mathematical analysis of data; inherent errors. Text: Wilson, *An Introduction to Scientific Research*. Mr. Wysong and Mr. Mitchell.

**Cer.E. 208. Ceramic Survey**
2-0-2. Prerequisite: None. General Elective for non-ceramic majors.

A survey is made of the classification and physical properties of ceramic products. The physical properties of raw materials are studied briefly with emphasis on qualities and limitations which relate to design and manufacturing processes. Text: Mitchell, *Ceramics — Stone Age to Space Age*. Mr. Mitchell or Mr. Hansard.

**Cer.E. 209. Ceramic Survey Laboratory**
0-3-1. Prerequisite or Corequisite: Cer.E. 208.

Plant trips to local ceramic plants. Production of molds and pottery. Text: None. Mr. Hansard.
Cer.E. 305. Phase Equilibria for Ceramists
3-0-3. Prerequisite or Corequisite: Chem. 331.
Heterogeneous equilibria of inorganic systems. One, two, and three component systems. Solid solutions and isomorphous replacement. Alkemade lines. Metastable equilibrium. Paths of crystallization.
Mr. Wysong.

Cer.E. 311. Processing and Forming
3-3-4. Prerequisite: Cer.E. 203.
Winning, refining and preparation of ceramic raw materials, methods and mechanism of processing and forming ceramic products; their effect on the control of the properties of the products and adaptation to service requirements.
The relation of laboratory technique to plant practice including properties of materials, machines, processing and products. Commercial raw materials and products are provided and analyzed and, where practical, the corresponding plants are visited.
Text: Kingery, *Ceramic Fabrication Processes*.
Mr. Wysong or Mr. Moody.

Cer.E. 315. Solid State Ceramics
3-0-3. Prerequisite: Cer.E. 311.
The physical and chemical properties of earthy materials throughout common processes used in the production of ceramic wares. Control of phases of manufacture to introduce in the product those properties service conditions require. Sintering, melting, and crystallization processes and their effects on structure and density are discussed. Whitewares, terra cotta, heavy clay products, glass, and body, mold, and sagger composition and processing are studied.
Text: Kingery, *Introduction to Ceramics; Course Notes*.
Mr. Moody.

Cer.E. 318. Pyrometry and Instruments
1-3-2. Prerequisite: Physics 208.
The principles of heat measurement by shrinkage rings, melting points, color, pyrometric cones, expanding metals, thermocouples and resistance bridges. The factors governing choice of thermocouples. The principles behind construction of couples, CO₂ meters, temperature controls, and other control instruments.
Mr. Johnson or Mr. Wysong.

Cer.E. 320. Glass
2-3-3. Prerequisite or Corequisite: Cer.E. 305.
The fundamentals of glass structure, composition, manufacture, properties and applications. Phase relations of the important oxides. Reasons for glass formation instead of crystallization. Melting, quenching, annealing, tempering, fracturing, devitrification and modification are phenomena studies. Techniques of forming and basis of selection of ingredients for glass forming, fluxing, color, refractive index, and other properties are carefully considered.
Mr. Moody.

Cer.E. 406-7-8. Seminar
2-0-2. Prerequisite: Senior standing in Cer.E.
Discussion of current ceramic and scientific literature and reports of investigation. Course may be repeated with different numbers.
Text: *Journal of American Ceramic Society*.
Mr. Moody, Mr. Wysong.

Cer.E. 409. Microscopy
3-6-5. Prerequisites: Physics 209, Geology 414.
Involves the use of the microscope in the study and control of composition and structure of ceramic bodies and raw materials. Nature of light
and crystallography are briefly studied.
Text: Kerr, *Optical Mineralogy.*
Mr. Wysong.

**Cer.E. 422-23-12. Thesis**
1-0-1, 0-6-2, 0-6-2. Prerequisite: Senior standing in Ceramic Engineering.
Each senior conducts an original investigation on an approved ceramic subject under the supervision of the instructor in charge. The object of this course is to place the student upon his own initiative and to coordinate the knowledge that he has previously received.
Text: None. Staff.

**Cer.E. 418. Drying and Psychrometry**
2-0-2. Prerequisites: Cer.E. 315, Physics 209.
Fundamental consideration of water removal from unfired ceramic products by heat and air. Control of humidity, temperatures, air velocity and volume; economy and efficiency of drying and driers; problems to be met in safe drying.
Mr. Moody.

**Cer.E. 419. Firing and Combustion**
2-3-3. Prerequisites: Physics 209, M.E. 320 or equivalent.
Objectives of firing; combustion behavior of gaseous, liquid and solid fuels; the mechanics of heat transfer; physical and chemical properties of clay and other raw materials under heat treatment; design, operation and heat accounts of periodic and continuous kilns. The utilization of refractories in industry; the control of properties of refractories through raw materials and all phases of manufacture to best meet industrial requirements; fundamentals of aggregate packing and photo-elastic study of expansion and contraction.
Mr. Wysong.

**Cer.E. 421. Cements**
2-3-3. Prerequisites: Chem. 332; Cer.E. 305.
Includes the required properties of raw materials, processing and the hydraulic properties of cements. Portland, magnesia, high alumina, dental, and gypsiferous cements are included. This is an elective course for seniors and graduates. This course is offered periodically upon demand of six or more students.
Mr. Moody.

**Cer.E. 425-426. Physical Ceramics**
3-3-4, 2-0-2. Prerequisites: Cer.E. 315, Chem. 331, and Physics 209.
Application of Physical Chemistry, Crystal Chemistry, Colloid Chemistry, and Solid States Physics to Ceramics. Dispersion, viscosity, plasticity, grain size, crystal structure as related to properties, densification with additives to fill holes in structure, and theory of clay as a colloid electrolyte are studied. Differential thermal analysis, thermal shock, thermal expansion, electrodialysis, viscosity measurement, X-ray analysis, and other techniques of analysis are studied in the laboratory. Sintering, melting, and recrystallization.
Text: Kingery, *Introduction to Ceramics; Course notes.*
Mr. Moody, Mr. Mitchell.

**Cer.E. 431-32-34. Design and Construction**
1-3-2, 0-6-2, 0-3-1. Corequisite: Cer.E. 418. Prerequisite: Drawing 109 (or 103).
Design and working drawings of ceramic manufacturing equipment and plant layouts for specified products. The student makes his own selection under the supervision and with the approval of the instructor. Mr. Wysong, Mr. Hansard.

**Cer.E. 440. Glaze and Enamel Coatings**
3-3-4. Prerequisite: Cer.E. 320.
The fundamental methods for calculating, compounding, manufacturing and using vitreous and crystal-
line protective coatings as well as the methods commonly employed to correct faults. The prior preparations of frits, and ceramic bodies for glazing, or metals or glass for enameling are also considered. Compositions of low, moderate, and high temperature coatings are studied to learn bases of glass properties, adherance, color, opacification, and texture.


Mr. Hansard.

**Cer.E. 450. Engineering Materials in Nuclear Engineering**

2-3-3. Prerequisites: Senior or graduate standing and consent of instructor.

The basic principles of ceramic and metallurgy with particular emphasis on problems inherent in reactor technology. Engineering aspects of the structure and constitution of materials used in reactors including ceramic materials, cermets, metals and alloys. The behavior of these materials under conditions involving elevated temperatures, corrosion, and irradiation.


Mr. Hansard.

**Geol. 101. Introduction to Earth Science**

3-0-3. Prerequisite: None.

A survey of both celestial and earthly environment surrounding humanity; utilizing nature's storehouse of raw materials.


Mr. Straley.

**Geol. 201. General Geology**

3-0-3. Prerequisite: None.

An introduction to geological processes, including lectures on historical and economic geology, with special emphasis upon the needs of the engineer.


Staff.

**Geol. 202. General Geology Laboratory**

0-3-1. Prerequisite or Corequisite: Geol. 201.

An introduction to the study of minerals, rocks, topographic and geological maps, with special emphasis upon the needs of the engineer.

Text: Ellison, *General Geology Laboratory Workbook*.

Staff.

**Geol. 205. Historical Geology**

3-0-3. Prerequisites: Chem. 103; Phys. 207, Geol. 201, 202.

A course of recitations and lectures in Historical Geology.

Text: Moore, *Introduction to Historical Geology*.

Mr. Straley or Mr. Weaver.

**Geol. 307. Historical Geology Laboratory**

0-3-1. Prerequisite or Corequisite: Geol. 305.

Recognition and classification of fossils.

Text: *Laboratory Notes*.

Staff.

**Geol. 310. Crystallography and Tests**

1-3-2. Prerequisites: Math. 104; Geol. 201-2.

A study of crystal systems, Miller indices and other systems of notation; blowpipe analysis procedures; other tests for classifying crystals.


Mr. Husted, Mr. Wysong or Mr. Weaver.

**Geol. 311. Economic Geography**

3-0-3. Prerequisite: None.

The effects of climate, location, power, soil types, mineral deposits, agriculture and manufacture upon nations, peoples, civilization, and trade routes.

Text: Jones and Darkenwald, *Economic Geography*.

Mr. Straley.

**Geol. 312. Economic Geology**

3-0-3. Prerequisites: Geol. 201-2.

A geographical and economic study of all commercially valuable minerals and rocks.


Mr. Straley.
Geol. 313. Economic Geology Laboratory
0-3-1. Corequisite or Prerequisite: Geol. 312.

The laboratory study of metallic and non-metallic minerals useful to man; it is intended to supplement and accompany Geology 312. Special emphasis is placed upon minerals with important engineering uses. The course will cover the most important ore and non-metallic minerals, especially those used by and for engineers with particular emphasis upon ceramic raw materials, as well as other industrial raw materials.

Text: Dana and Ford, *Textbook of Mineralogy*; Laboratory notes.

Staff.

Geol. 414. Mineralogy
2-3-3. Prerequisites: Geol. 201, 202.

A course in descriptive and determinative mineralogy which includes the determination of important minerals and rocks by their chemical and physical properties.


Geol. 418. Petrography
2-6-4. Prerequisite: Geol. 414, Senior standing.

A general survey of the origin, descent, and recognition of rocks, with special emphasis upon engineering considerations and applications. This course will cover the composition, texture, origin, and relationships of rocks. Stress will be laid upon utility in engineering structures and as a raw material for engineering products.

Text: Grout, *Kemp's Handbook of Rocks*. Mr. Straley or Mr. Husted.

Geol. 421. Geological Processes
2-6-4. Prerequisites: Geol. 201-2, Senior standing.

An advanced treatment of geological processes, with emphasis upon applications to engineering. The course will cover the more detailed phases of geological processes, graduation, volcanism, and diastrophism, with special emphasis upon those phases which have the greatest bearing in the various fields of engineering. Mr. Straley or Mr. Weaver.

Geol. 422. Structural Geology
2-6-4. Prerequisites: Geol. 201-2. Senior standing.

A general survey of diastrophism and tectonic phases of volcanism and metamorphism, with emphasis upon application to engineering.

Text: DeSitter, *Structural Geology*; Lecture and Laboratory Notes.

Mr. Straley, Mr. Weaver or Mr. Husted.

Geol. 423. Introduction to Geophysics
3-3-4. Prerequisites: Physics 207-8-9, Geology 201, 202, Senior standing.

A general survey of terrestrial physics, with emphasis upon applications to engineering.


Geol. 424-25-26. Field Methods in Geology
0-6-2, 0-6-2, 0-6-2. Prerequisites: Geol. 201-2. Senior standing.

Methods and procedures of areal and subsurface geological mapping, with special emphasis upon structures and problems that arise in connection with engineering work. The development of the techniques of geological surveying as applied to field study and map work in which various aspects of processes are interpreted and mapped in terms of engineering utility. Lithological unity and petrographic types are likewise studied, calculated, and mapped.

Text: Lahee, *Field Geology*; Laboratory and Lecture Notes.

Staff.

Geol. 443. Advanced Engineering Geology
2-6-4. Prerequisites: Geol. 201-202.

Applications of geological science to problems of civil and other engineering. The course will cover mechanical properties of rocks, their failure under stress, their behavior under the action of fluids, and suitability for foundations. Bending,
breaking and abrasion of rock plates, the movement of igneous bodies and fluids, and applications to problems in Civil, Ceramic, and other engineering will form an integral part of the course. Mr. Weaver.

Geol. 445. Mining of Ceramic Materials
2-0-2. Prerequisites: Geol. 312, Senior standing.
Methods of developing and producing fuel and mineral deposits, with emphasis upon application to Ceramic engineering and tunneling. Development and production of mineral properties together with the methods used to extract the minerals and transport them to the surface. Some attention will be devoted to safety. Stress will be laid upon the extraction of those materials used in ceramic industries and to methods of tunneling as used by the civil engineer. Mr. Straley.

GRADUATE COURSES

(Complete details about graduate courses in Ceramic Engineering and Geology are contained in the Graduate Bulletin, a copy of which is available upon request.)
School of Chemical Engineering
(Established in 1901)


General Information

The degree, Bachelor of Chemical Engineering, may be obtained upon the completion of the following curriculum. The number of students who will be permitted to register for the Junior and Senior work in Chemical Engineering will be strictly limited. The selection will be made on the basis of the student's ability as demonstrated in two years of previous work.

Freshman Year

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<tr>
<th>Course No.</th>
<th>Subject</th>
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<tr>
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<td>Eng. 105</td>
<td>Introduction to Literature</td>
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<tr>
<td>Math. 100</td>
<td>College Algebra and Trigonometry</td>
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<tr>
<td>Math. 104</td>
<td>Analytical Geometry and Calculus</td>
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<tr>
<td>Math. 201</td>
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<tr>
<td>M.L. **</td>
<td>Modern Language OR</td>
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<td>S.S. 111-12-13</td>
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<tr>
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<td>P.T. 101-2-3</td>
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</table>

**Chem. 101, 102, 103 may be scheduled. A minimum grade of C is required for Chem. 101 and 102. The prerequisite for Chem. 214 is Chem. 109 or Chem. 103 with a grade of C or better.

Sophomore Year

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<tr>
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<tr>
<td>Chem. 214-15</td>
<td>Analytical Chemistry</td>
<td>2-6-4</td>
<td>2-6-4</td>
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<tr>
<td>Ch.E. 202</td>
<td>Stoichiometry and Material Balance</td>
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<td>3-0-3</td>
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<tr>
<td>Eng. 201-2-3</td>
<td>Survey of the Humanities</td>
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<tr>
<td>Math. 202-3</td>
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<td>Math. 304</td>
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***For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.
### Junior Year

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<td>Ch.E. 314-15</td>
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<td>Ch.E. 311</td>
<td>Chemical Eng. Analysis</td>
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<td>Chem. 340-1-2</td>
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<td>Mech. 305</td>
<td>Statics</td>
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<tr>
<td>Mech. 331</td>
<td>Mechanics of Materials</td>
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<td>Mech. 302</td>
<td>Applied Mechanics</td>
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<td>Chem. Engineering Thermodynamics</td>
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<td>Comprehensive Problems</td>
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<td>Ch.E. 407-8</td>
<td>Chemical Process Analysis</td>
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<td>Ch.E. 411</td>
<td>Nuclear Engineering Fundamentals</td>
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<td>Ch.E. 413</td>
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<td>Ch.E. 434</td>
<td>Chemical Plant Design</td>
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<td>E.E. 325</td>
<td>Electrical Circuits and Fields</td>
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<td>E.E. 326 or</td>
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<td>E.E. 327</td>
<td>Electric Power Conversion</td>
<td>2-3-3</td>
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<td>Phys. 319</td>
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<td>Ch.E. 341</td>
<td>Process Instrumentation</td>
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**Totals** 15-12-19 15-9-18 17-9-20

### Senior Year

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**Totals** 15-6-17 17-3-18 15-12-19

*Not more than 9 hours electives may be in advanced ROTC. At least 6 hours of electives must be humanities from list on page 34.

### Courses of Instruction

**NOTE:** *Under Quarters, 3-3-4 means 3 hours class, 3 hours laboratory, 4 hours credit.*

**Ch.E. 202. Stoichiometry and Material Balance**


Stoichiometric principles and calculations and material balances are applied to chemical processes.


**Ch.E. 302. Chemical Engineering Calculations**

3-3-4. Prerequisites: Ch.E. 202 and Math. 304.

Fundamental principles of momentum and energy transfer are developed. Applications of these principles are stressed.

Ch.E. 311. Chemical Engineering Analysis
3-0-3. Prerequisites: Ch.E. 314.

The analyses of chemical engineering processes and operations involving fluid and heat transfer.
Texts: McCabe and Smith, *Unit Operations of Chemical Engineering*; Perry, *Chemical Engineer's Handbook*.
Mr. Newton, Mr. Ward.

Ch.E. 314. Unit Operations
3-3-4. Prerequisites: Ch.E. 302 and Chem. 331.

The development of Ch.E. 302 is extended to include mass transfer. Major emphasis is placed on applications involving heat and mass transfer.
Mr. Newton, Mr. Ward and Mr. Fleming.

Ch.E. 315. Unit Operations
3-3-4, Prerequisite: Ch.E. 302.
Stagewise operations.
Texts: McCabe and Smith, *Unit Operations of Chemical Engineering*; Perry, *Chemical Engineer's Handbook*; Staff, *Laboratory Notes*.
Mr. Grubb.

Ch.E. 328. Chemistry of Engineering Materials
3-0-3. Prerequisite: Chem. 103.
A survey of materials of construction with emphasis on nonmetallics. The fundamental properties of plastics, and all types of surface coatings are studied.
Staff.

Ch.E. 329. Survey of Chemical Engineering
3-0-3. Prerequisites: Chemistry 103, Mathematics 103 and Physics 209 or 213.

A general survey of chemical engineering including processes, equipment and calculations. Not open to students in the School of Chemical Engineering.

Ch.E. 339. Chemical Engineering Literature
1-0-1. Prerequisites: Ch.E. 302, Chem. 340, 331.

This course has as its objective the training of students in the use of the sources of information and an introduction to the finding of information in the library.
Text: *Staff Notes*. Mr. Ziegler.

Ch.E. 341. Process Instrumentation
2-3-3. Prerequisite: Ch.E. 314; E.E. 326 recommended.

A study of the methods and technology associated with chemical process systems analysis and the application of measurement and control devices and techniques to these systems.

Ch.E. 350. Elementary Heat and Mass Transfer
3-0-3. Prerequisites: Math. 203, Physics 209, M.E. 320, and Senior standing or consent of instructor.

Elementary heat and mass transfer primarily designed for Textile students. Not open to students in the School of Chemical Engineering. Offered in the fall quarter only.
Text: *Staff Notes*.

Ch.E. 407. Chemical Process Analysis
3-0-3. Prerequisites: Ch.E. 315, Chem. 342 and Chem. 333. Fall and Spring.

Introduction to the engineering of chemical reaction involving colloidal and amorphous materials.
Mr. Lewis.

Ch.E. 408. Chemical Process Analysis

Introduction to applied chemical kinetics.
Text: To be selected. Mr. Lewis.
Ch.E. 411. Nuclear Engineering Fundamentals
3-0-3. Prerequisites: Ch.E. 314, Met. 401, Phys. 319 recommended.
Survey of the principles of design and analysis of nuclear reactor systems stressing the relation of chemical engineering to the nuclear industry.
Text: Staff notes. Mr. Fleming.

Ch.E. 413. Unit Operations
3-3-4. Prerequisite: Ch.E. 314.
Diffusional processes, including combined mass and heat transfer.
Text: Perry, Chemical Engineer's Handbook; McCabe and Smith, Unit Operations of Chemical Engineering, Mr. Grubb and Mr. Newton.

Ch.E. 431. Chemical Engineering Economics
3-0-3. Prerequisite: Ch.E. 315.
A study of techniques required in project analysis in areas of systems cost analysis and the use of the economic balance for design and optimization.

Ch.E. 434. Chemical Plant Design
1-6-3. Prerequisites: Chem. 333, Ch.E. 413, Mech. 302. Fall and spring.
A comprehensive problem in plant design.
Text: None. Mr. Lewis.

Ch.E. 435-436-437. Chemical Engineering Thermodynamics
3-0-3. Prerequisites: Chem. 333 and Ch.E. 315.
A study of the principles of thermodynamics with applications to the problems of industry. The areas covered include flow of compressible fluids, estimation and use of thermodynamic properties, charts and tables, power and refrigeration cycles, phase equilibria, chemical equilibria and properties of solutions.
Text: Hougen and Watson, Chemical Process Principles, Parts I and II; Weber and Meissner, Thermodynamics of Chemical Engineers.
Mr. Ziegler, Mr. Newton and Mr. Ward.

Ch.E. 443-444-445. Special Problems
0-3-1. Prerequisite: Ch.E. 314.
The student is given an opportunity to develop initiative and to apply fundamental principles by doing semi-original laboratory investigation of a chemical engineering research nature.
Text: None. Staff.

Ch.E. 446. Comprehensive Problems
3-0-3. Prerequisites: Ch.E. 408, 431, 436.
The integration of the professional work of the previous courses by means of a series of comprehensive problems.
Text: To be selected. Mr. Newton and Mr. Ward.

Ch.E. 447. Comprehensive Problems
3-0-3. Prerequisites: Ch.E. 446, 413, 407, 435, Met. 402.
Continuation of Ch.E. 446. Emphasis on Unit Operations.
Text: Perry, Chemical Engineer's Handbook. Staff.

Ch.E. 448. Comprehensive Problems
3-0-3. Prerequisites: Ch.E. 447, 408, 436, Met. 402.
A continuation of Ch.E. 447, with emphasis on thermodynamics.
Text: Perry, Chemical Engineer's Handbook. Staff.

Courses of Instruction in Metallurgy
NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.
*Met. 325. General Metallurgy
(Formerly Ch.E. 325)
3-0-3. Prerequisites: Chem. 103 and Physics 207.
An introductory survey of basic physical metallurgical concepts followed by a study of the characteristics and engineering applications of carbon steels, gray and malleable cast irons. Consideration is given to

*This course is not to be scheduled by chemical engineering students, since they are required to schedule Met. 401.
the engineering significance of static and dynamic properties of metals and alloys.


Met. 327. General Metallurgy  
(Formerly Ch.E. 327)  
3-0-3. Prerequisite: Met. 325.

A study of the characteristics and engineering applications of the more widely used nonferrous alloys. Consideration is given to powder metallurgy as a tool in the fabrication of metallic materials and also to some of the new alloys for ultra high temperature service.

Text: Raudebaugh, Nonferrous Physical Metallurgy. Staff.

Met. 401. Engineering Materials  
(Formerly Ch.E. 425)  
3-0-3. Prerequisite: Chem. 333.

Principles of physical metallurgy including binary phase diagrams and mechanical testing methods as applied to metallic materials. Production of iron, steel, and nonferrous metals is surveyed.

Text: Guy, Elements of Physical Metallurgy. Mr. Engel.

Met. 402. Engineering Materials  
(Formerly Ch.E. 426)  
3-3-4. Prerequisite: Met. 401.

A study of the properties and application of carbon and alloy steels, cast irons, and nonferrous alloys. Some time is devoted to corrosion as an engineering problem and methods utilized in minimizing its effects. Laboratory work consists of metallographic observation of common ferrous and nonferrous alloys in various conditions.

Text: Guy, Elements of Physical Metallurgy and Staff Notes. Mr. Engel.

Met. 411. Basic Extractive Metallurgy  
3-0-3. Prerequisite: Chem. 333 or equivalent.

Theory and practice of extraction and refining of ferrous and nonferrous metals. Calculations and re-actions related to pyrometallurgical and hydro-metallurgical extractive processes will be emphasized.

Text: Newton, Extractive Metallurgy. Staff.

Met. 421. Nonferrous Metallography  
(Formerly Ch.E. 428)  
2-3-3. Prerequisite: Met. 441 or 402, or equivalent.

The use of the microscope to study the influence of processing variables on the structure and properties of metals and alloys. Pyrometric instrumentation as applied to heat treating operations and thermal analysis of metals and alloys is also covered.

Text: Kehl, Metallographic Laboratory Practice. Mr. Engel.

Met. 422. Ferrous Metallography  
(Formerly Ch.E. 428)  
3-3-4. Prerequisite: Met. 401 and 402.

The influence of processing variables on the microstructure and properties of steels and ferrous alloys. Heat treat operations and thermal analysis of ferrous materials.


Met. 423. Metallurgical Fabrication  
3-0-3. Prerequisite: Met. 401.

Primary forming techniques and secondary fabrication and joining processes will be discussed. Some of the processes to be considered are casting, rolling, forging, welding, etc.

Text: Semans, Engineering Materials, the ASM Handbook and Staff Notes. Staff.

Met. 441. Theoretical Physical Metallurgy  
(Formerly Ch.E. 427)  
3-0-3. Prerequisites: Met. 402 and Chem. 333 or equivalent.

A study of the physical and mechanical properties of metals and alloys in the light of their structure.

Text: Azaroff, Introduction to Solids. Mr. Engel and Mr. Hochman.
Chemical Engineering / 77

Met. 445. Electron Microscopy

The theory and principles of electron optics and electron microscopy will be covered. Techniques of preparation and observation of materials by electron microscopy will be presented in lecture and applied in the laboratory.


Met. 461. Pyrometry
1-3-2. Prerequisite: Met. 402.

Temperature measurement and control methods. Dilations, resistance, thermoelectric, total radiation, and color pyrometry. Control devices and methods of obtaining constant temperature.

Text: To be selected. Staff.

Met. 463. Metallurgical Testing
2-3-3. Prerequisites: Met. 402, Phys. 319 or equivalent.

Destructive and non-destructive test methods are outlined. The emphasis will be on the significance of results and the choice of materials based on test data.

Text: Staff notes. Mr. Hochman.

Met. 464. Nondestructive Testing
2-3-3.

The principles and theory of current industrial nondestructive testing methods will be covered. The emphasis will be on testing the soundness and reliability of primary and secondary fabricated metal structures.

Text: Nondestructive Testing Handbook and Staff notes. Mr. Hochman.

Met. 491. Corrosion and Protective Measures
(Formerly Ch.E. 429)
3-0-3. Prerequisites: Chem. 333 and Met. 325 or 401.

The electrochemical theory of corrosion; recommended materials and protective measures for chemical processing equipment and for atmospheric, underground, underwater, and elevated temperature exposures.

Text: Staff notes. Mr. Hochman.

Graduate Courses Offered

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Ch.E. 613</td>
<td>Technology of Fine Particles</td>
<td>3-0-3</td>
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<tr>
<td>Ch.E. 619</td>
<td>Chemical Engineering Calculations</td>
<td>3-0-3</td>
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<tr>
<td>Ch.E. 620</td>
<td>Applied Mathematics in Chemical Engineering</td>
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<tr>
<td>Ch.E. 622</td>
<td>Applied Chemical Kinetics</td>
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<tr>
<td>Ch.E. 630</td>
<td>Radiochemical Separations Processes I</td>
<td>3-0-3</td>
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<td>Ch.E. 631</td>
<td>Radiochemical Separations Processes II</td>
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<td>Ch.E. 632</td>
<td>Nuclear Process Kinetics</td>
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<td>Ch.E. 646</td>
<td>Economic Analysis of Chemical Engineering Processes</td>
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<td>Ch.E. 701, 2, 3</td>
<td>Seminar</td>
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<td>Ch.E. 704, 5, 6</td>
<td>Special Topics in Chemical Engineering (Credit to be arranged)</td>
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<tr>
<td>Ch.E. 707, 8, 9</td>
<td>Organic Chemistry and Industry</td>
<td>3-0-3</td>
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<td>Ch.E. 713</td>
<td>Fluid Flow</td>
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<td>Ch.E. 714, 15</td>
<td>Heat Transmission</td>
<td>3-0-3</td>
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<td>Ch.E. 716, 17, 18</td>
<td>Advanced Unit Operations</td>
<td>3-0-3</td>
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<td>Ch.E. 719, 20, 21</td>
<td>Chemical Engineering Thermodynamics</td>
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<td>Ch.E. 724</td>
<td>Properties of Matter at Low Temperatures</td>
<td>3-0-3</td>
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<td>Ch.E. 725</td>
<td>Special Topics in Thermodynamics</td>
<td>3-0-3</td>
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<td>Ch.E. 732</td>
<td>Chemical Plant Design</td>
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<td>Ch.E. 740</td>
<td>High Pressure Technology, I</td>
<td>3-0-3</td>
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<td>Ch.E. 741</td>
<td>High Pressure Technology, II</td>
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<td>Ch.E. 742</td>
<td>High Pressure Technology, III</td>
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**Graduate Courses in Metallurgy**

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<tr>
<th>Course Code</th>
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<td>Met. 601, 2, 3</td>
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<td>Met. 604</td>
<td>Special Topics in Metallurgy</td>
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<td>Met. 614</td>
<td>Electrometallurgy</td>
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<td>Met. 621</td>
<td>Metallurgical Design Problems</td>
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<td>Met. 625</td>
<td>Powder Metallurgy</td>
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<td>Met. 633</td>
<td>High Temperature Metallurgy</td>
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<td>Met. 700</td>
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<td>Met. 741</td>
<td>Advanced Physical Metallurgy</td>
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<td>Met. 751</td>
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<td>Met. 781</td>
<td>Metallurgical Thermodynamics</td>
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<tr>
<td>Met. 785</td>
<td>Metallurgical Kinetics</td>
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</table>

(Complete details about these courses are contained in the *Graduate Bulletin*, a copy of which is available upon request.)
School of Chemistry
(Established in 1906)


General Information

Included in the School are:

1. The courses in chemistry required in the various engineering curricula.
2. A curriculum leading to the degree of Bachelor of Science in Chemistry.
3. Graduate courses and research leading to the degree of Master of Science in Chemistry, and Master of Science in Nuclear Science.
4. Graduate courses and research leading to the degree of Doctor of Philosophy in Chemistry.

The degree of Bachelor of Science in Chemistry will be awarded upon the completion of the following prescribed courses and 51 quarter hours of elective work. No elective course will be given for less than six applicants. A student must have had the prerequisites for any course he elects.

A prerequisite for senior courses is a minimum grade-point average of 2.0 in the following junior courses: Chem. 331, 332, 333, 334, 335, 340, 341, 342, 343, 344, and 345.
## Freshman Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
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<tr>
<td>Chem. 107-8-9*</td>
<td>General Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<td>Draw. 113</td>
<td>Engineering Graphics</td>
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<tr>
<td>Eng. 101-2</td>
<td>Composition and Rhetoric</td>
<td>3-0-3</td>
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<tr>
<td>Eng. 105</td>
<td>Introduction to Literature</td>
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<tr>
<td>Math. 100</td>
<td>Algebra and Trigonometry</td>
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<td>Math. 104</td>
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<td>Calculus</td>
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<td>M.L. 101-2-3**</td>
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<td>S.S. 111-12-13</td>
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**Totals** 18-14-20 17-8-18 17-8-18

NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*Chem. 101, 102, 103 may be scheduled. However, a minimum grade of C is required for Chem. 101 and 102 and the prerequisite for Chem. 214 is Chem. 103 with a grade of C or better or Chem. 109.

**The School of Chemistry recommends that German be taken in the Freshman year. However, should Social Science be taken in the freshman year, German must be elected in the junior year.

***For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

## Sophomore Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
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<tbody>
<tr>
<td>Chem. 214-15</td>
<td>Analytical Chemistry</td>
<td>2-6-4</td>
<td>2-6-4</td>
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<tr>
<td>Chem. 340</td>
<td>Organic Chemistry</td>
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<td>Chem. 343</td>
<td>Organic Chemistry Laboratory</td>
<td>3-0-3</td>
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<tr>
<td>Eng. 201-2-3</td>
<td>Survey of Humanities</td>
<td>5-0-5</td>
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<tr>
<td>Math. 202-3</td>
<td>Calculus</td>
<td>5-3-6</td>
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<td>Phys. 207-8-9</td>
<td>Physics</td>
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**Totals** 18-14-21 18-14-21 14-14-20

*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

## Junior Year

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<th>Subject</th>
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<td>Chem. 341-2</td>
<td>Organic Chemistry</td>
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<td>Chem. 344-5</td>
<td>Organic Chemistry Laboratory</td>
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<td>Chem. 410</td>
<td>Organic Analysis</td>
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<td>Chem. 331-2-3</td>
<td>Physical Chemistry</td>
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<td>Chem. 334-5-6</td>
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**Totals** 6-9-18 8-9-17 5-12-18

*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.
Chemistry

Senior Year

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<tr>
<th>Course No.</th>
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<tr>
<td>Chem. 400</td>
<td>Physical Chemistry</td>
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<tr>
<td>Chem. 403</td>
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<td>Chem. 405-6</td>
<td>Instrumental Analysis</td>
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<td>Inorganic Chemistry</td>
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<td>Chem. 437-8</td>
<td>Special Problems</td>
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<td>Chem. 443-4</td>
<td>Organic Reactions</td>
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<td>7-12-17</td>
<td>4-6-18</td>
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*Not more than 9 hours of electives may be in the advanced ROTC. At least 15 hours of electives must be selected from the humanities electives on page 34. Among these electives the second year of German and the first year of French or Russian are recommended. For nontechnical electives the school of Chemistry recommends Math. 304 (or 305 & 306), 309, 412, and 415. Physics 319, and the sequence 308, 320, 409, and 313.

Courses of Instruction

**NOTE:** 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Chem. 101, 102, 103. General Chemistry
3-3-4. Prerequisite: Entrance Requirements.
A lecture and laboratory study of the fundamental laws and theories of chemistry with abundant descriptive matter included to illustrate them. This course includes an introduction to qualitative analysis.
Texts: Sienko and Plane, Chemistry; Smith and Wood, Laboratory Manual for General Chemistry.
Mr. Stanfield and Staff.

Chem. 107, 108, 109. General Chemistry
3-3-4. Prerequisites: Chem. 107: Satisfactory Placement Examination; Chem. 108: Chem. 107 or B or better in Chem. 101, and consent of staff.
This series of courses is designed for those students planning to pursue advanced courses in chemistry. The approach is more quantitative and less descriptive than in Chem. 101, 102, and 103.
Text: To be selected.
Mr. Stanfield and Staff.

Chem. 110. General Chemistry
3-6-5. Prerequisite: Satisfactory Placement Examinations.
This is an accelerated course with emphasis on chemical equilibrium. The laboratory work will consist mainly of qualitative analysis.

This course makes it possible for the well prepared student to complete freshman chemistry in one quarter. If a grade of C or better is made, credit for Chemistry 108, 109 will be granted. If a grade of D is made, Chemistry 108, 109 or 102, 103 must be taken.
Text: Hogness and Johnson, An Introduction to Qualitative Analysis and Ryschkewitsch, Chemical Bonding and the Geometry of Molecules.
Mr. Hunt.

Chem. 214, 215. Analytical Chemistry
2-6-4. Prerequisites: Chem. 109, Chem. 110 or Chem. 103 with a grade of C or better.
A classroom and laboratory study of the laws, theories, and techniques of analytical chemistry. Problem work is stressed.
Text: To be selected. Mr. Flaschka and Mr. Sturrock.

3-3-4. Prerequisite: Chem. 103.
A study of the various classes of organic compounds at an elementary level with emphasis on applications to the textile field.
Text: Seymour, Introduction to Organic Chemistry. Mr. Caine and Mr. Kimbrough.
Chem. 331, 332, 333. Physical Chemistry
Physico-chemical properties of matter in the gaseous, liquid, and solid states; solutions; equilibrium, kinetics and thermodynamics of chemical reactions, electrochemistry.
Text: Moore, Physical Chemistry.
Mr. Spicer, Mr. Eberhardt and Mr. Carpenter.

Chem. 334, 335, 336. Physical Chemistry Laboratory
0-3-1. Prerequisites: Chem. 215.
To be taken concurrently with or following Chem. 331, 332, 333.
Text: Eberhardt, Physical Chemistry Laboratory Notes.
Mr. Eberhardt and Staff.

3-0-3. Prerequisite: Chem. 103 or Chem. 109.
The principal classes of organic compounds, aliphatic and aromatic, are studied.
Text: Morrison and Boyd, Organic Chemistry.
Mr. Dyer, Mr. Grovenstein and Mr. Cox.

Chem. 343, 344, 345. Organic Chemistry Laboratory
0-6-2. Prerequisite: Chem. 103 or 109. To be taken concurrently with or following Chem. 340, 341, and 342 respectively. But Chem. 343 is prerequisite to Chem. 344, 345.
Mr. Dyer and Staff.

Chem. 346, 347. Organic Chemistry Laboratory
0-3-1. Prerequisite: Chem. 343. To be taken concurrently with or following Chem. 341 and 342, respectively.
Organic preparations and reactions—similar to, but less extensive than, Chem. 344, 345.
Mr. Dyer and Staff.

Chem. 348. Physical Chemistry Laboratory
0-3-1. Prerequisite: Chem. 331, 332.
The study of physical properties of matter and the nature of chemical bonding.
Text: Cartmell and Fowles, Valency and Molecular Structure.
Mr. Bertrand and Mr. Royer.

Chem. 349. Inorganic Chemistry Laboratory
0-3-1. Prerequisite: Chem. 348.
Lectures, recitation and laboratory work on the preparation, properties, and practical application of colloidal substances.
Text: Jirgensons and Straumanis, A Short Textbook of Colloid Chemistry.
Mr. Topp.

Chem. 350, 351. Physical Chemistry Laboratory
0-3-1. Prerequisite: Chem. 331, 332.
The study of physical properties of matter and the nature of chemical bonding.
Text: Cartmell and Fowles, Valency and Molecular Structure.
Mr. Bertrand and Mr. Royer.

Chem. 352. Physical Chemistry Laboratory
0-3-1. Prerequisite: Chem. 331, 332.
The study of physical properties of matter and the nature of chemical bonding.
Text: Cartmell and Fowles, Valency and Molecular Structure.
Mr. Bertrand and Mr. Royer.

Chem. 353. Physical Chemistry Laboratory
0-3-1. Prerequisite: Chem. 331, 332.
The study of physical properties of matter and the nature of chemical bonding.
Text: Cartmell and Fowles, Valency and Molecular Structure.
Mr. Bertrand and Mr. Royer.
A classroom study of selected topics with emphasis on laws, principles and generalizations; the periodic classifications, atomic structure, natural and artificial radioactivity, valence, complex compounds, and other topics.

Mr. Royer and Mr. Bertrand.

Chem. 437, 438, 439. Special Problems
0-6-2. Prerequisites: Chem. 333, Chem. 345.
The instruction will be individual and will include library, conference, and laboratory work.
Text: None.
Staff.

Chem. 443, 444. Organic Reactions
3-0-3. Prerequisite: Chem. 342.
A study of the scope and usefulness of some important reactions and theories in organic chemistry.
Mr. Grovenstein and Mr. Hine.

Chem. 445. Biochemistry
3-0-3. Prerequisite: Chem. 342.
Lectures, independent reading, and discussion of topics relating to the chemistry and metabolism of plant and animal products.
Mr. Dyer and Mr. Cox.

Chem. 450. Chemical Bibliography
2-0-2. Prerequisites: Chem. 341 or concurrently.
A study of the chemical library with instruction in the use of chemical journals, reference books, and other sources of information.
Text: Notes.
Mr. Stanfield.

Chem. 460. Nuclear and Radiochemistry
3-3-4. Prerequisite: Chem. 103 or equivalent, and to be taken concurrently with or following Physics 675, Principles of Nuclear Physics.
A course for non-chemists, covering topics related to the production and utilization of nuclear energy, principles of inorganic chemistry, radiochemistry, and separation methods for the actinide elements and fission products.
Text: Notes.
Mr. Neumann.

Chem. 475. Physical Chemistry for Engineers
3-0-3. Prerequisite: M.E. 320 or equivalent.
This course is designed to familiarize students who have had some thermodynamics in other areas with the applications of thermodynamics to chemical systems and with a foundation of the modern theory of chemical bonding.
Text: Barrow, *Physical Chemistry*.
Mr. Sherry and Mr. Spicer.

Chem. 476. Chemistry of the Solid State
3-0-3. Prerequisite: Chem. 333 or Chem. 475.
Applications of the concepts developed in Chemistry 475 to the structure of solids and their chemical and physical properties.
Text: Barrow, *Physical Chemistry*.
Mr. Sherry.

Graduate Courses Offered

Chem. 631, 2 Organic Chemistry 3-0-3
Chem. 633, 4, 5 Reactivity, Mechanism, and Structure in Organic Chemistry 3-0-3
Chem. 639 Organic Chemistry 3-0-3
Chem. 644, 5 Molecular Structure and Chemical Principles 3-0-3
Chem. 651, 2 Introduction to Electro-Chemistry 3-0-3
Chem. 657 Radiochemistry 3-0-3
Chem. 658 Experimental Radiochemistry 1-3-2
Chem. 661, 2, 3 Chemical Thermodynamics 3-0-3
Chem. 664, 5, 6 Advanced Inorganic Chemistry 3-0-3
<table>
<thead>
<tr>
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<th>Credits</th>
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<tr>
<td>Chem. 674</td>
<td>Organic Reagents in Analytical Chemistry</td>
<td>3-0-3</td>
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<tr>
<td>Chem. 675</td>
<td>Electroanalytical Chemistry</td>
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<tr>
<td>Chem. 677</td>
<td>Advanced Analytical Chemistry</td>
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<tr>
<td>Chem. 679</td>
<td>Special Topics in Analytical Chemistry</td>
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<tr>
<td>Chem. 700</td>
<td>Master's Thesis</td>
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<td>Chem. 701, 2, 3</td>
<td>Seminar</td>
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<td>Chem. 710-1</td>
<td>Polymer Chemistry</td>
<td>3-0-3</td>
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<td>Chem. 733, 4</td>
<td>Organic Chemistry</td>
<td>3-0-3</td>
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<tr>
<td>Chem. 735, 6</td>
<td>Special Topics in Organic Chemistry</td>
<td>3-0-3</td>
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<tr>
<td>Chem. 747, 8, 9</td>
<td>Organic Chemistry</td>
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<tr>
<td>Chem. 757</td>
<td>Chemical Kinetics</td>
<td>3-0-3</td>
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<td>Chem. 760, 1</td>
<td>Special Topics in Physical Chemistry</td>
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<td>Chem. 764</td>
<td>Statistical Thermodynamics</td>
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<tr>
<td>Chem. 767, 8</td>
<td>Principles of Quantum Mechanics</td>
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<tr>
<td>Chem. 780, 1, 2</td>
<td>Molecular Spectra</td>
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<td>Chem. 800</td>
<td>Doctor's Thesis</td>
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</table>

(Complete details about these courses are contained in the *Graduate Bulletin*, a copy of which is available upon request.)
School of Civil Engineering
(Established in 1896)


General Information

The civil engineer conceives, designs and builds projects coordinating and utilizing natural and human resources for urban and regional development. He works in the following broad fields of specialization within the profession: structural and construction engineering, hydraulic engineering, sanitary engineering, transportation, soils engineering, municipal and regional engineering and management, surveying and mapping.

The functional phases of civil engineering are research and development, planning and design, construction, and operation and maintenance. In addition to specific civil engineering courses, the curriculum provides training in the physical and social sciences and selected subjects from the other engineering professions.

It is not the purpose of the four-year curriculum to cover in detail all that is known or considered in the profession or in any one of its branches. Rather, emphasis is placed on fundamental laws and concepts to enable the students to attack problems in a logical manner and to draw conclusions from principles and facts. Better students are urged to do graduate work.

Satisfactory completion of the four-year curriculum leads to the degree of Bachelor of Civil Engineering.

Laboratories

The School of Civil Engineering occupies all of the Civil Engineering Building and a portion of the Joint Highway Research Laboratory. Modern laboratories provide for practical experience and research in air pollution, building materials, fluid mechanics, foundation models, highway materials, hydraulics, hydrology, photogrammetry, radiological health, sanitary engineering, soil mechanics, stress analysis, structural models, and surveying.

*On leave.
## Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
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<th>3rd Q.</th>
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<tbody>
<tr>
<td>Chem.</td>
<td>101-2-3</td>
<td>General Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<tr>
<td>E.Gr.</td>
<td>113-14-15</td>
<td>Engineering Graphics</td>
<td>0-6-2</td>
<td>0-6-2</td>
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<tr>
<td>Eng.</td>
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<td>Composition and Rhetoric</td>
<td>3-0-3</td>
<td>3-0-3</td>
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<tr>
<td>Eng.</td>
<td>105</td>
<td>Introduction to Literature</td>
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<td>3-0-3</td>
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<tr>
<td>Math.</td>
<td>100</td>
<td>College Algebra and Trigonometry</td>
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<tr>
<td>Math.</td>
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<td>Analytic Geometry and Calculus</td>
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<tr>
<td>Math.</td>
<td>201</td>
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<td>5-0-5</td>
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<tr>
<td>M.L.</td>
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<td>Modern Language OR</td>
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<tr>
<td>S.S.</td>
<td>111-12-13</td>
<td>Social Science</td>
<td>3-0-3</td>
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<tr>
<td>P.T.</td>
<td>101-2-3</td>
<td>Physical Training</td>
<td>0-4-1</td>
<td>0-4-1</td>
<td>0-4-1</td>
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<td>Gen.</td>
<td>101</td>
<td>Orientation</td>
<td>1-0-0</td>
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</table>

Totals (excluding ROTC)**  15-13-18  14-13-18  14-13-18

NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish.
Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

**Most students must take 3 basic ROTC courses. For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin. (Students who are exempt from ROTC take 3 hours of electives.)

## Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
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<tbody>
<tr>
<td>C.E.</td>
<td>201-2</td>
<td>Surveying</td>
<td>3-3-4</td>
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<tr>
<td>Eng.</td>
<td>201-2-3</td>
<td>Survey of the Humanities</td>
<td>3-0-3</td>
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<tr>
<td>Mech.</td>
<td>305</td>
<td>Statics</td>
<td>3-0-3</td>
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<tr>
<td>Mech.</td>
<td>308</td>
<td>Dynamics</td>
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<td>Phys.</td>
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<td>Physical Training</td>
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</table>

Totals (excluding ROTC)*  16-10-19  16-7-18  16-10-19

C.E. 203, Surveying Camp (Offered during summer on the campus of North Georgia College, Dahlonega, Georgia.)**

*Most students must take 3 basic ROTC courses. For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin. (Students who are exempt from ROTC take 3 hours of electives.)

**Students who are exempt from C.E. 203, Surveying Camp, take C.E. 310. See course description for C.E. 203 and C.E. 310.
### Civil Engineering / 87

#### Junior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
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<tbody>
<tr>
<td>C.E. 302</td>
<td>Civil Engineering Seminar</td>
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<tr>
<td>C.E. 305-6</td>
<td>Structural Analysis I, II</td>
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<td>3-0-3</td>
<td>3-3-4</td>
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<tr>
<td>C.E. 309</td>
<td>Materials of Construction</td>
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<td>3-3-4</td>
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<tr>
<td>C.E. 321-23</td>
<td>Fluid Mechanics I, II</td>
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<td>3-3-4</td>
<td>3-0-3</td>
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<tr>
<td>C.E. 415</td>
<td>Sanitary Engineering I</td>
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<td>3-3-4</td>
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<tr>
<td>C.E. 431</td>
<td>Hydrology</td>
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<td>Geol. 201</td>
<td>General Geology</td>
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<td>Geol. 202</td>
<td>General Geology Laboratory</td>
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<td>I.M. 204</td>
<td>Economics</td>
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<td>I.M. 329</td>
<td>Survey in Business Law</td>
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<td>Math. 304</td>
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<td>M.E. 320</td>
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<td>19-3-20</td>
<td>13-9-16</td>
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*Selected from list on page 34.

#### Senior Year

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<tr>
<td>C.E.* 310</td>
<td>Advanced Surveying</td>
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<tr>
<td>C.E. 320</td>
<td>Fluid Mechanics Laboratory</td>
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<td>C.E. 403</td>
<td>Construction</td>
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<tr>
<td>C.E. 406</td>
<td>Reinforced Concrete Design</td>
<td>2-3-3</td>
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<td>C.E. 407</td>
<td>Metal Structural Design</td>
<td>4-3-5</td>
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<tr>
<td>C.E. 409</td>
<td>Soil Mechanics and Foundations</td>
<td>3-3-4</td>
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<td>C.E. 416</td>
<td>Sanitary Engineering II</td>
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<td>C.E. 424</td>
<td>Transportation Engineering</td>
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<td>C.E. 439</td>
<td>Structural Design</td>
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<td>E.E. 325</td>
<td>Electrical Circuits and Fields</td>
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<td>Eng. 315</td>
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<td>Eng. 320</td>
<td>Technical Writing</td>
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<td>15-12-19</td>
<td>15-9-18</td>
<td>14-12-18</td>
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</tbody>
</table>

*Students who take C.E. 203, Summer Surveying Camp, 6 credits, omit C.E. 310. See course description for C.E. 203.

**Nine hours of elective course work in Civil Engineering or another field must be chosen when preregistering for the first quarter of the senior year or before taking the first of such electives. Forms for use in requesting approval of an elective sequence are available in the office of the School of Civil Engineering. The elective sequence must lead to some goal chosen by the student and approved by the Director of the School of Civil Engineering.

#### Courses of Instruction

**Note:** 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

**C.E. 201. Plane Surveying**

3-3-4. Prerequisites: Math. 100 or 102, E.Gr. 113.

The theory and practice of surveying. The care and use of the level, tape and transit. Computation of areas; stadia; topographic mapping; map plotting; measurement of angles and direction; land surveying and construction surveys.

Text: Davis and Foote, *Surveying*.
C.E. 202. Route Surveying
3-3-4. Prerequisite: C.E. 201.
Reconnaissance, preliminary, location and construction surveys for routes; computation of circular, reverse, compound, parabolic and spiral curves; earthwork; the use of the mass diagram; effect of grades, distance and curvature.
Text: Meyer, Route Surveying.

C.E. 203. Surveying Camp, 4 weeks course during summer*. 6 hours credit
Prerequisites: C.E. 201, 202.
Observations on the Sun and Polaris. Calculation of azimuth, time, latitude and longitude. Precise tapping, leveling and triangulation. Topographic and route surveys including the use of photogrammetry. Plane table surveys; adjustment of instruments.
*This course should be scheduled between the Sophomore and Junior years. It is required to all Civil Engineering students except as follows:
Students who graduate under the Cooperative Plan and students who graduate under the Regular Navy R.O.T.C. program. These students may substitute C.E. 310 for C.E. 203.
Text: Same as for C.E. 201 and 202 plus Eichler and Tubis, Photogrammetry Lab Kit.

C.E. 204. Elementary Surveying
1-3-2. Prerequisites: Math. 100 or 101, 102. For non-C.E. students. Not offered winter quarter.
The use and maintenance of the level, transit and tape; surveying principles, including leveling, angles, direction, areas, traverses, stadia, topographic mapping, construction surveys and mechanical layout.
Text: Brinker and Taylor, Elementary Surveying.

C.E. 210. Civil Engineering Applications of Digital Computers
0-3-1. Prerequisite: Math. 104.
A study of the application of digital computers to the solution of Civil Engineering problems. Exercises will use an algebraic compiler language and selected numerical methods.
Text: Selected manuals.

C.E. 305. Structural Analysis I
3-0-3. Prerequisites: Mech. 334.
Determination of forces and moments resulting from fixed and moving load systems on statically determinate structures; emphasis placed on influence lines.
Text: Wilbur and Norris, Elementary Structural Analysis.

C.E. 306. Structural Analysis II
3-3-4. Prerequisites: C.E. 305, or Mech. 343.
Introduction to the analysis of statically indeterminate structures. The moment area theorems; virtual work; slope deflection equations and moment distribution. Applications to beams, frames and trusses.
Text: Same as for C.E. 305.

C.E. 309. Materials of Construction
3-3-4. Prerequisite: C.E. 302, Mech. 334.
Basic principles of the properties of materials. Physical, chemical and mechanical properties of metals, concrete, timber, masonry and asphalt. The laboratory period is for tests, demonstrations and writing reports.

C.E. 310. Advanced Surveying
4-6-6. Spring Quarter. Prerequisites: C.E. 202. For C.E. students exempt from C.E. 203, Summer Surveying Camp.
Field Astronomy; Precise tapping, leveling and triangulation. Errors
and adjustments of observations. Adjustment of instruments. Division of land areas. Elements of photogrammetry, stereoscopic instruments, mosaics.
Texts: Davis and Foote, *Surveying*; Eichler and Tubis, *Photogrammetry Laboratory Kit*.

**C.E. 320. Fluid Mechanics Laboratory**  
0-3-1. Prerequisite: C.E. 323.
Experiment, demonstration and analysis of basic fluid phenomena and exercise in laboratory techniques.
Text: Carstens and Jones, *Laboratory Manual*.

**C.E. 321. Fluid Mechanics I**  
3-3-4. Prerequisite: Mech. 308.
Elementary mechanics of fluids with emphasis on analysis. Fluid statics; fluid kinematics; equations of motion; energy equation; momentum principle; flow of liquids in pipes. The laboratory period is for supervised computation.
Text: Streeter, *Fluid Mechanics*.

**C.E. 322. Fluid Mechanics II**  
3-0-3. Prerequisite: C.E. 321.
Continuation of C.E. 321. Fluid measurements; uniform and non-uniform flow in open channels; principles of dynamic similitude; principles of selection and performance of pumps and turbines.
Text: Same as for C.E. 321.

**C.E. 323. Elements of Fluid Mechanics**  
3-3-4. Prerequisites: Mech. 308, For non-C.E. students.
Elementary mechanics of fluids in a single comprehensive course. Fluid statics; flow of ideal and real fluids; impulse-momentum principle; flow of incompressible fluids in pipes; fluid measurements. The laboratory period is for lecture, laboratory demonstration and supervised computation.

**C.E. 400. Reinforced Concrete Design**  
3-0-3. Prerequisite: C.E. 406. No credit for C.E. students.
Analysis and design of reinforced concrete foundations, slabs and building frames.
Text: Same as for C.E. 406.

**C.E. 403. Construction**  
2-3-3. Prerequisite: Senior standing. Restricted to C.E. students.
The relations of construction to design and ultimate use; the construction contract; basic machinery and construction operations; job planning, estimating; cost accounting; preparation of bids. The laboratory is for supervised problems and inspection trips.

**C.E. 406. Reinforced Concrete Design**  
2-2-3. Prerequisites: C.E. 305, or Mech. 343; C.E. 309 or Arch. 324.
Principles of design of structural elements including beams, columns, and slabs; consideration of bond stresses, diagonal tension effects, and web reinforcement; application to the design of elementary structures.

**C.E. 407. Metal Structural Design**  
2-2-3. Prerequisites: C.E. 305 and C.E. 309.
Principles of design of tension and compression members, beams, riveted and welded connections; application to the design of elementary structures.

**C.E. 409. Soil Mechanics and Foundations**  
4-3-5. Prerequisites: Mech. 334, C.E. 309 or Arch. 322, 323, 324.
An introduction to soils engineering. Origin and composition of soils; physical properties of soils as affecting engineering design and construction; soil sampling. Mechanics of soil masses and applications to design of footings, foundations, retaining walls.
and similar structures; construction of fills, subgrades and other soil structures. The laboratory period is for making soil tests.


C.E. 412. Applied Soil Mechanics
1-3-2. Prerequisite: C.E. 409. Spring Quarter.

The application of soil mechanics principles to problems in design. Planning and execution of soil investigations, foundation bearing capacity and structural settlement analyses, and field tests for foundation design. Laboratory period is for inspection trips and design problems.


C.E. 413. Structural Analysis III
2-3-3. Prerequisite: C.E. 306. Fall and Winter Quarters.

Structural analysis using electronic digital computers; programming methods; flexibility and stiffness concepts; matrix notation. The laboratory period is for supervised computation.

C.E. 414. Sanitary Engineering I
3-3-4. Prerequisite: Chem. 103, C.E. 321.

Introduction to public health engineering. The engineering theory and the public health, legal and economic factors involved in the development of sources of public and industrial water supplies; design and construction of distribution systems; principles of design and operation of water treatment works. The laboratory period is for supervised design problems and inspection trips.


C.E. 416. Sanitary Engineering II
3-3-4. Prerequisite: C.E. 431. Corequisite: C.E. 323.

Sanitation; rural sewage disposal; occupational health; quantity and quality of sewage and industrial wastes; theory of design and construction of collection works for sanitary and storm sewage; principles of design and operation of sewage and industrial waste treatment plants. The laboratory period is for supervised design problems and inspection trips.

Text: Babbitt and Baumann, *Sewage and Sewage Treatment*.

C.E. 424. Transportation Engineering
5-3-6. Prerequisites: C.E. 202, C.E. 309.

The history, economics, design and construction of roads and highways; urban and rural traffic problems; the fundamentals of air, rail and water transportation. The laboratory periods are for making tests and reports on bituminous and other highway materials and for supervised design problems.

Text: Ritter and Paquette, *Highway Engineering and notes*.

C.E. 426. Highway Economics
3-0-3. Prerequisite: C.E. 424.

The economics of highway construction, operation and maintenance; methods of financing.

C.E. 431. Hydrology
3-0-3. Prerequisites: C.E. 302, 321.

The occurrence and movement of water on and below the surface of the earth, emphasizing engineering applications to the control and utilization of surface and underground waters; elementary meteorology; precipitation, evaporation and runoff; infiltration and groundwater; hydrograph analysis; data collection.

Text: Wisler and Brader, *Hydrology*.

C.E. 433. Applied Hydraulics
3-0-3. Prerequisites: C.E. 323, C.E. 431. Fall Quarter.

Practice in the analysis and solution of hydraulics problems associated with the design of civil engineering structures. Typical exercises: stability of hydraulic structures; forces determined by flow net analysis; design of flood-control outlets, stilling basins, spillways, canals, culverts, pipe systems.

**C.E. 438. Elementary Aerial Photogrammetry**

2-3-3. Offered Fall Quarter only. Prerequisite: C.E. 203 or C.E. 310 or consent of instructor.


**C.E. 439. Structural Design**

5-3-6. Prerequisites: C.E. 306, 406, 407.

Integrated design of structures in metal and concrete. Typical topics: buildings, bridges, plate girders, plastic design in steel, ultimate strength design in concrete, concrete foundations and retaining walls.

Texts: Same as for C.E. 406 and C.E. 407.

**C.E. 440. Water Treatment**

3-0-3. Prerequisite: C.E. 415. Fall Quarter.

Quality and conditioning of municipal and industrial water supplies; clarification, softening, filtration, disinfection, corrosion control and miscellaneous treatment.


**C.E. 441. Sewage and Industrial Waste Treatment**

3-0-3. Prerequisite: C.E. 416. Winter Quarter.

The theory and principles of sewage and industrial waste treatment for water pollution control; principles of design and operation of treatment plants.


**C.E. 442. Applied Hydrology**

3-0-3. Prerequisites: C.E. 323, 431. Winter Quarter.

Applications of hydrology in the design of hydraulic structures for water supply, irrigation, power, drainage and flood control facilities, with attention to groundwater as well as surface water phenomena.

**C.E. 443. Water Resources Development**

3-0-3. Prerequisites: C.E. 323, 431, or consent of instructor. Spring Quarter.

Identification and evaluation of problems related to comprehensive water resources development, including flood management, hydroelectric power, navigation, water quality management, irrigation, and other objectives. Attention to socio-economic and policy implications.

**C.E. 444. Special Problems**

1 Credit.

**C.E. 445, 446. Special Problems**

2 Credits. Prerequisite: Senior standing.

Minor research or special problems involving analytical or experimental investigations to develop student initiative and technique under general supervision.

**C.E. 447. Engineering Astronomy**

2-3-3. Prerequisite: Math. 203. Winter Quarter.

Study of the celestial sphere including the horizon system, equator system and angular measurements. Study of the Sun, Moon, Earth and planets, including man's early theories of the universe. Study of time and the calendar. Determination of time, latitude, longitude and azimuth. Trips will be made to the Agnes Scott College Observatory.


**C.E. 448. Design in Timber and Prestressed Concrete**

2-3-3. Prerequisite: C.E. 406. Spring Quarter.

Use of prestressed concrete and timber in structural design. Typical
topics: Methods of prestressing concrete; analysis and design of structural elements of prestressed concrete and timber; design of joints in timber structures.

C.E. 449. Engineering Aspects of Environmental Health
3-0-3. Prerequisite: Biol. 428 or consent of instructor.

The functions and practices of local, state and federal health agencies; engineering control of insects, rodents and vermin; refuse disposal; swimming pools and recreational areas; housing; and engineering analysis in problems of epidemiology, industrial hygiene and atmospheric pollution, and water supply and waste disposal.

Graduate Courses Offered

C.E. 601 Advanced Aerial Photogrammetry 2-3-3
C.E. 602 Photographic Interpretation 1-3-2
C.E. 603 Geodetic Engineering 2-3-3
C.E. 604 Legal Principles of Land Surveying 2-3-3
C.E. 605 Dock, Harbor and Shore Structures 3-0-3
C.E. 607 Physical and Physico-Chemical Properties of Soils 3-0-3
C.E. 608 Soil Testing 1-3-2
C.E. 611 Advanced Soil Mechanics 3-3-4
C.E. 613 Reinforced Concrete Structures I 4-0-4
C.E. 614 Structural Planning 3-0-3
C.E. 617 Experimental Analysis 3-0-3
C.E. 621 Indeterminate Structural Theory I 4-0-4
C.E. 622 Indeterminate Structural Theory II 3-0-3
C.E. 625, 6 Steady Flow in Open Channels I and II 3-0-3
C.E. 627 Flow in Enclosed Conduits 3-0-3
C.E. 628 Sedimentation and Sediment Transport 3-0-3
C.E. 629 Mechanics of Flow in Porous Media 3-0-3
C.E. 632 Water Power Engineering 3-0-3
C.E. 633 Intermediate Fluid Mechanics 3-0-3
C.E. 635 Design and Construction of Airports 2-3-3
C.E. 636, 7, 8 Highway Transportation, I, II, and III 2-3-3
C.E. 639, 40 Sanitary Engineering Design I and II 3-3-4
C.E. 641 Concrete Mix Design 2-3-3
C.E. 649 Urban Sanitary Facilities 2-3-3
C.E. 650 Urban Transportation Facilities and Policies 3-3-4
C.E. 652 Air Pollution, Measurements and Control 3-3-4
C.E. 653 Analytical Methods for Air Pollution Studies 3-3-4
C.E. 654 Highway Transportation IV 3-0-3
C.E. 655 Asphalt Mix Design 2-3-3
C.E. 656 Pavement Design 2-0-2
C.E. 657 Advanced Topics in Hydromechanics 3-0-3
C.E. 662 Materials and Design for Radiation Shielding 2-3-3
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>C.E. 663</td>
<td>Technology in Water Resources Development</td>
<td>2-2-3</td>
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<tr>
<td>C.E. 664</td>
<td>Economics of Water Resources Development</td>
<td>2-2-3</td>
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<tr>
<td>C.E. 665</td>
<td>Seminar in Water Resources Engineering</td>
<td>2-2-3</td>
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<tr>
<td>C.E. 666</td>
<td>Flood Management</td>
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<td>C.E. 670</td>
<td>Advanced Structural Mechanics</td>
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<tr>
<td>C.E. 671</td>
<td>Plastic Design in Steel</td>
<td>4-0-4</td>
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<tr>
<td>C.E. 672</td>
<td>Reinforced Concrete Structures II</td>
<td>4-0-4</td>
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<tr>
<td>C.E. 677</td>
<td>Soil Construction</td>
<td>2-3-3</td>
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<tr>
<td>C.E. 678</td>
<td>Advanced Foundation Engineering</td>
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<tr>
<td>C.E. 682</td>
<td>Basic Radiological Health</td>
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<tr>
<td>C.E. 683</td>
<td>Environmental Radiation Surveillance</td>
<td>3-3-4</td>
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<tr>
<td>C.E. 684</td>
<td>Industrial Waste Treatment and Disposal</td>
<td>3-0-3</td>
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<td>C.E. 685</td>
<td>Sanitary Engineering Processes</td>
<td>3-3-4</td>
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<tr>
<td>C.E. 686</td>
<td>Sanitary Engineering Processes II</td>
<td>3-3-4</td>
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<tr>
<td>C.E. 687</td>
<td>Stream Analysis</td>
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<td>C.E. 700</td>
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<td>C.E. 701, 2, 3</td>
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<td>C.E. 704, 5, 6</td>
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<td>C.E. 716</td>
<td>Structural Dynamics</td>
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<td>C.E. 727</td>
<td>Theoretical and Applied Soil Mechanics I</td>
<td>4-3-5</td>
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<tr>
<td>C.E. 728</td>
<td>Theoretical and Applied Soil Mechanics II</td>
<td>3-3-4</td>
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<td>C.E. 730</td>
<td>Engineering Hydrodynamics</td>
<td>3-0-3</td>
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<tr>
<td>C.E. 735</td>
<td>Reinforced Concrete Structures III</td>
<td>4-0-4</td>
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<td>C.E. 737</td>
<td>Gravity-Wave Phenomena</td>
<td>3-0-3</td>
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<td>C.E. 750, 1, 2</td>
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<td>C.E. 753, 4, 5</td>
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<td>C.E. 756, 7, 8</td>
<td>Research Topic</td>
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<td>C.E. 800</td>
<td>Doctor's Thesis</td>
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</table>

(Complete details about these courses are contained in the Graduate Bulletin, a copy of which is available upon request.)
School of Electrical Engineering


General Information

Almost every part of our society is influenced by the work of electrical engineers. They have long pioneered the fields of control, power, and communication and without controlled electricity, industry as we know it simply could not exist. Today electricity and electronics are expanding anew into the non-industrial world — into commerce, medicine, astronomy, and a seemingly endless array of diverse areas. The large-scale computer is becoming almost as familiar a sight in the insurance company office as it is in the scientific laboratory. The revolutionary achievements of the past have made electricity the servant of society. There is every reason to believe that the achievements of electrical engineering will be even more revolutionary in the future.

The School of Electrical Engineering offers a program that prepares its graduates to enter any phase of electrical engineering. Accordingly, all students are required to master the fundamentals of mathematics, physics, and electrical theory. Mastery of these fundamentals enables the student to learn quickly the techniques that are necessary for any special job. Moreover, a thorough mastery of fundamental concepts puts the student in a position to help extend knowledge in his own special field or even originate new fields that are unknown at the present.

Laboratory work is included, where appropriate, in the electrical engineering program to accustom the student to the use of electrical equipment and to develop his skill in practice as well as theory. Finally, a broad range of humanistic studies is included to help the engineer recognize and fulfill his responsibilities as a citizen and at the same time to prepare him for the day when he may leave strictly engineering work to assume administrative responsibilities.

The School of Electrical Engineering requires a scholastic average of C in the prescribed courses in mathematics, physics and electrical engineering. Students who fail to meet this requirement may continue in the School only on a probationary status.

*On leave
# Courses of Instruction

## Freshman Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
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<tbody>
<tr>
<td>Chem. 101-2-3</td>
<td>Inorganic Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<tr>
<td>Draw. 113-14-15</td>
<td>Engineering Graphics</td>
<td>0-6-2</td>
<td>0-6-2</td>
<td>0-6-2</td>
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<tr>
<td>Eng. 101-2</td>
<td>Composition and Rhetoric</td>
<td>3-0-3</td>
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<tr>
<td>Eng. 105</td>
<td>Introduction to Literature</td>
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<tr>
<td>Math. 100</td>
<td>Algebra-Trigonometry</td>
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<tr>
<td>Math. 104</td>
<td>Analytical Geometry-Calculus</td>
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<td>5-0-5</td>
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<td>Math. 201</td>
<td>Calculus</td>
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<tr>
<td>M.L. *</td>
<td>Modern Language OR</td>
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<tr>
<td>S.S. 111-12-13</td>
<td>Social Science</td>
<td>3-0-3</td>
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<tr>
<td>P.T. 101-2-3</td>
<td>Physical Training</td>
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<td>ROTC **</td>
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<td>Gen. 101</td>
<td>Orientation</td>
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**Totals** 18-14-20 17-14-20 17-14-20

*Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish.
Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

**For course numbers and descriptions see the appropriate ROTC sections of this Bulletin. Only 6 credit hours of basic ROTC may be applied toward meeting degree requirements.

## Sophomore Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tr>
<td>E.E. 205-6</td>
<td>Elements of Elec. Engineering</td>
<td>2-3-3</td>
<td>2-3-3</td>
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<tr>
<td>Eng. 201-2-3</td>
<td>Survey of the Humanities</td>
<td>3-0-3</td>
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<tr>
<td>Math. 202-3</td>
<td>Calculus</td>
<td>5-0-5</td>
<td>5-0-5</td>
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<tr>
<td>Math. 304</td>
<td>Differential Equations</td>
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<td>Phys. 207-8-9</td>
<td>Physics</td>
<td>5-3-6</td>
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<td>L.M. 204</td>
<td>Economics</td>
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<td>P.T. 201-2-3</td>
<td>Physical Training</td>
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**Totals** 19-8-20 18-11-20 18-11-20

**For course numbers and descriptions see the appropriate ROTC sections of this Bulletin. Only 6 credit hours of basic ROTC may be applied toward meeting degree requirements.

## Junior Year

<table>
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<th>Subject</th>
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<td>E.E. 311-12-13</td>
<td>Electric Circuits</td>
<td>3-3-4</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<tr>
<td>E.E. 304-5-6</td>
<td>Engineering Electronics</td>
<td>3-3-4</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<tr>
<td>E.E. 308</td>
<td>Electric Fields and Waves</td>
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<td>3-0-3</td>
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<tr>
<td>E.E. 342</td>
<td>Electrical Measurements</td>
<td>3-3-4</td>
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<tr>
<td>Eng. 315</td>
<td>Public Speaking</td>
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<tr>
<td>Mech. 306</td>
<td>Applied Mechanics</td>
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<tr>
<td>Mech. 331</td>
<td>Mechanics of Materials</td>
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<td>Humanities</td>
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**Totals** 17-6-19 12-9-18 15-6-17

*Humanities elective must be selected from the approved list on page 34 of this bulletin.
Senior Year

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<td>3-3-4</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<td>409-10</td>
<td>Electric Fields and Waves</td>
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<td>414</td>
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<td>320</td>
<td>Thermodynamics</td>
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<td>320</td>
<td>Technical Writing</td>
<td>8-0-8</td>
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<td>17-3-18</td>
<td>16-6-18</td>
<td>16-3-17</td>
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</table>

***Of the 36 hours of electives in the junior and senior years, at least 11 hours must be in electrical engineering courses at the 400 level or above. A maximum of nine hours of these electives may be in advanced ROTC courses.

Courses of Instruction

**NOTE:** 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

**E.E. 205. Elements of Electrical Engineering**

2-3-3. Prerequisites: Physics 207, Math. 201.


Text: Lecture notes. Mr. White.

**E.E. 206. Elements of Electrical Engineering**


An introduction to the theory of electric and magnetic fields.

Text: Lecture notes. Mr. Hurd.

**E.E. 304. Engineering Electronics**

3-3-4. Prerequisite: E.E. 206.

A basic study of the electronic structure of matter related in particular to the conduction process and other processes which govern the behaviour of solid state electronic devices and of electron tubes.

Text: Sproull, Modern Physics. Mr. Hurd.

**E.E. 305. Engineering Electronics**

3-3-4. Prerequisites: E.E. 304, 311.

An introduction to electronic circuits. Includes a study of equivalent plate circuits, amplifiers, rectifier systems, thyatron and phototube circuits. Lectures, recitation, computing, and laboratory periods.

Text: Angelo, Electronic Circuits. Mr. Hurd.

**E.E. 306. Engineering Electronics**

3-3-4. Prerequisite. E.E. 305.

A continuation of E.E. 305. Includes a study of oscillators, modulation and detection, transistors, and transistor circuits. Lectures, recitation, computing and laboratory periods.

Text: Angelo, Electronic Circuits. Mr. Hurd.

**E.E. 308. Electric Fields and Waves**

3-0-3. Prerequisites: E.E. 206, Math. 304.

An introduction to electromagnetic theory including the study of vector analysis, Maxwell's equations, static electric and magnetic fields, and fields and matter.


**E.E. 311, 312, 313. Electric Circuits**

3-3-4. Prerequisites: E.E. 205, Math. 304 or parallel.

A study of the transient and steady-state responses of RLC networks to a variety of types of forcing functions. Solutions of the differential equations for dynamic equilibrium lead to the concepts of com-
plex impedance and complex frequency. These results are used to analyze single-phase and three-phase circuits, resonant circuits, coupled circuits and others of special interest. Introductions to Laplace transforms and Fourier integrals are included. Text: Van Valkenburg, Network Analysis. Notes. Mr. Su.

**E.E. 315. Mechanical Plant of Buildings**
3-0-3. Prerequisite: Senior Architecture standing. Not to be scheduled for credit if credit for E.E. 331 has been earned.
A study of the design of wiring and lighting systems for buildings. Text: To be selected. Mr. Hagedorn.

**E.E. 325. Electric Circuits and Fields**
2-3-3. Prerequisite: Physics 208. For non-Electrical Engineering students. Not to be scheduled for credit if credit for E.E. 320 or E.E. 316 has been earned.
A study of magnetic and electric fields; electric circuits with a-c or d-c excitation. Lectures, recitations, computation and laboratory periods. Text: E. E. notes. Mr. Wallace.

**E.E. 326. Elementary Electronics**
2-3-3. Prerequisite: E.E. 325. For non-Electrical Engineering students. Not to be scheduled for credit if credit for E.E. 322 has been earned.
This course is an introduction to electronic and semiconductor devices and includes a study of circuits containing these elements, such as amplifiers and oscillators. Text: E. E. notes. Mr. Wallace.

**E.E. 327. Electric Power Conversion**
2-3-3. Prerequisite: E.E. 325. For non-Electrical Engineering students. Not to be scheduled for credit if credit for E.E. 321 or E.E. 317 has been earned.

**E.E. 328. Electronic Control**
3-3-4. Prerequisites: E.E. 326 and E.E. 327. For non-electrical Engineering students. Not to be scheduled for credit if credit for E.E. 322 has been earned.

**E.E. 342. Electrical Measurements**
3-3-4. Prerequisite: E.E. 312, or concurrently.
This course includes the modern methods of measuring resistance, current, capacitance, inductance and iron losses, and the calibration of electrical instruments. Lectures, recitations, computing and laboratory periods. Text: Stout, Basic Electrical Measurement. Mr. Nottingham.

**E.E. 408. Electrical Control Systems**
3-3-4. Prerequisite: E.E. 413 or parallel.
This course deals with systems of electromagnetic and electronic control of electrical machinery, including such special machines as the amplidyne, rototrol, amplistat, sel-syn, and electronic drive. Lectures, recitations, computing and laboratory periods. Text: R. W. Jones, Electrical Control Systems. Mr. Weston.

**E.E. 409. Electric Fields and Waves**

**E.E. 410. Electric Fields and Waves**
3-3-4. Prerequisite: E.E. 409.
A continuation of E.E. 409. Quasi-static fields, steady-state and trans-
ient response of lossless transmission lines, dissipative transmission lines, radiation and antennas.

3-3-4. Prerequisites: E.E. 308 and E.E. 313.
A study of electromechanical energy conversion methods and devices. Includes a study of transformers, rotating machinery and transducers.

E.E. 414. Electric Circuits
3-0-3. Prerequisite: E.E. 313.
A continuation of E.E. 313. Laplace transforms and Fourier integrals are used to study the behavior of electric and electromechanical systems.
Text: Cheng, *Analysis of Linear Systems.* Mr. Fielder.

E.E. 415. Principles of Feedback Control
3-3-4. Prerequisite: E.E. 414.
A basic study of closed-loop systems utilizing frequency response analysis. Synthesis techniques are developed for desired performance criteria. Electrical, mechanical and hydraulic systems are considered.
Text: Thaler and Brown, *Servomechanism Analysis.* Mr. Hammond.

E.E. 416. Electronic Computation
3-3-4. Prerequisites: E.E. 306 and E.E. 414.
A study of the basic principles of analog computation.

E.E. 417. Pulse Circuits
A study of the theory and design of pulse circuits with applications to electronic computers, radar and television circuits.

E.E. 419. Power System Analysis
3-0-3. Prerequisites: E.E. 313 and E.E. 308.
A study of power system parameters, fault currents, stability and protective relaying.

E.E. 422. Industrial Electronics
3-3-4. Prerequisites: E.E. 306 and E.E. 313.
Theory and operating characteristics of electronic power conversion and industrial electronic control devices. Laboratory and problem work are included.
Text: To be selected.
Mr. Nottingham.

E.E. 428, 429, 430. Communication Engineering
3-3-4. Prerequisites: E.E. 306, 313, and Math. 304.
An analytical study of radio circuit components, audio- and radio-frequency amplifiers, oscillators, radio-frequency power amplifiers, modulators and detectors. A study of transmitting and receiving systems including frequency-modulation, amplitude-modulation, and television. Some emphasis is placed on the inherent problem involving frequency- allocation, interference, and propagation. Lectures, recitation, computing and laboratory periods.

E.E. 432. Communication Circuits
3-3-4. Prerequisite: E.E. 313.
A study of communication circuits and electric filters. Lectures, recitations, computing and laboratory periods.

E.E. 434. High-Frequency Measurements
3-0-3. Prerequisites: E.E. 342 or parallel.
A study of the techniques employed in the measurement of voltage,
current, power, inductance, resistance and capacitance at audio and radio frequencies.

Text: To be selected. Mr. Paris.

E.E. 435. Transistor Circuit Analysis
3-3-4. Prerequisites: E.E. 306, 313.

After a short review of transistor parameters and equivalent circuits, quiescent-point and stability considerations are discussed. The analysis and design of both small-signal and large-signal amplifiers, transistor oscillators, modulators and pulse circuits are studied.


E.E. 436. Ultra-High-Frequency Techniques
3-3-4. Prerequisite: E.E. 409.

Elective for undergraduates and first-year graduate students. Primarily concerned with rectangular and cylindrical waveguides and resonators; qualitative study of klystrons, magnetrons, and travelling wave tubes; introduction to ferrite devices, such as gyrators and ferrite isolators. Laboratory experiments are concerned with basic measurements of frequency, SWR, attenuation, etc., at microwave frequencies.


E.E. 441. Illumination
3-3-4. Prerequisite: E.E. 313.

A course dealing with the scientific principles of illumination. Light sources and their application in industrial and commercial areas. Some emphasis is placed on building wiring, the National Electrical Code, and electrical specifications: Lectures, recitation, computing and laboratory periods.

Text: Boast, Illumination Engineering. Mr. McKinley.

E.E. 442. Electrical Design
3-3-4. Prerequisites: E.E. 413 or parallel.

Design problems of various types of apparatus involving the electric and magnetic circuits. Lectures and computing periods.

Text: Kuhlmann, Design of Electrical Apparatus. Mr. Perkins.

E.E. 443. Linear Graph Theory
3-0-3. Prerequisites: E.E. 312, Math. 304.


Text: Seshu and Reed, Linear Graphs and Electrical Networks. Mr. Fielder.

E.E. 452-453-454. Special Problems
0-3-1. Prerequisite: Senior E.E. standing.

Special engineering problems will be assigned to the student according to his needs and capabilities.

Text: None. Staff.

Graduate Courses Offered

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.E. 605</td>
<td>Symmetrical Components</td>
<td>3-3-4</td>
</tr>
<tr>
<td>E.E. 608</td>
<td>Power System Relaying</td>
<td>3-3-4</td>
</tr>
<tr>
<td>E.E. 609</td>
<td>Digital Control Circuits</td>
<td>3-0-3</td>
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<tr>
<td>E.E. 622, 3</td>
<td>Advanced Electrical Transients</td>
<td>3-0-3</td>
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<tr>
<td>E.E. 624</td>
<td>Advanced Electrical Measurements</td>
<td>3-3-4</td>
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<tr>
<td>E.E. 625, 6, 7</td>
<td>Feedback Control Systems</td>
<td>3-3-4</td>
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<tr>
<td>E.E. 632</td>
<td>Transistor Circuits</td>
<td>3-0-3</td>
</tr>
<tr>
<td>E.E. 634</td>
<td>Antenna Systems</td>
<td>4-3-5</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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</tr>
<tr>
<td>E.E. 638</td>
<td>Random Processes</td>
<td>3-0-3</td>
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<tr>
<td>E.E. 639</td>
<td>Electromagnetic Theory</td>
<td>3-0-3</td>
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<tr>
<td>E.E. 640</td>
<td>Wave Guides and Cavity Resonators</td>
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<tr>
<td>E.E. 647</td>
<td>Communication Circuits and Signals</td>
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<tr>
<td>E.E. 648</td>
<td>Modulation Theory</td>
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<td>E.E. 649</td>
<td>Noise in Communications Systems</td>
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<td>E.E. 650</td>
<td>Power System Stability</td>
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<td>E.E. 651</td>
<td>Electrical Properties of Materials</td>
<td>3-0-3</td>
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<tr>
<td>E.E. 652</td>
<td>Magnetic and Dielectric Properties of Materials</td>
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<tr>
<td>E.E. 659</td>
<td>Information Theory</td>
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<td>E.E. 660</td>
<td>Optimum Linear Filters</td>
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<tr>
<td>E.E. 661</td>
<td>Statistical Decision Theory</td>
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<tr>
<td>E.E. 662</td>
<td>Advanced Network Theory</td>
<td>3-3-4</td>
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<tr>
<td>E.E. 668</td>
<td>Statistical Theory of Measurement Systems</td>
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<td>E.E. 671</td>
<td>Hydromagnetics</td>
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<td>E.E. 672</td>
<td>Gaseous Electronics</td>
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<td>E.E. 673</td>
<td>Gaseous Discharges</td>
<td>3-0-3</td>
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<tr>
<td>E.E. 677</td>
<td>The Physical Basis of Electronic Devices</td>
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<td>E.E. 680</td>
<td>Tenor Analysis of Circuits</td>
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<tr>
<td>E.E. 681</td>
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<tr>
<td>E.E. 682</td>
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<td>E.E. 700</td>
<td>Master's Thesis</td>
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<td>E.E. 701</td>
<td>Seminar</td>
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<tr>
<td>E.E. 704</td>
<td>Special Problems</td>
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<tr>
<td>E.E. 718</td>
<td>Nonlinear Random Processes</td>
<td>3-0-3</td>
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<tr>
<td>E.E. 734</td>
<td>Oscillators</td>
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<tr>
<td>E.E. 745</td>
<td>Advanced Electromagnetic Theory</td>
<td>3-3-4</td>
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<tr>
<td>E.E. 750</td>
<td>Advanced Analysis and Synthesis of Automatic</td>
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<td>Control Systems</td>
<td>4-3-5</td>
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<td>E.E. 751</td>
<td>Random Processes in Automatic Control Systems</td>
<td>3-0-3</td>
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<td>E.E. 762</td>
<td>Advanced Network Theory II</td>
<td>3-0-3</td>
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<tr>
<td>E.E. 800</td>
<td>Doctor's Thesis</td>
<td></td>
</tr>
</tbody>
</table>

(Complete details about these courses are contained in the *Graduate Bulletin*, a copy of which is available upon request.)
Engineering Graphics

Department Head—R. Kenneth Jacobs; Associate Professor—Joseph C. Darden, Jr.; Assistant Professors—Ishmael L. Ellis, Everard M. Heim, G. Dewey Hilding, John D. Hutcheson, Donald H. Smith, Earl M. Wheby; Lecturers—Joseph W. Adams, Theodoric C. Linthicum, Robert H. Smith; Teaching Assistants—John G. Nevitt, Hardy J. Smith; Secretary—Sarah Stephens.

General Information

Graphics has long been a language of the Engineer. It has endured through the years because it is the most flawless means of communication yet invented by man. Where the spoken word or the written document is always subject to misinterpretation, a well executed graphical analysis conveys the thought or plan exactly as intended.

As the line of demarcation between the efforts of engineers and scientists continues to diminish, it becomes increasingly imperative that rapid communication between them be extended and improved. Engineering Graphics, or Graphic Science, not only supplies the common language linking the closely oriented fields of engineering and science, it also takes on the added task of providing the engineer with means of expression in his newer role in the area of analysis and synthesis without relinquishing his command in design, which has long been his primary responsibility. This nowise ignores the cultural attainments arising from study in this discipline which, for many, initiates first steps into our modern and ever changing world of precise measurements, spatial relationships, and clear thinking.

To visualize in three dimensions and to express thoughts and ideas in concise form readily understood by those conversant with the common language is one of the essentials for growth in engineering and allied sciences. Setting a climate conducive to the student's development in this phase of his education is the aim and purpose of the department.

While all students at Georgia Tech do not pursue identical courses in Graphics, since the subject matter is suited to specific needs of the various disciplines, it is expected that the able student will reach that level of graphics literacy whereby he may live comfortably within his professional environment.

Courses of Instruction

Note: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit. Students are expected to use drawing instruments approved by the Department of Engineering Graphics. Transfer students should present their drawings to the department when applying for credit.

E.Gr. 105. Managerial Graphics
0-6-2. Prerequisite: None. Not open to students with credit in E.Gr. 113 or equivalent.
Effective communication between manager, engineer, and technician through application of basic drafting principles. Presentation of technical data and business trends in industry through creative construction of graphs, charts, and nomograms.
Text: Luzadder, Basic Graphics, and Departmental Notes.
Mr. Wheby and Staff.
E.Gr. 106. Charts and Graphs
0-6-2. Prerequisite: E.Gr. 113 or equivalent.
Topics of study include working drawings; operational drawings and specifications; theory and construction of charts and graphs used to present technical data and trends in business.
Text: Luzadder, Basic Graphics, and Departmental Notes.
Mr. Wheby and Staff.

E.Gr. 113. Engineering Graphics
0-6-2. Prerequisite: None.
Topics of study include lettering (capital and lower case); the use of instruments; geometric construction; orthographic projection; emphasis on descriptive geometry concepts as applied to the solution of problems involving orthographic projection of solids, auxiliary views, and points, lines and planes.
Mr. Jacobs and Staff.

E.Gr. 114. Engineering Graphics
0-6-2. Prerequisite: E.Gr. 113.
Topics of study include the solution of problems involving points, lines, and planes by use of the revolution method; intersection of surfaces; development of surfaces; warped surfaces; Practical applications are emphasized.
Mr. Durden and Staff.

E.Gr. 115. Engineering Graphics
0-6-2. Prerequisite: E.Gr. 114.
Topics of study include sections and conventions; dimensioning; pictorial representation; detail sketches; shop processes; assembly drawings from detail sketches; working pictorial sketches; introduction to charts and graphs; reproduction processes, ink tracing on cloth; graphical calculus.
Mr. Heim and Staff.

E.Gr. 304. Graphic Statics I
0-3-1. Prerequisite: One of the following courses: Mech. 301, Mech. 305, Mech. 306, or Mech. 342.
Graphical solutions of coplanar force systems, resultants, equilibrium of simple structures, funicular polygon through three points, trusses, friction.
Text: Lecture Notes and Departmental Work Sheets.
Mr. D. H. Smith and Staff.

E.Gr. 305. Graphic Statics II
1-3-2. Prerequisites: E.Gr. 114, E.Gr. 304 or consent of instructor.
Graphical solutions of three dimensional force systems and structures; graphical integration and funicular polygon solutions of area properties and beam slopes and deflections.
Text: Lecture Notes and Departmental Work Sheets.
Mr. Durden.
School of Engineering Mechanics


General Information

Engineering Mechanics has long been recognized as a fundamental of engineering, and all engineering curricula include some courses in mechanics. Recent advances in science and technology are creating problems which are demanding for their solution the direct application of fundamental principles of mechanics in the hands of a trained analyst. The course of study offered here provides both breadth and depth through a strong foundation in mathematics, basic electricity and electronics, dynamics and vibration, advanced strength of materials, theoretical and experimental stress analysis. Successful completion of the program outlined should enable the graduate to enter upon a career in any one of a number of different phases of engineering or to fit into a research program. An excellent background is also provided for further study at the graduate level.

A minimum scholastic average of C is required in the prescribed courses in mathematics, physics and engineering mechanics. Students who fail to meet this requirement may continue only on a probationary status.

A modern well-equipped laboratory is maintained for experimentation and demonstration in the field of experimental stress analysis. There is an air conditioned dark room and the required equipment for photoelastic studies and experiments. The necessary machines for production of models and specimens are available.

The School of Engineering Mechanics offers a four year undergraduate program of study leading to the degree Bachelor of Science in Engineering Mechanics and graduate programs leading to the Master of Science and Doctor of Philosophy degrees. The requirements for the B.S. in Engineering Mechanics are listed on the following pages; the requirements for the M.S. and Ph.D. degrees may be found in the Graduate Bulletin.
Freshman Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 101-2-3</td>
<td>General Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<tr>
<td>E.Gr. 113-14-15</td>
<td>Engineering Graphics</td>
<td>0-6-2</td>
<td>0-6-2</td>
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</tr>
<tr>
<td>Eng. 101-2</td>
<td>Composition and Rhetoric</td>
<td>3-0-3</td>
<td>3-0-3</td>
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<tr>
<td>Eng. 105</td>
<td>Introduction to Literature</td>
<td>3-0-3</td>
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<tr>
<td>Math. 100</td>
<td>College Algebra and Trigonometry</td>
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<tr>
<td>Math. 104</td>
<td>Analytical Geometry and Calculus</td>
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<tr>
<td>Math. 201</td>
<td>Calculus</td>
<td>5-0-5</td>
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<tr>
<td>M.L.*</td>
<td>Modern Language, OR</td>
<td>3-0-3</td>
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<tr>
<td>S.S. 111-12-13</td>
<td>Social Science</td>
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<tr>
<td>P.T. 101-2-3</td>
<td>Physical Training</td>
<td>0-4-1</td>
<td>0-4-1</td>
<td>0-4-1</td>
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<tr>
<td>Gen. 101</td>
<td>Orientation</td>
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<td><strong>Totals (excluding ROTC</strong>)**</td>
<td>15-13-18</td>
<td>14-13-18</td>
<td>14-13-18</td>
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</table>

NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish. Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.**

**Most students must take two years of basic ROTC. For further details see page 30. For course numbers and credits, see the course descriptions under the appropriate ROTC sections of this Bulletin.

Sophomore Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. 201-2-3</td>
<td>Survey of Humanities</td>
<td>3-0-3</td>
<td>3-0-3</td>
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<tr>
<td>Math. 202-3</td>
<td>Calculus</td>
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<tr>
<td>Math. 304</td>
<td>Differential Equations</td>
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<td>Phys. 207-8-9</td>
<td>Physics</td>
<td>5-3-6</td>
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<tr>
<td>M.E. 208</td>
<td>Engineering Materials and Processes</td>
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<tr>
<td>Mech. 305</td>
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<td>P.T. 201-2-3</td>
<td>Physical Training</td>
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<td>16-7-18</td>
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*Humanities elective must be elected from the approved list on page 34.
### Junior Year

<table>
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<th>Course No.</th>
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<th>3rd Q.</th>
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<td>Physical Chemistry for Engineers</td>
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<td>Chem. 476</td>
<td>Chemistry of the Solid State</td>
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<td>Eng. 320</td>
<td>Technical Writing</td>
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<td>Math. 411</td>
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<td>Phys. 319</td>
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Totals 16-3-17 17-3-18 18-0-18

*Of the 24 hours of undesignated electives in the junior and senior years, at least 9 hours must comprise a sequence of technical courses leading to some goal. A maximum of 9 hours of these electives may be in advanced ROTC.

### Senior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<td>Dynamics</td>
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<td>Applied Vibration</td>
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<td>Mech. 441</td>
<td>Advanced Strength of Materials</td>
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<td>Mech. 444</td>
<td>Stress Analysis</td>
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<td>Mech. 446</td>
<td>Continuum Mechanics</td>
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<td>Mech. 471</td>
<td>Introduction to Experimental Stress Analysis</td>
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<td>M.E. 310</td>
<td>Fluid Mechanics</td>
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<td>6-0-6</td>
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</table>

Totals 18-0-18 15-6-17 16-6-18

*Math. 491, Advanced Calculus, (3-0-3) may be substituted for Math. 413.

**Courses of Instruction**

**Engineering Mechanics**

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

**Mech. 301. Applied Mechanics**

2-0-2. Prerequisites: Phys. 207; and Math. 203 or concurrently.

Topics of study include elements of statics; laws of equilibrium applied to machines and structures; laws of friction applied to simple machines.

Mech. 302. Applied Mechanics
2-0-2. Prerequisites: Mech. 301, or Mech. 305; Math. 203 or concurrently.

Topics of study include elements of rectilinear and curvilinear kinematics, kinetics of particles, and kinetics of translation of bodies with applications.


Mech. 303. Applied Mechanics
3-0-3. Prerequisites: Mech. 302; Math. 203.

Topics of study include kinematics and kinetics of rotating bodies; kinematics and kinetics of plane motion; work, power, energy, and their relationships.


Mech. 305. Statics
3-0-3. Prerequisites: Phys. 207; Math. 203 or concurrently.

Topics of study include elements of statics in two and three-dimensions; review of centroids and moments of inertia of areas; laws of equilibrium applied to machines and structures; friction.


Mech. 306. Applied Mechanics
5-0-5. Prerequisites: Math. 207; Math. 203 or concurrently.

Elements of statics in two and three dimensions; laws of equilibrium applied to machines and structures; friction; centroids, centers of gravity, and moments of inertia; kinematics; kinetics of translation, rotation, and plane motion; work-energy and impulse-momentum principles.


Mech. 308. Dynamics
5-0-5. Prerequisites: Mech. 301 or Mech. 305; Math. 203 or concurrently.

Kinematics of rectilinear and curvilinear motion of particles; kinematics of rotation and plane motion of rigid bodies; kinetics of a particle; kinetics of translation, rotation, and plane motion of bodies; work and energy relations; impulse and momentum principles.


Mech. 312. Applied Mechanics
3-0-3. Prerequisites: Math. 203, Phys. 207.

Review of vector algebra and vector calculus; kinematics and kinetics of particle motion; introductory space mechanics; plane motion of rigid bodies.

Text: To be selected. Staff.

Mech. 313. Applied Mechanics
3-0-3. Prerequisite: Mech 312.

Mechanics of rigid body motion; the method of impulse and momentum; simple gyroscopic applications; work and energy methods; introduction to vibration theory.

Text: To be selected. Staff.

3-0-3. Prerequisites: Math. 203 or concurrently; Mech. 301 or Mech. 305.

Topics of study include stresses and strains; shear and bending moment diagrams; flexure and longitudinal shear stresses in beams; torsion; combined stresses.


2-0-2. Prerequisites: Mech. 301 or Mech. 305; Mech. 331.

Topics of study include deflection of beams; statically indeterminate beams; column theory; introduction to strain energy.


5-0-5. Prerequisites: Mech. 305 or Mech. 306; Math. 203 or concurrently.
Catalog Description

Mech. 422. Mechanical Vibrations II
3-0-3 Prerequisite: Mech. 421.

Simple stresses and strains; membrane stresses; torsion; shear and bending moment diagrams; flexure stresses and shearing stresses in beams; introduction to plastic bending of beams; combined stresses; deflection of beams; statically indeterminate beams; introduction to strain energy; column theory.


Mech. 337. Mechanics of Materials
3-0-3. Prerequisites: Mech 332 or Mech. 334; Math. 203.
Topics of study include beam deflections due to bending moment and simple cases of statically indeterminate beams by the conjugate beam concept; beam deflections due to vertical shear; energy of strain; the theorems of Castigliano; impact; statically indeterminate axial stresses; curved beams; thick walled cylinders.


Mech. 342. Statics
Topics of study include coplanar and space force systems; equilibrium of particles and rigid bodies; simple structures; centroids and moments of inertia of areas reviewed; load, shear and bending moment diagrams; parabolic and catenary cables.

Text: Beer and Johnson, *Statics*.

Mech. 343. Mechanics of Materials
5-0-5. Prerequisites: Mech. 342.
Topics of study include Hooke’s Law; simple stresses and strains; mechanical properties of materials; combined stresses with graphical illustration by Mohr’s circle; deflection of beams; columns.


Mech. 401. Dynamics
3-0-3. Prerequisite: Mech. 421, or consent of instructor.

Topics of study include the two and three dimensional kinematics and kinetics of particles and systems of particles with application to motion in a resisting medium, central force motion, problems involving redistribution of mass and the motion of a particle allowing for the effects of the earth’s rotation.

Text: Notes and references.

Mech. 402. Dynamics
3-0-3. Prerequisite: Mech. 401, or consent of instructor.

Topics of study include the two and three dimensional motion of a rigid body, Euler’s Equations, and an introduction to energy methods and Lagrange’s Equations.

Text: Notes and references.

Mech. 404. Applied Vibration
3-0-3. Prerequisite: Mech. 421, or consent of the instructor.

Topics of study include mobility method; geared systems; topics in applied vibration; introduction to the vibration of elastic bodies; tabular methods for vibration of beams.

Text: To be selected.

Mech. 421. Mechanical Vibrations
3-0-3. Prerequisites: Math. 304 or Math. 305; Mech. 303 or 308; Mech. 332 or 334.

Topics of study include kinematics of vibration; the single degree of freedom system, without and with damping; two degrees of freedom; several degrees of freedom; vibration of beams and shafts; critical speeds.


Mech. 441. Advanced Strength of Materials
3-0-3. Prerequisites: Mech. 332 or Mech. 334; senior standing.

Topics of study include unsymmetrical bending; shear center; the short eccentrically loaded column; further treatment of columns; further treatment of deflection of structural members.

**Mech. 444. Stress Analysis**

3-3-4. Prerequisites: Mech. 337 or Mech. 441 or A.E. 331 or equivalent; Math. 304 or equivalent.

Stress relations for an arbitrary continuous body; introduction to the theory of isotropic elasticity; strain gages and strain measurements; illustrative elasticity solutions for beams; unsymmetrical bending; torsion; shear flows in closed box beams; practical applications to structures.

Text: Notes; text to be selected.

**Mech. 446. Continuum Mechanics**

3-0-3. Prerequisite: Mech. 444 or consent of instructor.

Geometrical foundations; concept of stress and strain tensors; analysis of stress and strain; fundamental physical laws; constitutive equations; introduction to elasticity, plasticity, thermoelasticity, viscoelasticity, wave propagation.


**Mech. 471. Introduction to Experimental Stress Analysis**

1-6-3. Prerequisite: Senior standing.

Topics of study include the elements of two dimensional photoelasticity; the elements of electric resistance strain gage theory and practice; strain recording devices; measurement of damping in simple vibrating systems; introductory study of fatigue.

Text: Notes and references.

Mr. Armstrong and Mr. Hill.


3-0-3. Prerequisite: Senior standing.

Topics of study include fatigue; creep; effect of shape, size, temperature, and microstructure of specimen; the more common stress-strain equations, hysteresis, after effect, etc.; theories of failure. Considerable reading and report writing required.

Text: Notes and References.

Mr. Armstrong.

**Graduate Courses Offered**

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<thead>
<tr>
<th>Course</th>
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<th>Credits</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Mech. 446</td>
<td>Continuum Mechanics</td>
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<tr>
<td>Mech. 603</td>
<td>Applied Vibrations</td>
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<tr>
<td>Mech. 604</td>
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<td>Mech. 610</td>
<td>Theory of Oscillations</td>
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<tr>
<td>Mech. 613</td>
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<td>Mech. 615</td>
<td>Gyroscopic Motion and Devices</td>
<td>3-0-3</td>
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<td>Mech. 618</td>
<td>Space Ballistics</td>
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<tr>
<td>Mech. 620</td>
<td>Theory of Experimental Stress Analysis</td>
<td>2-3-3</td>
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<td>Mech. 622</td>
<td>Energy Methods in Mechanics</td>
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<tr>
<td>Mech. 635</td>
<td>Advanced Strength of Materials</td>
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<td>Mech. 640</td>
<td>Introductory Photoelasticity</td>
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<td>Mech. 643</td>
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<td>Mech. 653</td>
<td>Theory of Elastic Stability</td>
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<td>Mech. 654</td>
<td>Theory of Shells</td>
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<td>Mech. 662</td>
<td>Plasticity</td>
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<td>Mech. 664</td>
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<td>Mech. 704, 5, 6</td>
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<td>Mech. 725</td>
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<td>Mech. 750</td>
<td>Nonlinear Vibrations</td>
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<tr>
<td>Mech. 751</td>
<td>Nonlinear Vibrations</td>
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<td>Mech. 760</td>
<td>Theory of Elasticity</td>
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<tr>
<td>Mech. 800</td>
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(Complete details pertaining to these courses are contained in the Graduate Bulletin, a copy of which is available upon request.)
Department of English


General Information

Fundamental for effective study and successful communication with others is the ability to think logically, to organize material properly, and to express ideas in clear and appropriate English prose. Toward these ends the English courses of the freshman year are primarily directed.

Every student must achieve an acceptable minimum level of writing. Students of exceptional ability, as revealed by their scores on College Board tests, will be placed in Merit sections and challenged to secure credit for three courses in one quarter. Regular students will take three quarters of composition. Students beyond the freshman year whose composition is found to be unsatisfactory may be required to repeat a composition course, even though they have received credit for the course. Transfer students may be required to take a proficiency test in writing before credit is allowed.

In addition to the composition course for freshmen, the department offers courses in communication, written and oral, to students in the junior and senior classes. For students from foreign countries a special two-year program serves as an introduction to the American language and the American way of life.

The department offers to all sophomores a unified series of courses in the humanities aimed at a deeper appreciation of the value of the individual in society and a wider acquaintance with the great writers and great ideas basic to an understanding of western culture. Additional elective courses in literature and language are available for juniors and seniors.

Courses of Instruction

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Eng. 50. Reading for Speed and Comprehension
2-0-0. Prerequisite: None.
Mechanics of reading, exercises in increasing speed and improving comprehension. Recitation, tests, and individual practice.
Text: Brown, Efficient Reading.
Mr. Almon and Mr. Foote.

Eng. 101, 102. Composition and Rhetoric
3-0-3. Prerequisite: None.
Analyzing and writing short units of composition efficiently and effectively, with emphasis on methods, relevancy, and adequacy of organization and development.
Texts: Haman, The Rhetoric Reader, Clark, Student and Society, Sher-

*Deceased.
wood, *Discourse of Reason, A Student's Guide to Freshman English.* A dictionary acceptable to the department. Mr. Walker and Staff.

**Eng. 105. Introduction to Literature**
3-0-3. Prerequisite: Eng. 102.
Guided analysis of humanistic ideas in selected literary works, with special attention to the relationship of content to form. Lectures, discussions, quizzes, papers.
Text: McNamee, *Literary Types and Themes.* Mr. Walker and Staff.

**Eng. 110. Vocabulary Building**
3-0-3. Prerequisite: None.
Development of a useful vocabulary required in technical and scientific courses and general reading. Recitation, written exercises, individual practice and research, quizzes.

**Eng. 131-2.3. English for International Students**
5-0-5. Freshman year, consecutive quarters.
Admission by consent of the department.
A one-year course designed as an introduction to written and spoken English, stressing American pronunciation, idiomatic phrases, and language appropriate to basic social situations and customs of the American people.

**Eng. 201-2.3. Survey of the Humanities**
3-0-3. Prerequisite: Eng. 105.
A sequence of courses studying the contribution of several western civilizations from the Greeks to modern times as revealed in literature. Lecture, quizzes, reports, collateral reading.
Texts: Selected readings in each period. Mr. Walker and Staff.

**Eng. 204. Creative Writing**
3-0-3. Prerequisite: Eng. 105.
Study and practice in several forms and methods of composition, with emphasis on effective writing. Recitation, quizzes, compositions.
Mr. Haman.

**Eng. 221-2-3; 331-2-3. Acting and Producing the Play**
0-3-1. Prerequisite: Admission by consent of instructor.
Participation in the production of various kinds of plays, including the presentation of one play before an audience. Mrs. Santacroce.

**Eng. 231-2-3. Literature for International Students**
5-0-5. Sophomore year, consecutive quarters. Prerequisite: Eng. 133.
An introduction to American ideas as expressed in American literature, with continued training in writing and speaking the American language.
Texts: Selected texts as announced. Mr. Spillman and Mr. Foster.

**Eng. 301. Modern Drama**
3-0-3. Prerequisite: Eng. 203.
Dramatic theory and technique as illustrated by a number of modern playwrights. Lectures, reports, collateral reading, quizzes.
Text: Reinert, *Modern Drama.* Mr. Chalkin and Mr. Walker.

**Eng. 302. Shakespeare**
3-0-3. Prerequisite: Eng. 203.
A brief statement of the life and times of Shakespeare and a careful study of certain of his principal works. Lectures, reports, collateral reading, quizzes.

**Eng. 303. American Literature**
3-0-3. Prerequisite: Eng. 203.
Reading of American writers for form and ideas. Lectures, reports, collateral reading, quizzes.
Text: Selected texts as announced. Mr. Foster and Mr. Young.
Eng. 304. Contemporary Literature
3-0-3. Prerequisite: Eng. 203.
A careful study of major figures and movements in modern fiction. Lectures, reports, collateral reading, quizzes.
Text: To be announced.
Mr. Haman and Mr. O'Neill.

Eng. 306. The English Language
3-0-3. Prerequisite: Eng. 105.
Study of the origin of the English language, its relation to other languages, and its differentiation and development into modern English and American. Lectures, quizzes, term paper.
Text: Robertson and Cassidy, Development of Modern English.
Mr. Walker.

Eng. 315. Public Speaking
3-0-3. Prerequisite: Eng. 203.
Instruction in the basic principles of effective public speaking, with emphasis on practice and criticism. The course is conducted as a laboratory. Text: Dickens, Speech Dynamic Communication.
Mr. Walker and Staff.

Eng. 318. Argumentation and Debate
3-0-3. Prerequisite: Admission by consent of the instructor.
Principles of argumentation and persuasion, with emphasis on issues of current public interest.
Text: To be announced. Mr. Rainey.

Eng. 320. Technical Writing
3-0-3. Prerequisite: Eng. 203.
Study and practice of effective English in business letters, technical papers, engineering reports. Letters, reports, quizzes.
Texts: Comer and Spillman, Modern Technical and Industrial Reports; Murphy, Modern Business Letters.
Mr. Walker and Staff.

Eng. 360. The Literature of the Bible
3-0-3. Prerequisite: Eng. 203.
Study of a number of Biblical selections of unusual literary merit. Lectures, collateral reading, reports, quizzes.
Mr. Ketchin.

Eng. 381-2-3. Seminars in Literature
3-0-3. Prerequisite: Consent of the Department.
Intensive study of individual writers, movements, periods or themes in literature, with the purpose of developing through discussion and critical papers knowledge in depth, critical independence, and expository skill.
Text: To be announced.
Mr. Walker and Staff.
School of Industrial Engineering
(Established in 1945—Option in M.E., 1924-1945)
(Including a Program in Safety Engineering)


General Information

The study of Industrial Engineering prepares a student for a successful career in the manufacturing, research, and service industries. Based as it is on a broad engineering background, the professional courses taken in the last two years offer a perspective which enables the graduate to cope with complex problem situations encountered in modern industry and business.

The Industrial Engineer at this institution encompasses the areas of operations research, management science, and overall systems engineering. He is concerned with methods, organization, planning, coordination, equipment and personnel—all of the factors which play a role in the cost, quality and quantity of output. He deals with the top management, the engineering staff and the production force in achieving these goals.

New problems have arisen and new techniques have been developed during recent years which are peculiar to and characteristic of industrial engineering. These include the analysis of a proposed product with regard to the possible steps and sequences of operations involved in its manufacture, a selection of the most efficient machines to perform those operations, the layout of the plant and shops to provide for the flow of the product from one machine to another, organization of the material supply, avoidance or elimination of bottlenecks, together with the related problems of quality and cost control, testing, inspection and personnel relations.

Industrial engineering coordinates men, materials, machines, and methods, so as to solve problems met in the conversion, transformation and fabrication of raw materials into the products of industry.

The successful industrial engineer must possess special interests and abilities in the analysis of the human, technical, and cost problems of modern manufacturing. In addition, he must possess the essential personality and attributes
of character which will enable him to work with and direct others in the planning and operation of manufacturing enterprises.

Industrial engineering is a loosely defined occupational area. In its restricted usage it is usually limited to production organization, planning and methods. It may include the training and direction of personnel, specifications and purchasing of materials, cost and sales control, health and safety programs, accounting systems and traffic management. In some instances this occupation embraces the management of construction of new industrial enterprises and large scale public works. It may also include consultation in the area of finance and economics as these relate to mergers, reorganization, large scale modernization or retooling, etc.

Since this occupational area is concerned with the management aspect of professional engineering, it bears a reasonably close relationship with the activities of those men performing administrative functions in any of the other branches of engineering. There is a similar relationship with the work of consulting engineers and in many cases with works managers or plant superintendents in large enterprises. The work of the industrial engineer is likewise related to that of executives, directors, owners or managers of large manufacturing enterprises, particularly in those areas in which engineering problems and methods are important, and in which the executive has an engineering background, through education and/or experience.

The successful completion of the curriculum leads to the degree of Bachelor of Industrial Engineering.

Freshman Year

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<tr>
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<th>2nd Q.</th>
<th>3rd Q.</th>
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<td>Eng.</td>
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<tr>
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<tr>
<td>Math.</td>
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<td>Math.</td>
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<td>M.L.</td>
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<td>Modern Language OR</td>
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<td>S.S.</td>
<td>111-12-13</td>
<td>Social Science</td>
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Totals: 18-14-20 17-14-20 17-14-20

NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish.
Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

**For course numbers, see the course descriptions under the appropriate ROTC sections of this bulletin.
### Sophomore Year

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<td>Eng. 201-2-3</td>
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<td>Math. 304</td>
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*For course numbers, see course descriptions under the appropriate ROTC sections of this Bulletin.

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<td>C.E. 324</td>
<td>Fluid Mechanics</td>
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<td>Applied Mechanics</td>
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<td>Met. 325</td>
<td>Metallurgy</td>
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<td>Math. 407</td>
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<td>Electives*</td>
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<td>20-0-20</td>
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*Free electives—a maximum of nine credit hours of advanced ROTC may be used.

### Senior Year

<table>
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<tr>
<th>Course No.</th>
<th>Subject</th>
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<tr>
<td>I.E. 447</td>
<td>Factory &amp; Process Design</td>
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<td>Legal &amp; Ethical Phases of Engineering</td>
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<td>M.E. 322-3</td>
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<td>12-9-15</td>
<td>14-6-16</td>
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</table>
Courses of Instruction

**NOTE:** 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

I.E. 304. Organization for Production
3-0-3. Prerequisite: Math. 201.
   The principles of organization and administration which are applicable to various engineering and industrial enterprises. An elective course for all engineering students.
   Text: To be selected. Staff.

I.E. 306. Production Control
   A lecture and problems course covering production control systems, work routing, dispatching, inventory control, stores, etc.
   Text: To be selected. Mr. Franklin and Staff.

I.E. 311. Manufacturing Processes
3-0-3. Prerequisite: None.
   A study of modern manufacturing processes and production methods.
   Text: To be selected, visual aids and lecture notes. Staff.

I.E. 339. Evaluation of Engineering Data
3-0-3. Prerequisite: Math. 203 or concurrently.
   Elementary probability theory, descriptive statistics, theoretical probability distributions, statistical inference, point and confidence interval estimation, simple regression and correlation analysis.

I.E. 340. Evaluation of Engineering Data
3-0-3. Prerequisite: I.E. 339.
   An introduction to the methods of industrial experimentation including the analysis of variance, multiple regression, and design of experiments.
   Text: Duncan, Quality Control and Industrial Statistics. Staff.

I.E. 349. Elementary Quality Control
3-0-3. Prerequisite: Math. 104. Not to be scheduled for credit if credit for I.E. 339 or I.E. 439 has been earned.
   An introduction to industrial quality control by statistical methods. This course will include methods of data analysis, sampling, and control charts as applied to manufacturing processes.
   Text: E. L. Grant, Statistical Quality Control. Staff.

I.E. 402. Production Problems
3-0-3. Prerequisite: Senior standing, I.E. 304 or instructor permission.
   A case method study of modern production plant problems. A wide variety of problems are used but stress is laid on the consideration of original and unusual cases.
   Text: To be selected. Staff.

I.E. 410. Industrial Surveys and Reports
1-3-2. Prerequisite: Senior standing.
   A study of some of the problems which engineers encounter in investigating and reporting on various industrial operations.
   Text: Staton and Groseclose, Industrial Reports. Mr. Staton and Staff.

I.E. 411-412. Seminar
1-0-1. Prerequisite: Senior standing in I.E.
   To provide an hour for the Industrial Engineering students and faculty to join in discussions on current problems, professional responsibilities and opportunities.
   Text: None. Staff.

I.E. 415. Methods and Systems Analysis
3-6-5. Prerequisite: I.E. 339 or Math. 416 or equivalent.
   A study of methods engineering, work measurement, and systems design. This course provides an understanding of the principles of effective work and of the scientific method as applied to the analysis, measurement, and design of integrated systems of men, materials, and facilities. Applications of theory and principles are made by use of a term project.

Mr. Smalley and Mr. C. Johnson.

I.E. 416. *Motion and Time Study*
2-3-3. Prerequisite: Junior standing; Non-Industrial Engineering students.

An introduction to the problems of work methods and work measurements associated with increasing productivity and decreasing the costs of producing goods and services.

Text: Barnes, *Motion and Time Study*.

I.E. 420. *Cost and Production Estimating*
3-0-3. Prerequisite: I.E. 415.

A course in the development of estimating techniques for tool and equipment costs, production rates, costs ratios, establishment of basic time charts, etc.

Text: Doyle, *Tool Engineering*.

I.E. 422. *Job Evaluation and Wage Incentives*
3-0-3. Prerequisite: I.E. 415 or I.E. 416.

A course designed to give the student the principles used in establishing wage rates and salaries. The characteristics and objectives of different wage incentive plans and the design and analysis of incentive formulas and curves are considered.

Text: Brennan, *Wage Administration*.

Mr. Smalley and Staff.

I.E. 424. *Materials Handling Equipment and Methods*

The engineering and design aspects of materials handling equipment, methods of application, operations analysis and systems, including cost controls.


Mr. Eaton and Mr. Apple.

I.E. 425. *Engineering Economy*
3-0-3. Prerequisites: Math. 104 and Junior Standing.

The fundamental principles and basic techniques of economic analysis of engineering projects. Topics such as time value of money, economic measures of effectiveness, costs and their estimation, basic comparative models, break-even analysis, and replacement analysis are included.

Text: Grant and Ireson, *Engineering Economy*.

Mr. Groseclose and Staff.

I.E. 433. *Electronic Data Processing*
3-0-3. Prerequisites: Senior standing and I.E. 415 or I.E. 416.

Case studies of industrial applications of electronic data processing such as inventory control, production control, payroll, etc. Emphasis will be placed on systems analysis, flow charts, and methods and equipment used. Students will be given an opportunity to use electronic data processing equipment in operation at the Rich Electronic Computer Center.

Text: To be selected. Mr. Krol.

I.E. 434. *Introduction to Operations Research*
3-0-3. Prerequisites: I.E. 339 and Math. 407 or Math. 238 or equivalents, and Senior Standing.

An introduction to the methodology of Operations Research in the solution of industrial, engineering, and other problems. Emphasis is placed on the development and use of mathematical decision models.


Staff.

I.E. 439. *Quality Control*
3-0-3. Prerequisite: I.E. 339 or Math. 206 or Math. 416.

The theory and application of statistical control charts to the problems associated with the design, specifications and control of product quality. Also covered is the theory and application of attribute and variables sampling procedures and the problems associated with the reliability of complex equipment.
I.E. 441. Sales Engineering
3-0-3. Prerequisite: Senior standing in engineering.
A study of the problems involved in selling technical goods and services requiring engineering skill and knowledge in their application. Particular attention is given to the engineering application and service aspects of this work.
Text: Duncan, *Quality Control and Industrial Statistics*. Staff.

I.E. 446. Project Management Systems Design
2-3-3. Prerequisite: Senior standing.
A study of project planning and control using "Critical Path" techniques. Topics included are network logic, scheduling computations, resource scheduling under various constraints, time-cost trade-off algorithms, cost control, and multi-project resource allocation. Laboratory work provides practical applications and use of computer programs.

I.E. 447. Factory and Process Design
2-6-4. Prerequisites: I.E. 420 and I.E. 424 or Instructor permission.
The design, equipment selection and layout studies necessary for new or redesigned manufacturing plants or processes.

I.E. 450. Legal and Ethical Phases of Engineering
3-0-3. Prerequisite: Senior standing.
This course covers the subject of contracts, patents, copyrights and trademarks, agency, sales agreements, and engineering specifications. The engineer and his relations to the law, to the public and the ethics of his profession.
Text: Mead and Ackerman, *Contracts, Specifications and Engineering Relations*. Mr. Cox and Staff.

Graduate Courses Offered

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
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<td>Modern Industrial Organizations</td>
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<td>I.E. 603</td>
<td>Methods of Industrial Engineering Research</td>
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<td>I.E. 606</td>
<td>Materials Control</td>
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<td>I.E. 611</td>
<td>Industrial Engineering</td>
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<tr>
<td>I.E. 613</td>
<td>The Design of Manufacturing Enterprises</td>
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<td>I.E. 615</td>
<td>Transportation Cost Analysis</td>
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<td>I.E. 619</td>
<td>Quality Control</td>
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<td>I.E. 624</td>
<td>Advanced Materials Handling</td>
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<td>I.E. 625</td>
<td>Advanced Engineering Economy</td>
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<td>I.E. 629</td>
<td>Reliability Theory and Practice</td>
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<tr>
<td>I.E. 639</td>
<td>Experimental Statistics</td>
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<tr>
<td>I.E. 640</td>
<td>Advanced Work Measurement</td>
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</table>
Smaller industrial enterprises with limited staff functions will seldom have the services of safety engineering specialists. Even in larger companies where such specialists are present, sound organizational procedure dictates that practically every segment of the organization participate in the safety program. Increasing emphasis is being directed to this participation as accident costs mount and the nature of accident causes is more fully recognized.

Thus, our graduate can expect to be required to deal with problems of accident prevention regardless of his specialty or his work assignment at any particular moment. The following courses are designed to enable one to accept such responsibilities effectively.

The development of the safety engineering specialist must necessarily be assigned to the graduate level, available only upon completion of a comprehensive undergraduate study program.

**Courses of Instruction**

**NOTE:** 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

**S.E. 403. Elements of Safety Engineering**

3-0-3. Prerequisites: I.E. 304, I.E. 339 or equivalent, I.E. 415 or I.E. 416 (Engineering students only).

The nature and extent of the industrial accident problem with particular emphasis on the role of the engineer in modern industrial operations. The identification and solution of technical accident problems using appropriate analysis procedures. Design principles and characteristics for accident prevention in the plant, the process, and the work-center. Not to be scheduled for credit if credit for S.E. 401 or S.E. 404 has been earned.

Text: To be selected.

Mr. Cox and Staff.
S.E. 404. Industrial Safety Administration
3-0-3. Prerequisites: I.M. 220, I.M. 324, and I.M. 345 (Non-engineering students only).

The nature and extent of the industrial accident problem. The selection and evaluation of data appropriate to accident control measurements and decisions, including realistic treatment of cost factors. Modern organizational relationships in the safety program. The control of industrial accidents by non-technical measures. Not to be scheduled for credit if credit for S.E. 401 or S.E. 403 has been earned.

Text: To be selected.

Mr. Cox and Staff.

S.E. 405. Industrial Fire Prevention and Protection
3-0-3. Prerequisite: Senior Standing.

The economics of the industrial fire risk. Design of the plant, process, and work-center of optimum fire hazard. Design of fire protection facilities under varying industrial conditions. Credit is not given for both S.E. 405 and S.E. 402.

Text: To be selected.

Mr. Cox and Staff.

Graduate Courses Offered

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tr>
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<td>History of Industrial Accident Prevention</td>
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<td>S.E. 604</td>
<td>Indices of Safety Performance</td>
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<td>S.E. 605, 6</td>
<td>Safe Design and Utilization of Industrial Facilities</td>
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<td>S.E. 607</td>
<td>The Comprehensive Safety Program</td>
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<td>S.E. 615</td>
<td>Industrial Fire Control</td>
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<td>S.E. 616</td>
<td>Safety Standards in Industry</td>
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<td>S.E. 618</td>
<td>Engineering Control of Industrial Health Hazards</td>
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<tr>
<td>S.E. 704, 5, 6</td>
<td>Problems in Safety Engineering</td>
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School of Industrial Management
(Established in 1935)


General Information

The principal objective of the School of Industrial Management is to provide collegiate education of the highest possible quality to prepare students for careers as industrial managers. The continuing growth of industry in Georgia, the South and the nation, and the increasing complexity of modern industrial operations have resulted in a great need for college graduates with formal preparation in industrial management. Georgia Tech's industrial management program concentrates on long-range career objectives, rather than attempting to develop specific job knowledge. The emphasis in the program, therefore, is upon developing the student's abilities to utilize the tools of analysis commonly required of industrial managers, to be responsive to his changing environment, and to both express and implement his ideas.

Undergraduate program. Georgia Tech's School of Industrial Management has a single undergraduate degree program leading to the degree Bachelor of Science in Industrial Management. A student is not permitted a narrow field of specialization or major concentration, as is typical in schools of business.

In the first two years of the program, much of the required work is taken in other departments, including mathematics through introductory calculus and finite mathematics; two full years of laboratory science, chemistry or biology, and physics. In addition, the industrial management student acquires a sound background in the social and behavioral sciences, and the humanities.

Within the School, beginning in the sophomore year, the student is required to complete an integrated core of courses in the following areas: (1) organization and administration, including principles of management, human relations and organization theory; (2) economic analysis and managerial applications; (3) industrial relations, production, marketing and financial management; and (4) legal, political and social environment of industry. Required courses in analytical methods, statistics, managerial accounting and managerial applications of data processing are also included in the program.

Transfers to Industrial Management. Many students who enter Georgia Tech intending to major in one of the engineering or scientific areas become interested in transferring to the School of Industrial Management. Only students
who demonstrate their ability to successfully complete the requirements of the program are permitted to transfer. It is therefore definitely to the student's advantage to determine the requirements which must be met before transfer will be permitted, as early as possible, in consultation with the Associate Director of the School of Industrial Management.

Graduate Program. A brief description of the Master of Science in Industrial Management program appears on page 131, together with a list of graduate courses offered by the School.

Survey Courses for Non-Majors. In addition to courses offered primarily for its own undergraduate and graduate programs, the School of Industrial Management offers several courses designed expressly for non-majors, as follows:

<table>
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<tr>
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<td>Survey of Principles of Economics</td>
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<tr>
<td>I.M. 316</td>
<td>Finance Survey for Engineers</td>
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<td>I.M. 317</td>
<td>Industrial Marketing</td>
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<td>I.M. 329</td>
<td>Survey in Business Law</td>
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<td>I.M. 336</td>
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Curriculum in Industrial Management

Freshman Year

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<td>Inorganic Chemistry OR</td>
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<td>Biol. 201-2-4</td>
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<td>Eng. 101-2-5*</td>
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* Students are required to earn a minimum grade of “C” in both English 101 and 102.

** Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish. Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

*** For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.
### Sophomore Year

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<td>Survey of the Humanities</td>
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<td>I.M. 220*</td>
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</table>

*To receive credit towards the degree B.S. in I.M., a minimum grade of "C" must be earned in each of these courses, viz., I.M. 201, 202, 203, 215, 216, 220.

**For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

### Junior Year

<table>
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<tr>
<td>I.M. 323-24</td>
<td>Statistics I, II</td>
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<td>I.M. 345-46</td>
<td>Cost Accounting and Control I, II</td>
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Senior Year*

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*Minimum grade average of “C” must be earned during the student’s last three full-time quarters to qualify for graduation.

**At least (12) hours of electives, as approved by the School of Industrial Management and exclusive of advanced ROTC, must be taken outside the School.

Courses of Instruction

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

I.M. 201, 202, 203. Economic Principles and Problems
3-0-3. Prerequisite: Sophomore standing or permission of instructor.

This three course sequence begins with an examination of the scope and method of economics. It continues with a study of the theory of markets and distribution. It concludes with an examination of national income theory and international trade.


Mr. Biven and Staff.

I.M. 204. Survey of Principles of Economics
3-0-3. Prerequisite: Sophomore standing. Not open to I.M. students.

A survey and an introduction to economics. It includes an examination of the two major areas of economics: national income and employment theory, and the theory of markets, distribution, and the behavior of the firm.

Text: Ulmer, Economics.

Mr. Biven and Staff.

I.M. 215, 216. Accounting I, II
3-0-3. Prerequisite: Sophomore standing.

This is a two-course sequence in the fundamentals of accounting. During the first quarter fundamental accounting concepts are introduced and their use in business decisions discussed. During the second quarter attention is given to various types of business organizations and the parallel effects on operations, taxes, and accounting procedures. These courses together are designed to emphasize the “tool aspect” of accounting for management. Applications of accounting information to management decisions are stressed throughout the two-quarter sequence.

Text: Finney and Miller, Principles of Accounting, Introductory.

Mr. Bollinger and Staff.

I.M. 220. Industrial Organization
3-0-3. Prerequisite: Sophomore standing.

Presents a fundamental understanding of the process, objectives and functional areas of business from the managerial viewpoint as
well as the dynamic nature of business and the emerging tools and analytical approaches of modern business.


Mr. O'Connor and Staff.

I.M. 310, 311. Marketing I, II
3-0-3. Prerequisite: I.M. 203 or equivalent.

A critical examination of the activities involved in the movement of manufactured goods from the producer to the consumer. Basic functions of marketing and the institutions available for their performance are studied. Emphasis is placed on principles, policies, and trends relating to marketing efficiency.

Text: Beckman and Davidson, *Marketing.*

Mr. Flinn and Staff.

I.M. 312. Distribution Management
3-0-3. Prerequisite: I.M. 310, 311.

An analysis is made of the functions and problems of the sales manager, particularly with reference to the characteristics of the sales organization and the selection, training, supervision and control of the personal selling force.

Text: To be selected.

Mr. Brewster, Mr. Flinn.

I.M. 316. Finance Survey for Engineers
3-0-3. Prerequisite: Junior standing.

Not open to I.M. undergraduates.

Designed to acquaint the student with the more popular types of business organizations, with special emphasis on the corporation, its organization, management and types of securities issued. Credit not given for both I.M. 316 and I.M. 338.


Mr. Cooper and Staff.

I.M. 317. Industrial Marketing
3-0-3. Prerequisite: Junior standing.

Not open to I.M. undergraduates.

A survey of marketing principles and policies, with emphasis on the functions that must be performed by manufacturers and marketing institutions to insure consumer satisfaction and profitable operation of the firm. Credit not given for both I.M. 317 and I.M. 310 or I.M. 311.


Mr. Brewster, Mr. Flinn.

I.M. 320. Industrial Management Principles
3-0-3. Prerequisite: I.M. 220.

A presentation of the evolving theory of management as a framework for the analysis of the interaction between the characteristics of humans, and the social-task environment created by complex industrial organizations and their objectives.


Mr. O'Connor and Staff.

I.M. 322, 324. Statistics I, II
3-0-3. Prerequisite: Junior standing.

The first course deals with the collection, analysis and interpretation of quantitative data. Measures of central tendency, types of variation and index numbers are covered in detail.

The second course covers statistical inference, time series analysis and simple correlation as tools of control and forecasting in the fields of economics, business and industry.


Mr. Fulmer and Staff.

I.M. 325, 326. Law I, II
3-0-3. Prerequisite: Junior Standing.

The first course includes background of the law and legal procedures; a study of contracts, the problem of organizing a business; forms it may take and procedure of organization; financing the new business; acquiring the site and other problems involving property, both real and personal; agency and labor relations.

The second course deals with legal problems peculiar to particular forms of organization, distribution of goods, negotiable instruments, bailments and common carriers, in-
Insurance, taxes and business, competitive practices, patents and copyrights as business property, and bankruptcy.

Text: Anderson-Kumph, Business Law. Mr. Proctor and Staff.

I.M. 329. Survey in Business Law
3-0-3. Prerequisite: Junior standing. Not open to I.M. undergraduates.
A study is made of those law cases which pertain strictly to legal questions arising out of engineering operations. It is designed for students who are not able to take a more extended course in business law.
Text: Dillavou and Simpson, Law for Engineers and Architects. Staff.

I.M. 336. Accounting Survey
3-0-3. Prerequisite: Junior standing. Not open to I.M. undergraduates.
This is a brief survey of the analysis and the recording of business transactions, the preparation of financial statements and their interpretations. Credit not given for both I.M. 336 and I.M. 215.
Text: Childs, Accounting for Management Control.
Mr. Bollinger and Staff.

I.M. 337. Cost Accounting
4-0-4. Prerequisites: I.M. 336 and Junior standing. Not open to I.M. undergraduates.
A survey of the essentials of cost accounting. Emphasis is placed on the utilization of cost data and reports by management indicating management's control over industrial operations. Credit not given for both I.M. 337 and I.M. 345.
Text: Childs, Accounting for Management Control.
Mr. Bollinger and Staff.

I.M. 338, 339. Finance I, II
3-0-3. Prerequisites: I.M. 203, 216.
This is a two-quarter study of the principles of corporation finance. It consists largely of lectures with brief illustrations of the following topics: forms of business organizations and conditions under which each might be used to the best advantage; corporate securities including stocks, bonds, mortgages, and notes; sources of capital and methods of financing; profits, reserves, surplus and dividend policies; expansion; refinancing and reorganization.
Text: Guthmann and Dougall, Corporate Financial Policy.
Mr. Cooper and Staff.

I.M. 343. Taxation
3-0-3. Prerequisite: I.M. 216.
This course deals with federal income taxes and is directed toward the management planning necessitated by various tax alternatives. The tax implications of business management are reviewed. Major emphasis is on the business income tax requirements, though some attention will be given to the personal incidence of income tax. Personal incidence is covered relative to tax applications in the partnership and proprietorship forms of business organization.
Text: Prentice-Hall Federal Tax Course.
Mr. Bollinger.

I.M. 345, 346. Cost Analysis and Control, I, II
3-0-3. Prerequisite: I.M. 216.
This is a two-course sequence in cost accounting fundamentals and in the management application of cost data. The first quarter is concerned with the mechanics of cost determinations and the application of such data to budgetary applications. The second quarter includes such topics as: quantitative elements in decision-making, capital expenditure analysis, profit/volume analysis, product pricing. During the two-quarter sequence major emphasis is placed on management use of the cost accounting tool, more than on the mechanics of cost determination.
Text: Crowningshield, Cost Accounting Principles and Managerial Applications.
Mr. Bollinger and Staff.
I.M. 347. Techniques of Industrial Communications
3-0-3. Prerequisite: Junior standing.
A study of the basic techniques of communication as employed in industry by management, by employees and by the public. Internal and external functions of public relations are covered with emphasis on the application of practical media in achieving definite results.
Text: Cutlip and Center, Effective Public Relations. Mr. Adler.

I.M. 349. Economics of Industrial Demand
3-0-3. Prerequisite: Junior standing.
This is a course covering the principles, methods and procedures of purchasing goods for industrial use. Emphasis is placed on procurement as a management function.
Text: Lewis, Procurement. Mr. Flinn and Staff.

I.M. 352. Industrial Economic Analysis
3-0-3. Prerequisite: I.M. 201, 202, 203.
An advanced course in microeconomics, concerned with the scope and methods of economics, production and distribution theory, and the structure of markets, which emphasizes managerial applications of economic theory.
Text: Stigler, Price Theory. Mr. Biven and Staff.

I.M. 390. Survey of Statistics
3-0-3. Prerequisite: Junior standing. Not open to I.M. undergraduates.
A survey of discrete statistics with special emphasis on economic and business applications. Includes sampling, the normal distribution, hypothesis testing, linear regressions and correlation, time series and index numbers.
Text: Nelson, Elements of Statistics. Mr. Fulmer and Staff.

I.M. 391. Seminar
1-0-0. Prerequisite: Junior Standing.
This course consists primarily of lectures, and question and answer periods with prominent business, government, labor and educational leaders concerned with aiding the student in making career decisions and preparing him for adjustment to the industrial world. Final grade assigned will be either "satisfactory" or "failure." Staff.

I.M. 408. Personnel Management Problems
3-0-3. Prerequisite: Junior Standing. Credit not given for both I.M. 408 and I.M. 318.
This course concentrates on typical problems encountered by the personnel department in an industrial organization, such as selection, training and placement of workers, merit rating and promotion, and the development of sound personnel management techniques.

I.M. 409, 410. Analytical Methods in Industrial Management, I, II
3-0-3. Prerequisites: I.M. 324 and Math. 235.
This sequence of courses is an introduction to analytical models and their use in industrial management. The first quarter is concerned with decision theory and allocation methods. Included are discussions of the nature of decisions, objectives and utility, logic, goals, and the fundamental theories of decision making. Among the allocation methods discussed are linear programming; simplex and transportation algorithms. In the second quarter game theory and its application to management problems, queuing or waiting line theories, and inventory theory are covered. The emphasis in both courses is the solution of managerial problems rather than the construction of mathematical models.

I.M. 415. Automation and Management
3-0-3. Prerequisite: Senior standing.
A survey of automatic and electronic processes, together with recent technological changes, and their im-
pact on management standards, personnel displacement, private investment, productivity, and industrial organization.


Mr. Buckingham and Staff.

I.M. 416. Management Applications of Data Processing

2-3-3. Prerequisite: I.E. 416, or concurrently.

The aim of the course will be to study and show how mechanical and electronic devices are meeting management's need for planning and control data. The first part of the course will consider the principles of data processing; the second part will deal with basic applications to management problems.


Mr. Stalnaker.

I.M. 418. Production Management, I

3-0-3. Prerequisites: I.M. 320, 352.

The objective of this course is to develop student understanding of the organizational, economic, and physical framework within which the manufacturing division functions and contributes to overall objectives. Students are expected to develop a philosophy of production management.


Mr. Han and Staff.

I.M. 419. Production Management, II

3-0-3. Prerequisites: I.M. 410, 418.

A course requiring students to apply quantitative and non-quantitative analytical methods to production management case problems.


Mr. Han and Staff.

I.M. 420. Integrated Management Problems

3-0-3. Prerequisites: I.M. 418, 422 and 455.

Comprehensive cases are used to integrate knowledge about the functional areas of industrial management—production, finance, marketing, industrial relations, human relations and administration.

Text: Selected cases.

Mr. Carney and Staff.

I.M. 422. Finance III

3-0-3. Prerequisite: I.M. 339.

Analytical techniques of financial management are developed and then applied to case studies. Among the topics covered are flow of funds analysis, present value techniques, cost of capital, and capital budgeting analysis.


Mr. Cooper and Staff.

I.M. 425, 426. Law I, II

Re-designated I.M. 325, 326. Credit not given for both sequences.

I.M. 428, 429. Industrial Relations

3-0-3. Prerequisite: Junior standing.

The first course makes an examination of the trade-union as an economic institution and of issues in management-union relations.

The second course deals with the economics of the labor market, including analysis of labor mobility, unemployment, wage determination, and theories of wages.


Mr. Marshall and Staff.

I.M. 430. Management Decision Laboratory

0-3-1. Prerequisite: Senior standing.

This course gives statements practice in making certain management decisions. Use is made of computers and simulated operations of manufacturing firms in a competitive market.


Mr. Fulmer.

I.M. 432. Intermediate Economic Analysis

Re-designated I.M. 352. Credit not given for both I.M. 432 and I.M. 352.
I.M. 443. Investments
3-0-3. Prerequisite: I.M. 339 or I.M. 316, or permission of the instructor.
A study of the sources of financial information and its interpretation, the operation of stock exchanges, over-the-counter markets, and methods of underwriting. A study is also made of the various types of securities available for investment and tests to determine their investment quality.
Text: Jordan and Dougal, *Investments.*
Mr. Etheridge.

I.M. 454. Labor Relations Problems
3-0-3. Prerequisite: I.M. 428.
An analysis of public policy in labor relations as reflected in legislative enactments, court decisions, and the common law. Emphasis will be given to management-labor problems arising out of strikes, labor injunctions, picketing, union security, contract negotiation, and other matters as affected by and related to recent laws such as the Norris-LaGuardia Act, Wage-Hour Act, Wagner Act, Taft-Hartley Act and Landrum-Griffin Act.
Mr. Dallas, Mr. Marshall.

I.M. 455. Marketing III
3-0-3. Prerequisite: I.M. 311.
This course consists of cases involving the management of marketing activities. Careful consideration is given to the functions of planning, organizing, and controlling the essential elements of the overall marketing program of the firm.
Mr. Flinn and Staff.

I.M. 456. Marketing Management Problems
3-0-3. Prerequisite: I.M. 455 or permission of instructor.
This is an advanced problems course in the field of marketing management.
Mr. Brewster, Mr. Flinn.

I.M. 458. Contemporary Unionism and Collective Bargaining
3-0-3. Prerequisite: I.M. 428.
This is a study of the organization and structure of unions in the United States and includes such subjects as union policies and aims, the theory of collective bargaining, collective bargaining procedures and techniques, and analysis of union-management contracts with attention given to typical clauses such as provisions for grievance machinery, technological changes, lay-offs, and union security.
Mr. Dallas, Mr. Marshall.

I.M. 459. Industrial Relations in the Piedmont Region
3-0-3. Prerequisite: Senior standing.
Special attention is given to industrial relations in the Southeast, and its study will serve as an introduction to a method of regional industrial relations analysis.
Mr. Gilman.

I.M. 465. Nonmarket Environment of the Firm
3-0-3. Prerequisite: Senior standing.
Analysis of the nature of and significance to management of the legal, social and political framework within which broad economic influences are generated, market transactions are conducted, and the firm is managed.
Text: Instructor's syllabus and selected readings.
Mr. Gilman and Staff.

I.M. 474. Industrial Development in Latin America
3-0-3. Prerequisites: I.M. 203 or I.M. 204; knowledge of Spanish; and consent of the instructor.
A course designed to acquaint the student with the latest theories and principles of industrial development in developing countries. The student will prepare an analysis of the prob-
lems and opportunities in industrial development in a specific Latin American country.
Text: Bryce, Industrial Development.

Mr. O'Connor.

I.M. 486. National Income and Fiscal Policy
3-0-3. Prerequisites: I.M. 201, 202, and 203.
An intermediate macroeconomic theory course designed to develop the student's understanding of the national economic environment within which the firm operates. Principal topics are: analysis of the national income model and its components, and contemporary fiscal and monetary theory.

Mr. Biven and Staff.

I.M. 487. Comparative Economic Systems
3-0-3. Prerequisite: I.M. 203 or equivalent.
A critical study is made of the methods by which various economic systems meet common fundamental problems in production, exchange, distribution, consumption, and capital formation. Comparative analyses of the major theories underlying these methods are undertaken, and their efficacy considered in the light of modern technology.

Mr. Buckingham and Staff.

I.M. 488. Economics of Industrial Competition
3-0-3. Prerequisite: Senior standing.
A study of the competitive structure of industry in terms of theoretical models and contemporary business organization, alternative public policy goals, and a critical review and appraisal of antitrust legislation.

Mr. Cooper.

I.M. 490. Contemporary Economic Theory
3-0-3. Prerequisite: I.M. 203 or equivalent.
This is a course in national economic policy. An analysis will be made of such problems as full employment, inflation, the relation of government to business, the farm situation, international trade conditions and the underdeveloped countries.
Text: Camp and Weiler, Economic Policy.

Mr. Biven.

I.M. 491. Seminar
Re-designated I.M. 391. Credit not given for both I.M. 391 and I.M. 491.

I.M. 495. Economics of Industrial Location
3-0-3. Prerequisites: I.M. 203 and I.M. 311 or equivalent.
A survey of economic factors influencing industrial location. General consideration will be given to locational patterns, processes of economic growth, and the public policy aspects of managerial decisions. More particular attention will be directed to the impact of transfer and processing costs, land use competition and technological change on problems of plant location.
Text: Selected readings.

Mr. Schaffer and Mr. Tarpley.

I.M. 499. Industrial Management Honors Seminar
3-0-3. Prerequisite: Last or next to last quarter seniors by invitation of the Faculty of the School of Industrial Management.
This course is designed to give a selected group of outstanding seniors in the School of Industrial Management an opportunity to research, analyze and discuss current management and economic problems with specialists in the various areas.
Text: Selected readings. Senior Staff.
Graduate Courses Offered

The program leading to the degree of Master of Science in Industrial Management provides an opportunity for graduates from a broad range of rigorous undergraduate curricula to prepare themselves for general management or challenging staff responsibility. Up to thirty hours of selected undergraduate courses provide a foundation for the advanced phase of the program, which is based on the graduate courses listed below. These courses are described in detail in the Graduate Catalogue.

Applicants should have had at least a year of college math and a year of a laboratory science as part of their undergraduate preparation, and an overall undergraduate average of B or better. (Students who are well qualified in other respects may be permitted to remove undergraduate math and science deficiencies during their first year of graduate work.) The Admission Test for Graduate Study in Business is required of all applicants including foreign students. Inquiries about the graduate program should be addressed to The Graduate Committee, School of Industrial Management.

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<td>I.M. 620</td>
<td>The Theory of Industrial Organization</td>
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School of Information Science
(Established in 1963)

Acting Director—William F. Atchison; Regents’ Professor—Waldemar T. Ziegler; Assistant Professors—Dale L. Barker, Dewey E. Carroll, James Gough, Jr., Arthur T. Kittle, Edward G. Roberts; Secretary—Mrs. Adele L. Champaign.

General Information

Information Science is the field of academic study and professional practice concerned with the investigation of the properties and functions of recorded knowledge and with all aspects of its generation, dissemination, storage, and use in society. A central focus of interest in the field at present is upon the exploration and development of new methods and systems (mechanized and non-mechanized) for the improved dissemination, organization, storage, retrieval, and use of information in the large and growing bodies of literature in all subject fields—especially those of science and engineering.

The School of Information Science was established as a graduate degree granting department of the Institute in September of 1963 with the support of the National Science Foundation. The objectives of the present master’s programs of the School are (1) to prepare students with undergraduate scientific and engineering backgrounds for professional practice and research in the field of Information Science, and (2) to lay the foundations for advanced study and research in this area on the doctoral level.

Students entering these programs may elect one of two primary areas of specialization. The first is designed to prepare students for careers as specialists in science information service and technical literature analysis in industrial and research laboratories, science libraries, and technical information centers. It stresses the fundamentals of literature analysis in science and engineering, the languages used in these fields, and advanced study in a particular science or engineering field appropriate to the student’s interest. The second area of specialization is for students interested primarily in information problems as an area of scientific study and research and in the design and operation of information systems as a field of applied engineering. It stresses the theoretical aspects of Information Science and the technological problems in developing and operating systems for the storage, processing, retrieval, and use of information of all kinds.

At present four courses in the Information Science curricula are open to undergraduate students in their junior and senior years. These courses, which are described below, may be taken with profit by students who are not necessarily planning to enter one of the graduate Information Science programs. A Special Bulletin of the School of Information Science is available for students interested in the courses and requirements of the graduate degree programs.
Courses of Instruction

NOTE: 3-0-3 means 3 hours class, 0 hours laboratory, 3 hours credit.

I.S. 401, 402. Languages for Science and Technology
3-0-3, 3-0-3. Prerequisite: Senior standing or consent of instructor.
A survey of the chief languages in which scientific and technical literature is published. Emphasis is on the written appearance, systems of writing, sounds, relation to other languages, basic grammatical structure, and a practical technical and bibliographic vocabulary of German, French, Russian, other major Teutonic, Romance, and Slavic languages, Japanese, and Chinese, with descriptive information concerning other important languages.

Mr. Gough.

I.S. 413, 414. Scientific and Engineering Literature
2-0-2, 0-3-1. Prerequisite: Senior standing, or consent of instructor, to be taken concurrently.
Study of the reference and bibliographic sources of scientific and engineering literature, including such information retrieval systems as abstracts, bibliographies, catalogs, and indexes. Stresses concepts and strategy of searching the literature with a major search problem as an experiment in the student's field of science or engineering.

Mr. Roberts.

Graduate Courses Offered

The School welcomes inquiries concerning the graduate programs in Information Science, and applications for admission will be considered from qualified students with undergraduate backgrounds in any of the major scientific and engineering fields. The courses of study for each student are planned individually in consultation with the Director of the School.

I.S. 601 Properties, Structure, and Functions of Scientific and Technical Literature 3-0-3
I.S. 604 Bibliographic Description of Scientific and Technical Literature 3-0-3
I.S. 605 Organization of Information for Storage and Retrieval 3-0-3
I.S. 606 Mechanized Information Storage and Retrieval Systems 3-0-3
I.S. 613 Information Sources and Search Techniques 3-0-3
I.E. 614 Special Problems in Literature Analysis 3-0-3
I.S. 700 Thesis Research
I.S. 704, 5, 6 Special Problems in Information Science Credit to be arranged
School of Mathematics  
(Established in 1952)


General Information

The School of Mathematics has two functions: (1) to train students in basic mathematics and in its use as an effective tool in engineering and the natural sciences; (2) to provide more advanced mathematical training for those who plan to make mathematics their profession.

In addition to the usual undergraduate service courses, programs of study are offered which lead to the degrees of

- Bachelor of Science in Applied Mathematics
- Master of Science in Applied Mathematics
- Doctor of Philosophy.

Numerous advanced undergraduate and graduate courses are offered which may be used as electives by students in the schools of engineering and the natural sciences. Close cooperation is maintained with the staff of the Rich Electronic Computer Center, which is located on the campus.

Students of especial ability are invited to participate in an Honors Program which extends through a large part of the freshman and sophomore years.

The requirements for the B.S. in Applied Mathematics are listed on the following pages; the requirements for the graduate degrees may be found in the Graduate Bulletin.

Departmental Degree Requirements

The following institutional regulation concerning degrees is quoted from the publication Student Rules and Regulations as amended by the Faculty May 31, 1960:

"To be a candidate for a degree, a student must have passed all courses required for the degree, must have a scholastic average for his entire academic program of at least 2.0 and must have done creditable work in his depart-

*On leave.
mental courses so as to merit the recommendation for the degree by the director of his school and by the dean of his college. (X, A2, p. 10)."

The School of Mathematics sets forth the following regulations as its interpretation of "creditable work in...departmental courses."

1. A grade of C or better must be made on each mathematics course required in the curriculum.

2. An academic average of 2.3 or better must be made on all mathematics courses on the 400 level specified by number in the curriculum.

3. In cases where these rules appear to work unreasonably or unjustly, exceptions may be made by the Director or Associate Director of the School of Mathematics.

**Freshman Year**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 101-2-3</td>
<td>Inorganic Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
<td>3-3-4</td>
</tr>
<tr>
<td>Draw. 113</td>
<td>Engineering Graphics</td>
<td>0-6-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eng. 101-2</td>
<td>Composition and Rhetoric</td>
<td>3-0-3</td>
<td>3-0-3</td>
<td></td>
</tr>
<tr>
<td>Eng. 105</td>
<td>Introduction to Literature</td>
<td></td>
<td></td>
<td>3-0-3</td>
</tr>
<tr>
<td>Math. 100</td>
<td>College Algebra and Trigonometry</td>
<td>5-0-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math. 104</td>
<td>Analytic Geometry and Calculus</td>
<td></td>
<td>5-0-5</td>
<td></td>
</tr>
<tr>
<td>Math. 201</td>
<td>Calculus</td>
<td></td>
<td></td>
<td>5-0-5</td>
</tr>
<tr>
<td>M.L. *</td>
<td>Modern Language OR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.S. 111-12-13</td>
<td>Social Science</td>
<td>3-0-3</td>
<td>3-0-3</td>
<td>3-0-3</td>
</tr>
<tr>
<td>P.T. 101-2-3</td>
<td>Physical Training</td>
<td>0-4-1</td>
<td>0-4-1</td>
<td>0-4-1</td>
</tr>
<tr>
<td>ROTC **</td>
<td>ROTC</td>
<td>3-1-2</td>
<td>3-1-2</td>
<td>3-1-2</td>
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<tr>
<td>Gen. 101</td>
<td>Orientation</td>
<td>1-0-0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Totals</td>
<td>18-14-20</td>
<td>17-8-18</td>
<td>17-8-18</td>
</tr>
</tbody>
</table>

NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*The School of Mathematics recommends that French, German or Russian be taken in the freshman year. Should this not be done, French, German or Russian must be elected in the junior year.

**For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. 201-2-3</td>
<td>Survey of the Humanities</td>
<td>3-0-3</td>
<td>3-0-3</td>
<td>3-0-3</td>
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<tr>
<td>Math. 202-3</td>
<td>Calculus</td>
<td>5-0-5</td>
<td>5-0-5</td>
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<tr>
<td>Math. 238</td>
<td>Finite Mathematics II</td>
<td>3-0-3</td>
<td></td>
<td></td>
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<tr>
<td>Math. 305-6</td>
<td>Differential Equations</td>
<td>3-0-3</td>
<td>3-0-3</td>
<td>3-0-3</td>
</tr>
<tr>
<td>Phys. 207-8-9</td>
<td>Physics</td>
<td>5-3-6</td>
<td>5-3-6</td>
<td>5-3-6</td>
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<tr>
<td>P.T. 201-2-3</td>
<td>Physical Training</td>
<td>0-4-1</td>
<td>0-4-1</td>
<td>0-4-1</td>
</tr>
<tr>
<td>ROTC *</td>
<td>ROTC</td>
<td>3-1-2</td>
<td>3-1-2</td>
<td>3-1-2</td>
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<tr>
<td>Elective</td>
<td>Electives (Note 1)</td>
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<tr>
<td></td>
<td>Totals</td>
<td>19-8-20</td>
<td>19-8-20</td>
<td>14-8-18</td>
</tr>
</tbody>
</table>

**For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.
Junior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
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<tbody>
<tr>
<td>Eng. 320</td>
<td>Technical Writing</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
</tr>
<tr>
<td>Eng. 315</td>
<td>Public Speaking</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
</tr>
<tr>
<td>Math. 309</td>
<td>Introd. to Higher Algebra</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
</tr>
<tr>
<td>Math. 401-2-3</td>
<td>Introd. to Analysis</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
</tr>
<tr>
<td>Math. 405-414</td>
<td>Modern Algebra</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
</tr>
<tr>
<td>Phys. 308</td>
<td>Intermediate Electricity</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
</tr>
<tr>
<td>Phys. 319</td>
<td>Modern Physics for Engineers</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
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<tr>
<td>Elective</td>
<td>Electives (Note 1)</td>
<td>0-0-9</td>
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<tr>
<td>Totals</td>
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<td>9-0-18</td>
<td>12-0-18</td>
<td>9-0-18</td>
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</table>

Senior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 404</td>
<td>Introd. to Analysis</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
</tr>
<tr>
<td>Math. 427-8-9</td>
<td>Seminar</td>
<td>2-0-2</td>
<td>2-0-2</td>
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<td>Math.</td>
<td>(Any four Math. Courses at the</td>
<td>3-0-3</td>
<td>4-0-4</td>
<td>4-0-4</td>
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<tr>
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<td>400 level or higher)</td>
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<tr>
<td>Phys. 320</td>
<td>Mechanics</td>
<td>0-0-9</td>
<td>0-0-9</td>
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<tr>
<td>Elective</td>
<td>Electives (Note 1)</td>
<td>8-0-17</td>
<td>10-0-19</td>
<td>8-0-17</td>
</tr>
</tbody>
</table>

NOTE 1: The total of 54 hours of electives in the sophomore, junior, and senior years must include at least 9 hours of humanistic-social studies from the list on page 34 and at least 12 additional hours of course work in fields other than mathematics and advanced ROTC. The total of 54 hours must not include more than 9 hours of advanced ROTC.

Courses of Instruction

Math. 100. College Algebra and Trigonometry
5-0-5. Prerequisite: Entrance algebra and trigonometry.
The real number system, the concept of function, theory of equations, systems of equations, permutations, combinations, the binomial theorem, sequences, mathematical induction, progressions.

Math. 101. College Algebra
5-0-5. Prerequisite: Entrance algebra.
The real number system, the concept of function, theory of equations, systems of equations, permutations, combinations, the binomial theorem, sequences, mathematical induction, progressions.

Math. 102. Trigonometry
5-0-5. Prerequisite: Math. 101.
Exponential and logarithmic functions, trigonometric functions, complex numbers, inverse functions, trigonometric equations.

Math. 104. Analytic Geometry and Calculus
5-0-5. Prerequisite: Math. 100 or 102.
Elements of analytic geometry, including the conic sections. Introductory calculus with emphasis on the concepts of limit, continuity, and derivative. Differentiation of algebraic and trigonometric functions, simple applications.
Math. 201. Calculus
5-0-5. Prerequisite: Math. 104.

The antiderivative and the definite integral. Area, volume, work. Differentiation and integration of transcendental functions. Techniques of integration.

5-0-5. Prerequisite: Math. 201.

Polar coordinates, vectors, solid analytic geometry, linear systems and matrices.

Math. 203. Calculus

Partial differentiation, multiple integrals, improper integrals, sequences, infinite series.

Math. 205. Elementary Statistical Analysis
3-0-3. Prerequisite: Entrance Algebra.

Construction of consistent probability measures for finite sequences of statistical experiments; independent trials; random variables, their means, variances and distributions; sampling; estimation and testing of hypotheses; nonparametric tests of association. Entire development restricted to finite sample spaces.

Math. 206. Elementary Statistical Analysis
3-0-3. Prerequisites: Math. 205; Math. 201 or concurrently.

Motivation and definition of random variables with continuous distributions; normal distribution and the Central Limit Theorem; nonparametric tests; estimation and testing hypotheses in normal distributions; simple regression and correlation.

Math. 235. Finite Mathematics I
3-0-3. Prerequisite: Math. 104.


Math. 238. Finite Mathematics II
3-0-3. Prerequisite: Math. 201.

A course similar to Math. 235 but somewhat more advanced. Elementary mathematical logic, set theory; elementary probability. Credit will not be allowed for both Math. 235 and Math. 238.

Math. 304. Differential Equations
5-0-5. Prerequisite: Math. 203.


Math. 305. Differential Equations
3-0-3. Prerequisite: Math. 203 or concurrently.

A course centered around the linear equation with applications selected from physics, chemistry, and mechanics.

Math. 306. Differential Equations
3-0-3. Prerequisite: Math. 305.

Systems of linear differential equations, linear differential equations with variable coefficients, power-series solutions, the method of Frobenius.
Math. 309. Introduction to Higher Algebra
3-0-3. Prerequisite: Math. 203.
Vectors, vector spaces, matrices, systems of linear equations, transformations of coordinates in a vector space, quadratic forms, diagonalization, characteristic values.

Math. 400. Special Topics
3-0-3. For example Math. 400 (a) could be Optimization Techniques, a companion course to Math. 407.
The purpose here is to enable the School of Mathematics to comply with requests for courses in selected topics. Given on demand.
Text: To be selected.

Math. 401. Introduction to Analysis
3-0-3. Prerequisite: Math. 304 or 305 or concurrently.
The first of four courses on fundamental concepts of analysis. Real and complex number systems, sets, limits, continuity, differentiation of functions of one real variable.

Math. 402. Introduction to Analysis
3-0-3. Prerequisite: Math. 401.
A continuation of Math. 401. Partial differentiation, functions of bounded variation, rectifiability, connectedness, the Riemann-Stieltjes integral.

Math. 403. Introduction to Analysis
3-0-3. Prerequisite: Math. 402.
Infinite series, sequences of functions, improper integrals.

Math. 404. Introduction to Analysis
3-0-3. Prerequisite: Math. 402.
The fourth course of the sequence on fundamental concepts. Jacobians, implicit function theorem, line integrals, multiple integrals, vector analysis.

Math. 405. Modern Algebra
3-0-3. Prerequisite: Math. 309.
A survey of modern algebraic systems including groups, rings, fields, and finite-dimensional vector spaces. Linear transformations on vector spaces with matrix interpretation.

Math. 407. Linear Programming
3-0-3. Prerequisite: Math. 202 or concurrently.
Mathematical structure of the linear programming problem. Requisite topics in linear algebra. Simplex method. Transportation and production scheduling, inventory control, and other applications.

Math. 409. Fundamental Concepts in Mathematics
3-0-3. Prerequisite: Differential equations or consent of instructor.
A course designed for mathematics majors and beginning graduate students. Unifies and extends certain basic notions of college mathematics.
Text: To be selected.

Math. 411. Advanced Engineering Mathematics
3-0-3. Prerequisite: Math. 304 or 305.
The Laplace transformation and its properties. Elementary applications to physical systems involving the solution of ordinary and partial differential equations.

Math. 412. Advanced Engineering Mathematics
3-0-3. Prerequisite: Math. 304 or 306 or consent of instructor.
Fourier series, Bessel functions, partial differential equations. Text: To be selected. Staff.

Math. 413. Advanced Engineering Mathematics
3-0-3. Prerequisite: Math. 304 or 305 or consent of instructor.
Topics from complex function theory including conformal mapping and contour integration.
Text: Churchill, Complex Variables and Applications. Staff.

Math. 414. Modern Algebra
3-0-3. Prerequisite: Math. 405.
Inner products, Gram-Schmidt process, Schwarz's inequality and the spectral theorem.

Math. 415. Introduction to Probability
3-0-3. Prerequisite: Math. 203 or concurrently.
An introduction to probability theory and its applications; discrete and non-discrete probability distributions; laws of large numbers.

Math. 416. Mathematical Statistics
3-0-3. Prerequisite: Math. 415.
A general study of discrete, continuous, and limiting distributions with emphasis on the normal distribution and the central limit theorem; exact sampling distributions, selected topics in estimation and testing hypotheses.

Math. 417. Mathematical Statistics
3-0-3. Prerequisite: Math. 416.
A continuation (from Math. 416) of estimation and of testing hypotheses; regression theory, design of experiments, analysis of variance, distribution-free methods.

Math. 418. Probability with Applications
3-0-3. Prerequisite: Math. 203.
An introduction to random processes with the necessary preliminary study of discrete sample spaces, combinatorial analysis, and basic laws of probability.

Math. 419. Probability with Applications
3-0-3. Prerequisites: Math. 418; Math. 309 or concurrently.

Math. 420. Vector Analysis
3-0-3. Prerequisite: Math. 304 or 306 or consent of instructor.
Vector algebra and applications to force diagrams; vector calculus, divergence, curl, and their role in potential theory. Line integrals, Gauss' theorem, Stokes' theorem, Green's theorem.
Text: Brand, Vector Analysis. Staff.

3-0-3. Prerequisite: Math. 203.
Organization and characteristics of digital computers; development of algorithms for elementary numerical methods; natural language and problem oriented language programming for machines currently available at the Rich Electronic Computer Center; the digital computer as a tool for experimental analysis.
Text: To be selected. Staff.

Math. 426. Computer Programming and Coding
3-0-3. Prerequisites: Math. 425, 443; Math. 444 or concurrently or consent of instructor.
Application of the digital computing equipment currently available at the Rich Electronic Computer
Center to implement and investigate methods studied in numerical analysis.

Text: To be selected.  Staff.

Math. 427. Seminar
2-0-2. Prerequisites: Math. 309, 402, and either 306 or 304.
Study and discussion intended to enhance investigative independence and expository skill. Content varying from year to year, usually beginning with solution of a series of related problems.
Text: None.  Staff.

Math. 428. Seminar
2-0-2. Prerequisite: Math. 427.
A continuation of Math. 427 with greater emphasis on individual study. Oral and written presentation of results.
Text: None.  Staff.

Math. 429. Seminar
2-0-2. Prerequisite: Math. 428.
Individual investigations of problems of moderate difficulty with a suitable account of results.
Text: None.  Staff.

3-0-3. Prerequisite: Math. 203.
An elementary tensorial treatment of various geometric and mechanical concepts needed in the study of hydrodynamics, elasticity, and plasticity.

Math. 431. Introductory Topology
3-0-3. Prerequisite: Math. 401 or consent of instructor.
A course to provide background for the use of topological methods in analysis. Topological spaces, continuous transformations, metric spaces.
Text: Bushaw, Elements of General Topology.  Staff.

Math. 434. Differential Geometry
3-0-3. Prerequisite: Math. 203.
The theory of curves and surfaces, including the first and second fundamental forms of a surface and topics related to them.
Text: To be selected.  Staff.

Math. 438. Mathematical Logic
3-0-3. Prerequisite: Math. 203 or consent of instructor.
An introductory course in the basic topics of set theory, the statement calculus, the restricted predicate calculus. Additional topics considered to the extent that time permits include the relationship of logic to the foundations of mathematics, recursive functions (Turing machines), formal languages, extended predicate calculus, decision problems.

Math. 441. Theory of Groups
3-0-3. Prerequisite: Math. 203.
An introductory course in group theory suitable for students of mathematics, chemistry, and physics.
Text: Barnes, Introduction to Abstract Algebra.  Staff.

Math. 443. Numerical Analysis I
3-0-3. Prerequisite: Math. 203.
Numerical solutions of systems of linear and nonlinear equations; interpolation and "best" approximations in the least square and uniform norms.
Text: To be selected.  Staff.

Math. 444. Numerical Analysis II
3-0-3. Prerequisites: Math. 304 or 306; Math. 443 or consent of instructor.
Numerical integration, operator calculus, difference equations, and numerical approximation of solutions of ordinary differential equations.
Text: To be selected.  Staff.

Math. 445. Numerical Analysis III
3-0-3. Prerequisite: Math. 444 or consent of instructor.
Numerical approximation of solutions of integral equations and partial differential equations; eigenvalue
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problems; selected topics of current interest.
Text: To be selected. Staff.

Math. 446. Introduction to Game Theory
3-0-3. Prerequisites: Math. 235 or Math. 309 or Math. 407 or consent of instructor.
An introduction to game theory with emphasis on zero-sum two-person games, Military, economic, and recreational illustrations. Discussion of connections with linear programming and decision functions.
Text: To be selected. Staff.

Graduate Courses Offered

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Math. 600</td>
<td>Special Topics</td>
<td>3-0-3</td>
</tr>
<tr>
<td>Math. 601, 2, 3</td>
<td>Methods of Applied Mathematics</td>
<td>3-0-3</td>
</tr>
<tr>
<td>Math. 604, 5, 6</td>
<td>Modern Abstract Algebra I, II, III</td>
<td>3-0-3</td>
</tr>
<tr>
<td>Math. 607, 8, 9</td>
<td>Ordinary Differential Equations</td>
<td>3-0-3</td>
</tr>
<tr>
<td>Math. 618, 19, 20</td>
<td>Mathematical Theory of Elasticity</td>
<td>3-0-3</td>
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<td>Math. 627, 8</td>
<td>Theoretical Hydrodynamics I, II</td>
<td>3-0-3</td>
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<td>Math. 631, 2, 3</td>
<td>Functions of a Real Variable</td>
<td>3-0-3</td>
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<td>Math. 634, 5, 6</td>
<td>Functions of a Complex Variable</td>
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<td>Math. 637, 8, 9</td>
<td>Partial Differential Equations</td>
<td>3-0-3</td>
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<tr>
<td>Math. 641, 2, 3</td>
<td>Mathematical Statistics</td>
<td>3-0-3</td>
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<td>Math. 644, 5, 6</td>
<td>Functional Analysis I, II, III</td>
<td>3-0-3</td>
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<td>Math. 651, 2, 3</td>
<td>General Topology</td>
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<tr>
<td>Math. 661, 2, 3</td>
<td>Algebraic Topology</td>
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<tr>
<td>Math. 691</td>
<td>Calculus of Variations</td>
<td>3-0-3</td>
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<td>Math. 692</td>
<td>Integral Transforms</td>
<td>3-0-3</td>
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<td>Math. 693</td>
<td>Integral Equations</td>
<td>3-0-3</td>
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<tr>
<td>Math. 694</td>
<td>Special Functions of Higher Mathematics</td>
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<td>Math. 695</td>
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<td>Math. 700</td>
<td>Master's Thesis</td>
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<td>Math. 701, 2, 3</td>
<td>Seminar</td>
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<td>Math. 704, 5, 6</td>
<td>Special Topics</td>
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<tr>
<td>Math. 707, 8, 9</td>
<td>Advanced Problems in Ordinary</td>
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<td></td>
<td>Differential Equations</td>
<td>3-0-3</td>
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<tr>
<td>Math. 800</td>
<td>Doctor's Thesis</td>
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</table>

For requirements for the graduate degrees in Mathematics, consult the Graduate Bulletin.
School of Mechanical Engineering
(Established in 1888)


General Information

Mechanical Engineering embraces the science and art of the generation, transmission, and utilization of heat and mechanical energy, and the design as well as the production of tools and machines and their products. Research, design, production, operation, administration, and economics are functional aspects of this branch of professional engineering.

The course of study is not designed to cover the entire field of Mechanical Engineering but to impress basic principles upon the student and to assist him to assimilate new ideas and to draw correct conclusions from given facts.

Emphasis, in the freshman and sophomore years, is placed on mathematics, chemistry, and physics and, in the junior and senior years, on the strength and the metallurgy of materials, applied mechanics, thermodynamics, heat transfer and fluid mechanics, and the application of those fundamental subjects to the diverse problems of mechanical engineering.

Satisfactory completion of the curriculum leads to the degree, Bachelor of Mechanical Engineering.

*Leave of Absence
**Deceased, October 12, 1963.
### Freshman Year

<table>
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<tr>
<th>Course</th>
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<td>Inorganic Chemistry</td>
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<td>Draw.</td>
<td>113-14-15</td>
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<td>Eng.</td>
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<td>Composition and Rhetoric</td>
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<td>Eng.</td>
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<td>Introduction to Literature</td>
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<tr>
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<tr>
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<tr>
<td>S.S.</td>
<td>111-12-13</td>
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<td>3-3-4</td>
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<td>P.T.</td>
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<td>18-14-20</td>
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*Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish.

Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

**For course numbers, see course descriptions under appropriate ROTC sections of this Bulletin.

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
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<th>3rd Q.</th>
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<td>Erg.</td>
<td>201-2-3</td>
<td>Survey of Humanities</td>
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<td>3-3-4</td>
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<td>5-0-5</td>
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<td>M.E.</td>
<td>207-8</td>
<td>Engineering Materials and Processes</td>
<td>2-3-3</td>
<td>2-3-3</td>
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*For course numbers, see course descriptions under appropriate ROTC sections of this Bulletin.

### Junior Year

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<td>Electric Circuits and Fields</td>
<td>2-3-3</td>
<td>2-3-3</td>
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<td>E.E.</td>
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<td>Elementary Electronics</td>
<td>2-3-3</td>
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<tr>
<td>M.E.</td>
<td>309</td>
<td>Metallurgy and Heat Treating</td>
<td>2-3-3</td>
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*The Basic Science Elective will be selected from Chemistry, Mathematics or Physics. The Mathematics or Physics course must be numbered 300, or above.

**Humanities elective to be selected from list on page 34.
Senior Year

<table>
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<tr>
<th>Course No.</th>
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<td>Materials Engineering</td>
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<td>M.E. 415</td>
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<td>M.E. 467-81-82</td>
<td>Machine Design</td>
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<td>M.E. 491</td>
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Totals 17-9-20 16-6-18 15-6-17

*M.E. Electives are to be chosen from the following engineering analysis, design and systems courses: M.E. 420, 421, 422, 425, 428, 431, 432, 439, 443 and at least two of them shall be selected from M.E.420, 421, and 422.

**If Group Elective courses are chosen in the field of Mechanical Engineering, they will be selected from the following: M.E. 403, 420, 421, 422, 425, 426, 427, 428, 429, 431, 432, 439, 443, 445, 447, and 480.

Three courses in science or technical courses in another field of engineering may be selected to fulfill the Group Elective requirement. A student who wishes to do this must submit a letter to the School of Mechanical Engineering, when preregistering for his first quarter senior year, outlining his program and listing three electives which he wishes to take. These courses should lead to some goal, selected by the student, and must be approved by the departmental schedule advisor, subject to final approval by the Director of the School of Mechanical Engineering.

Courses of Instruction

Note: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

M.E. 207. Engineering Materials and Processes

2-3-3. Prerequisites: Chem. 103 and Phys. 207 or concurrently.

The atomic, unit cell and microscopic principles of metal structures are introduced. The technology of casting, forming and joining is also studied. Laboratory problems and metallographic investigations complete the work.

Text: Burton, Applied Metallurgy for Engineers. Mr. Talbot and Staff.

M.E. 208. Engineering Materials and Processes


Machine tools are analyzed. The theory and metallurgy of cutting are studied. Tool geometry, cutting fluids technology, thermal problems and surface finish are considered. Experiments include machinability, cutting dynamometry and metrology problems.


Mr. Talbot and Staff.

M.E. 309. Metallurgy and Heat Treatment

2-3-3. Prerequisite: M.E. 207.

An expanded study of the elements of material science. Principles of physical metallurgy, metallography and strengthening mechanisms are studied and some experiments are performed.

Text: Guy, Elements of Physical Metallurgy. Mr. Bailey and Staff.

M.E. 310. Fluid Mechanics

3-0-3. Prerequisites: M.E. 323 or parallel.

An introduction to the study of fluid mechanics is presented, including the following topics: statics, kinematics, dynamics, energy and momentum relations for steady flow.
Text: Kenyon, *Fluid Mechanics.*
Mr. Purdy and Staff.

**M.E. 311. Fluid Mechanics**
3-3-4. Prerequisites: M.E. 324 or parallel, Mech. 303 or parallel, M.E. 310 and M.E. 350.

A continuation of M.E. 310 with a presentation of the following topics: dimensional analysis and similarity, incompressible flow in closed conduits, compressibility phenomena, and drag forces.

Text: Kenyon, *Fluid Mechanics.*
Mr. Purdy and Staff.

**M.E. 315. Heat Transfer**
3-0-3. Prerequisites: M.E. 323 and Math. 304 or 305.

Basic heat transfer mechanisms are introduced. Radiation, steady and unsteady conduction, and demonstrations of the pertinent principles are emphasized.

Text: To be selected.
Mr. Sunderland and Staff.

**M.E. 320. Thermodynamics**
4-0-4. Prerequisites: Phys. 209 or parallel, Math. 203 or parallel.

The fundamentals of engineering thermodynamics are covered. The properties of fluids, energy equations, and practical applications are included.

Text: To be selected.
Mr. Hinton and Staff.

**M.E. 322. Thermodynamics**
3-0-3. Prerequisites: Phys. 209 or parallel; Math. 203 or parallel.

A study of the fundamental laws of engineering thermodynamics and the properties of systems. Processes in the perfect gas are considered.

Hinton and Staff.

**M.E. 323. Thermodynamics**
3-0-3. Prerequisites: M.E. 322, Phys. 209, Math. 203.

A continuation of M.E. 322 including semi-perfect gases, real gases, vapors, mixture of gases, and combustion.

Text: Jones and Hawkins, *Engineering Thermodynamics.*
Mr. Hinton and Staff.

**M.E. 324. Thermodynamics**
3-0-3. Prerequisite: M.E. 323.

Applications of thermodynamics to engineering systems including vapor cycles, gas cycles, nozzles, turbines, compressors, and refrigeration.

Text: Jones and Hawkins, *Engineering Thermodynamics.*
Mr. Hinton and Staff.

**M.E. 334. Mechanical Equipment of Buildings**
3-0-3. Prerequisite: Phys. 209 or 213.

Principles of water supply, plumbing and heating are studied. Design features of various types of heating systems are considered.

Staff.

**M.E. 335. Mechanical Equipment of Buildings**
2-3-3. Prerequisite: M.E. 334.

Principles of air conditioning are studied. Application of heating and air conditioning principles to practical design problems is carried out during the laboratory period.

Staff.

**M.E. 350. Instruments Laboratory**
0-3-1. Prerequisites: M.E. 320 or 322 or parallel.

Principles of measurement, accuracy of instruments and data analysis are discussed. Instrumentation employed includes: planimeters, pressure and temperature measuring devices, speed, torque and power elements.

Text: To be selected.
Mr. Barfield and Staff.
M.E. 353. Materials Laboratory  
0-3-1. Prerequisites: Mech. 332 or Mech. 336, or parallel.  
Basic methods of determining and evaluating phenomenological properties of engineering materials are experimented with. Stress analysis instrumentation is introduced.  
Mr. Talbot and Staff.

M.E. 367. Machine Design  
4-3-5. Prerequisites: Mech. 302 and 332.  
Kinematics, stress analysis methods, machine elements, and fundamental machine design principles are studied.  
Text: Phelan, Fundamentals of Mechanical Design.  
Mr. Johnson and Staff.

M.E. 403. Metal Cutting Principles  
2-3-3. Prerequisites: M.E. 208, M.E. 309, Mech. 337.  
Basic cutting processes are analyzed. Tool geometry, chip formation and machining economics are among the topics studied. Experiments dealing with the measurement of cutting forces, grinding ratios and tool life are conducted.  
Text: Notes.  
Mr. Vidosic.

M.E. 410. Materials Engineering  
2-3-3. Prerequisite: M.E. 309.  
The mechanical, thermal, electrical, chemical and irradiation behavior of engineering materials are studied from macrostructural considerations. Ceramics and plastics are also introduced as engineering materials.  
Mr. Talbot and Staff.

M.E. 415. Heat Transfer  
3-0-3. Prerequisite: M.E. 311 and 315.  
Laminar and turbulent convection, boiling, condensation, and demonstrations of the pertinent principles are emphasized. Design problems involving combinations of the basic heat transfer mechanisms are considered.  
Text: To be selected.  
Mr. Sunderland and Staff.

M.E. 420. Internal Combustion Engines  
3-3-4. Prerequisites: M.E. 311, 315 and 324.  
The mechanical construction, engine cycles, ignition, fuels, fuel feeds, combustion, vibration and balancing, and performance of internal combustion engines, with reference to aeronautical, automotive, and industrial use. The laboratory is devoted to experimental study of engines and their component parts.  
Text: Obert, Internal Combustion Engines.  
Mr. Shepard and Staff.

M.E. 421. Heating, Ventilating and Air Conditioning  
3-3-4. Prerequisites: M.E. 324, M.E. 415 or parallel.  
The theory of heating, ventilating and air conditioning and its application to engineering systems. The laboratory work includes tests on equipment and materials pertinent to the field.  
Text: Carrier, Cherne, Grant, and Roberts, Modern Air Conditioning, Heating and Ventilating.  
Mr. Hinton and Staff.

M.E. 422. Power Plant Engineering  
3-3-4. Prerequisite: M.E. 324 and 415 or consent of instructor.  
Modern power plant cycles, pumps, piping, fans, fuels, steam generators, boiler auxiliaries, heat exchangers and the economics of power plants are studied. The laboratory work consists of tests of equipment pertaining to the subject.  
Text: Zerban and Nye, Power Plants.  
Mr. Barnett and Staff.

M.E. 425. Engineering Analysis  
3-0-3. Prerequisite: M.E. 415, or parallel.  
Methods of analysis of engineering situations requiring application of fundamentals of engineering sciences
are studied. Projects requiring synthesis and analysis of engineering systems will be assigned.

Text: Notes. Mr. Gorton.

Principles underlying all forms of turbomachinery are studied. Application of these principles is made to give a unified treatment of pumps, compressors, and turbines.


M.E. 427. Combustion and Flames 3-0-3. Prerequisite: M.E. 311, 315, and 324, or consent of instructor.
Stoichiometric and thermochemical analyses of the principal fuel air reactions are to be examined. Concepts of modern theories of combustion and flame propagation are presented.


M.E. 428. Elements of Rocket Systems 3-0-3. Prerequisite: M.E. 415 or parallel.
Basic elements, ballistics, and technical problems associated with the design of propulsion systems for solid and liquid propellant rockets are considered.

Text: Sutton, Rocket Propulsion Elements. Mr. Shepard.

An intermediate study of one dimensional compressible flow systems related to Mechanical Engineering.


M.E. 431. Refrigeration 3-0-3. Prerequisite: M.E. 324.
A study of the compressor, condenser, piping and accessories of the refrigeration plant, and other practical applications of the principles of refrigeration.

Text: Jordan and Priester, Refrigeration. Mr. Barnett.

M.E. 432. Steam Turbines 3-0-3. Prerequisite: M.E. 324.
A detailed study of the design and operation of steam turbines.

Text: Church, Steam Turbines. Mr. Hinton and Staff.

M.E. 439. Gas Turbines 3-0-3. Prerequisites: M.E. 311 and 324.
The theory and the design of gas turbines and jet engines and the various applications of these engines.


A continuation of M.E. 421. The subject matter emphasizes the design of various systems, including automatic controls, and the selection of equipment.

Text: Carrier, Cherne, and Grant, Modern Air Conditioning, Heating and Ventilating. Mr. Hinton.

Fundamental principles and generalized behavior of closed loop linear systems are examined. Pneumatic, mechanical, and electrical control systems are applied to pressure, flow, speed, temperature, and position control.

Text: To be selected. Mr. E. Harrison.

M.E. 447. Elements of Nuclear Power 3-0-3. Prerequisite: M.E. 415 or concurrently, or equivalent.
A study of characteristics of nuclear power systems. Nuclear physics and nuclear reactions will be used for establishing some reactor principles and reactor types.

Text: To be selected. Mr. Barnett.
M.E. 467. Machine Design
3-3-4. Prerequisites: Mech. 303, 332.
Kinematics and dynamics of machinery—motion, velocity, acceleration and inertia forces—are studied. A few principles of mechanism synthesis are introduced.
Texts: Shigley, Theory of Machines; Mark's (or equivalent) Mechanical Engineer's Handbook, Hall and Azpell, Mechanism Problems.
Mr. Johnson and Staff.

M.E. 480. Dynamics of Machinery
2-3-3. Prerequisite: M.E. 467.
Dynamic forces in machines, balancing and dynamics of reciprocation are studied. Cam dynamics and dynamics of feedback controls are also introduced.
Texts: Shigley, Theory of Machines; Leutweiler, Problems in Mechanics of Machinery. Mr. Murphy.

M.E. 481. Machine Design
3-3-4. Prerequisites: M.E. 467, Mech. 337 and M.E. 410 or concurrently.
Principles of design—synthesis and analysis—are introduced. The application of engineering mechanics to the design and selection of machine elements is then pursued. Component design projects are undertaken in the laboratory.

M.E. 482. Machine Design
3-3-4. Prerequisites: M.E. 410 and M.E. 481.
Study of the design process is continued. Decision theory, creativity concepts, particular design factors and optimization are considered. Systems design include projects undertaken as laboratory exercises.
Texts: Class notes; Shigley, Mechanical Engineering Design; Vidosic, Machine Design Notes.
Mr. Murphy and Staff.

M.E. 491. Seminar
1-0-1. (Winter quarter only). Prerequisite: Senior standing in Mechanical Engineering.
Civil and professional responsibilities and opportunities are brought to students by leaders in engineering, business, and community affairs.
Staff.

M.E. 496-7-8-9. Special Problems in Mechanical Engineering
0-9-3, 0-6-2, 0-3-1, 0-12-4, respectively. Prerequisite: Senior standing in Mechanical Engineering.
These courses are for the student who is interested in creative work.
Staff.
<table>
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<td>3-0-3</td>
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<tr>
<td>M.E. 658</td>
<td>Mechanism Synthesis</td>
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<td>M.E. 659</td>
<td>Engineering Design</td>
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<tr>
<td>M.E. 661</td>
<td>Advanced Dynamics of Machinery</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 662</td>
<td>Machine Vibration</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 663</td>
<td>Elastic Yield Design of Machine Members</td>
<td>3-0-3</td>
</tr>
<tr>
<td>M.E. 669</td>
<td>Materials for Design</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 671</td>
<td>Deformation of Metals</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 672, 3</td>
<td>Fabrication of Metals</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 674, 5</td>
<td>Variational Methods in Engineering</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 676, 7, 8</td>
<td>High Temperature Design I, II, III</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 683</td>
<td>Lubrication</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 711</td>
<td>Magnetogasdynamics I</td>
<td>3-0-3</td>
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<tr>
<td>M.E. 712</td>
<td>Magnetogasdynamics II</td>
<td>3-0-3</td>
</tr>
<tr>
<td>M.E. 713</td>
<td>Magnetogasdynamics III</td>
<td>3-0-3</td>
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</tbody>
</table>

(Complete details about these courses are contained in the Graduate Bulletin, a copy of which is available upon request.)
Department of Military Science
(Established in 1917)


Reserve Officers' Training Corps

The Federal Government offers instruction at Georgia Institute of Technology, a Senior Division of the Army Reserve Officers' Training Corps, in six branches: Air Defense Artillery, Chemical Corps, Corps of Engineers, Infantry, Ordnance Corps, and Signal Corps. All branches are open to regular advanced course students and students enrolled under the Co-operative Plan. General objectives of the course of instruction are to produce junior officers possessing qualities and attributes essential to their progressive and continued development as officers in the United States Army Reserve and in the Regular Army. Training in military leadership is emphasized, with instruction being given in subjects common to all branches of the Army and in tactics and techniques of the several branches.

The complete course of instruction of the Senior Division ROTC program comprises four years. The first year of the basic course consists of approximately 70 hours of instruction, and the second year approximately 90 hours. The advanced course consists of approximately 110 hours of instruction each year and the addition of a six-week summer camp.

Academic Credit

Academic credit is granted for the completion of military courses as indicated in the sections that follow. However, not more than 9 hours credit in advanced ROTC courses may be applied toward a degree.

<table>
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<tr>
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<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
<th>Credit Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic 1st Year</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Basic 2nd Year</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Advanced 1st Year</td>
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<tr>
<td>Advanced 2nd Year</td>
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<tr>
<td>Total</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>22</td>
</tr>
</tbody>
</table>
Uniforms
Students enrolling in the basic or advanced course will be furnished the ROTC uniform through Georgia Tech at an approximate cost to the student as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Course</td>
<td>$ 75.00</td>
</tr>
<tr>
<td>Advanced</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Prior to formal enrollment in the ROTC basic or advanced course, each student will deposit with the Cashier of Georgia Tech the appropriate amount shown above. The receipt of this deposit will then be taken to the Uniform Accounts Office where a Purchase Order will be issued to the depositor. This Purchase Order must be presented to the supplier of ROTC uniforms used in the ROTC program for proper fitting and issuance of items of uniform and insignia. Uniforms become the property of the individual and are not returnable for reimbursement once they have been issued.

Students formally enrolled in the ROTC are authorized a commutation in lieu of uniform which is earned in accordance with the length of time actually enrolled. The uniform allowance for advanced course students is $100.00 per student and is reimbursed to the student upon completion of the advanced course. The uniform allowance for basic students is $50.00 and is reimbursed to the student on the basis of one-sixth of the total per quarter of enrollment satisfactorily completed.

Texts
Textbooks are furnished by the Government.

Advance Course Subsistence Allowance
Students formally enrolled in the ROTC and pursuing the advanced course will be paid a monetary allowance at a rate equal to the value of the commuted ration, normally $0.90 per day. Commutation will not be allowed for any period in excess of two school years plus one intervening summer vacation between such years, less the period of prescribed camp training during such vacation, nor for any longer total period than 595 days. Students will not be paid subsistence allowance during the period of prescribed camp training, whether or not they attend camp at the normal time. The summer vacation for which commutation will be allowed will be for the summer following the junior year. For each unexcused absence from an hour of instruction, an amount equivalent to two days' commutation, $1.80, will be deducted from the student's next payment of commutation.

The Basic Course
The basic course consists of formal instruction for two hours per week for two academic years of at least 30 weeks each, with the exception of one quarter of the freshman year. During this quarter the student will attend drill only. Subjects included in the basic course are the same for all students. During the sophomore year, selection is made of students considered eligible for enrollment in the advanced course. *Note*: All quarters include instruction in Leadership, Drill and Exercise of Command, to provide for leadership training, drill experience, and the development of certain essential characteristics of leadership such as initiative and self-confidence, through progressive training; also, to provide a thorough indoctrination in military courtesy and customs of the service.
M.S. 101. Leadership, Drill, and Exercise of Command: Individual Weapons and Marksmanship

2-1-2.
Leadership, Drill, and Command, stressing fundamentals on small unit level. Marksmanship training on indoor range. Mechanical functioning, disassembly, assembly, and employment with .30 and .22 cal. rifles.

M.S. 102. United States Army and National Security: Organization of the Army and ROTC

2-1-2.
Missions and responsibilities of the United States Army, the United States Army Reserve, and the National Guard as members of the National defense team. History and organization of ROTC. Design of military organizations, specifically Infantry units.

M.S. 104. Leadership Laboratory (Drill) 0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

M.S. 201. Military Map Reading, Individual Tactics, and Small Unit Tactics

2-1-2.
Maps and Aerial Photograph Reading, to include orientation and use of compass. Small unit tactics with emphasis on the defense.

M.S. 202. Tactics and Military History

2-1-2.
Tactics of individual soldier and small unit tactics emphasizing the offense. United States Military History to 1860 with emphasis on the principles of war.

M.S. 203. Military History

2-1-2.
Continuation of military history of the United States from 1861 to the present.

The Advanced Course

Students who have successfully completed the basic course and who are selected for further training may enroll in the advanced course. The advanced course is a recognized elective in all departments at Georgia Tech to the extent that nine hours of credit may be applied toward a degree providing the entire advanced course is completed. If the student does not complete the entire advanced program, ROTC credits may not be used as electives unless the student has been relieved of his contractual obligations by the Department of the Army.

Students who are members of the Naval Reserve, Marine Reserve, Coast Guard, or Air Reserve are required to terminate membership therein in order to become eligible for the advanced course. Students who are members of any Army Reserve or National Guard Unit must be transferred to a Reserve Control Group before they can sign the advanced course contract.

Upon the successful completion of the advanced course of four years’ education at a college level, graduates will be tendered commissions as second lieutenants in the United States Army Reserve. Students who meet other requirements promulgated by the Army will be designated Distinguished Military Students, and on graduation may be offered commissions in the Regular Army.

Members of the advanced course are required to attend camp one summer, normally between the junior and senior years. All students going to camp receive mileage for the round trip at the rate of five (5) cents per mile and are messed, housed, uniformed, and given medical and dental attention at
government expense while at camp. Students will receive pay at the rate of $78 per month. The duration of the camp is six weeks beginning about 20 June each year.

The advanced course consists of two quarters of military classroom instruction and one quarter of drill only in each of the junior and the senior years. Each quarter of classroom instruction includes four hours of class and one hour of drill. The program of instruction consists of a series of subjects which relate to the particular arm or service, and, in addition, a series of subjects common to all branches.

**Army Air Defense Artillery Section**

Any qualified student enrolled in any academic course may make application.

**M.S. 311. Fundamentals of Missile Science and Pre-Camp Orientation**

4-1-3.

The integrated air defense missile battery and its operation. Familiarization with Field Artillery principles and procedures. Preparation for summer camp. Infantry tactics.

**M.S. 312. Leadership, Military Teaching Principles, and Introduction to Guided Missiles**

4-1-3.

An introduction to the basic principles of leadership. Principles, methods and techniques of military instruction. An introduction to guided missiles and their associated equipment.

**M.S. 304. Leadership Laboratory (Drill)**

0-1-0.

Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of "S" will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

**Chemical Corps Section**

Admission to the Chemical Corps Unit requires acceptance based on performance in Basic Military (Freshman and Sophomore years) and is in general limited to those students who are enrolled in an academic course of instruction leading to an engineering, technical, or other scientific degree.

**M.S. 321. Chemical Corps Missions, Organization, Aspects of CBR Warfare and Defense**

4-1-3.
clude employment, detection, defense against decontamination and munitions. Infantry tactics and counterinsurgency.

M.S. 322. Leadership, Military Teaching
Principles, and Summer Camp
Orientation
4-1-3.

M.S. 304. Leadership Laboratory (Drill)
0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

M.S. 421. Military Administration, Military
Justice, Role of the U.S. in World Affairs
4-1-3.

Corps of Engineer Section

Admission to the Corps of Engineer Unit is limited to those students who are enrolled in an academic course leading to an engineering, technical, or scientific degree. Instruction in technical subjects supplements that of the engineering school, with particular attention to the military application of such subjects.

M.S. 331. Leadership, Methods of Military
Teaching Principles, and Field
Fortifications
4-1-3.
An introduction to the basic principles of leadership. Principles, methods and techniques of military instruction. Field fortification construction.

M.S. 332. Military Structures, Use of
Explosives, and Mine Warfare
4-1-3.

Basic military administration procedures. Fundamentals of military law. The role of the United States in World Affairs to include the recent world situation.

M.S. 422. Operations, Logistics and Service
Orientation
4-1-3.
Military operations and logistics to include command and staff functions, estimate of the situation, combat orders, troop movements, supply and evacuation. Active service orientation.

M.S. 404. Leadership Laboratory (Drill)
0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

M.S. 431. Engineer Logistics, Staff
Procedures, Engineer Unit Operations
and Camouflage
4-1-3.
A study of engineer logistics to include unit supply, troop movements, and motor transportation. Organization, function, and duties of staffs.
Military Science / 155

Employment and utilization of engineer units in all types of operations. Camouflage construction.

M.S. 432. Military Administration, Military Justice and the Role of the U.S. in World Affairs
4-1-3.
Basic concepts of military administration. Fundamentals of military law, justice, and court procedures. Orientation on geographical and economic factors which influence the role of the United States in World Affairs.

M.S. 404. Leadership Laboratory (Drill)
0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

Infantry Section
Any qualified student enrolled in any academic course may make application.

M.S. 341. Infantry Tactics and Techniques
4-1-3.
Military fundamentals common to all branches including leadership, military teaching principles, individual night training and patrolling.

M.S. 342. Infantry Tactics and Techniques
4-1-3.
Organization of Infantry units to include the Division. Techniques of tactical estimates and preparation of combat orders. Communication principles, techniques and equipment. Tactical employment of Infantry units to include the Company.

M.S. 304. Leadership Laboratory (Drill)
0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

M.S. 441. Infantry Tactics and Techniques
4-1-3.
Command and staff functions including training management, intelligence, operations, and logistics. Service Orientation.

M.S. 442. Infantry Tactics and Techniques
4-1-3.

M.S. 404. Leadership Laboratory (Drill)
0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

Ordnance Corps Section
Admission to the Ordnance Unit will be limited to those students who are enrolled in an academic course of instruction leading to an engineering, technical, or other scientific degree. However, students enrolled in other courses than these may be admitted if marked ability, aptitude, or interest in technical fields of endeavor is demonstrated.

M.S. 351. Ordnance Tactics and Techniques
4-1-3.
An introduction to the organization and mission of the Ordnance Corps. The characteristics, design, and capabilities of small arms, automotive components, ammunition, artillery, guided missiles, and nuclear weapons employed by the Army. Infantry tactics.
M.S. 352. Ordnance Tactics and Techniques
4-1-3.
An analysis of the problems of maintenance and supply of Ordnance materiel for a global Army. An introduction to military leadership and military teaching methods with emphasis on student instruction.

M.S. 304. Leadership Laboratory (Drill)
0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

M.S. 451. Ordnance Tactics and Techniques
4-1-3.
Army administration as a tool of management. An introduction to military justice procedures. The role of the U.S. in world affairs.

M.S. 452. Ordnance Tactics and Techniques
4-1-3.
A survey of the various tools of management used to accomplish the Ordnance mission; including operations research, linear programming, automatic data processing systems and the modern Army supply system. Service orientation.

M.S. 404. Leadership Laboratory (Drill)
0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

Signal Corps Section

Application for admission to the advanced course of the Signal Corps Unit is in general limited to those students enrolled in one of the academic fields leading to a degree in engineering, electronics, or physics. However, students enrolled in courses other than these may be accepted if marked ability, aptitude, or interest in technical fields of endeavor is demonstrated.

M.S. 361. Leadership, Military Teaching Principles, Signal Communication Materiel
4-1-3.
Instruction in the principles of leadership. A study of the principles, methods and techniques of military instruction. Introduction to communication material.

M.S. 362. Signal Corps Tactics and Techniques
4-1-3.
A study of the various means of communication to include telephony, telegraphy, carrier, HF, VHF and microwave systems. An introduction to the global communication network of the U.S. Army. Infantry tactics.

M.S. 304. Leadership Laboratory (Drill)
0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.

M.S. 461. Signal Corps Operations, Logistics, Service Orientation
4-1-3.
A study of staff organization and functions, including supply and evacuation, troop movements and motor transportation. Service orientation to prepare the future officer for active service.
M.S. 462. Army Administration, Military Justice, Role of the U.S. in World Affairs
4-1-3.
Basic concepts and fundamentals of Army Administration and mess management. Fundamental concepts of military justice in the Armed Forces of the United States. Role of the U. S. in world affairs.

M.S. 404. Leadership Laboratory (Drill) 0-1-0.
Military drill period will be attended, in uniform, by students enrolled in the Army ROTC program. Attendance and aptitude marks will be assigned, and a grade of “S” will be given for satisfactory completion of this course. No preparation is required and no tests will be given.
Department of Modern Languages

Department Head—James D. Wright; Professor Emeritus—Joseph A. Campomoro; Professor—George F. Walker; Associate Professor—Louis J. Zahn; Assistant Professors—James Gough, Jr., Carl E. Steinhauser, Roy O. Wyatt; Instructors—John S. Austin, Jr., John R. Canavan, Richard L. Hawkey.

General Information

The Department of Modern Languages seeks first to give the student sufficient mastery of a foreign language to enable him to read and understand with reasonable facility the scientific and technical literature of that language. Further, it seeks to inform the student, through the medium of the foreign language, of the civilization and literature of the countries where that language is spoken. In facilitation of the effort to attain these goals the Department attempts to section, according to ability and/or preparation, its first- and/or second-year students of those languages which attract enrollments either large enough to support such sectioning or specifically qualified to do so.

A student taking a language in which he has two or more years of high school credit must schedule initially a course not lower in number than the first course of the 200 series in that language. If such a student finds that, for any reason, his knowledge of the language in question is inadequate for his successful participation in this initially selected course, then prior to the end of the period during which courses may be dropped without penalty he may, with the approval of the Department of Modern Languages, transfer to any less advanced course in the same language which is available and to which his preparation is believed to be equal. Beginning with that less advanced course, he may then take for full credit toward graduation the entire complement of language courses recommended for his program of study. A student who elects to take courses in a language which he speaks as a native language must also schedule a course not lower than the first course of the 200 series — if the language in question is French, German, or Russian. If the language in question is Spanish, such a student must schedule the available course of the series, M.L. 316-317-318. Otherwise the student in either of these situations may schedule the beginning course of another language.

Credit for courses of the 100 series is given only after completion of the full three quarters. Credit for courses above the level of the 100 series is given on a quarterly basis.

Students who are registered under the Co-operative Plan and who study the elementary course of a foreign language are required to study German. This requirement is made necessary by the fact that German is the only foreign language in which all three elementary courses are normally offered each quarter — a situation which usually makes possible the scheduling of any first-year German course during any quarter and which, in the study of the other languages, usually makes possible the scheduling of only that first-year course which is reserved for the quarter in question. Accordingly students who are enrolled only every other quarter can easily complete the first year of their language study in German but might do so only with great loss of time in the other languages.
Courses of Instruction

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

French

Those students who have had two years of high school training in French and those who have had more than two are required to register initially for a course not lower in number than M.L. 207. The gradation of the series M.L. 207-208-209 and the instructional variety within that series are such that both groups of students can profitably take the courses.

With permission of the instructor, exceptionally well prepared matriculating freshmen who have had three or more years of high school training in the language may be admitted to the series M.L. 307-308-309. This series is intended primarily, however, for students who have had two years of college training or the equivalent.

M.L. 107. Elementary French
3-0-3. Prerequisite: None.

Essential principles of French grammar; acquisition of vocabulary through simple conversational exercises and the reading of simple selections.


Mr. Walker and Staff.

M.L. 108. Elementary French
3-0-3. Prerequisite: M.L. 107 or equivalent.

Continuation of M.L. 107; extension of the survey of French grammar; acquisition of a large general vocabulary through conversation and the reading of texts dealing with French civilization and history.


Mr. Walker and Staff.

M.L. 109. Elementary French
3-0-3. Prerequisite: M.L. 107 and 108 or equivalent.

Reading of selected texts; composition; completion of the survey of French grammar.


Mr. Walker and Staff.

M.L. 207. Intermediate French
3-0-3. Prerequisite: M.L. 107-108-109 or equivalent.

Survey of French Literature from circa 1800 to the Present

Class and collateral study of prose, drama, and lyric poetry by representative authors through indicated literary movements; course conducted in French.

M.L. 307. Period: c. 1800-1850. Romanticism: the reappearance of lyric poetry; the importance of the individual, as opposed to classical anonymity.

3-0-3. Prerequisite: M.L. 207-208-209 or equivalent.
Texts: Clouard and Leggeuré, *Anthologie de la littérature française*, vol. II; selected paperbacks.

Mr. Santee.


3-0-3. Prerequisite: M.L. 207-208-209 or equivalent.


3-0-3. Prerequisite: M.L. 207-208-209 or equivalent.

Texts: Same as for M.L. 307 and 308.

Mr. Santee.

German

Matriculating freshmen who register at the beginning of the fall quarter for M.L. 101, the initial course of the elementary German series, are divided according to officially determined criteria into two groups. The students in the smaller of these groups are offered the opportunity to participate in a program of instruction which is more direct in presentation and more intensive in character than is the one which is conducted for the majority of the students. Participation in this more intensive and more directly presented program is completely voluntary on the part of the students concerned.

Matriculating freshmen who have two or more years of high school credit and who must therefore register initially for a course not lower in number than M.L. 201, may choose between the series M.L. 201-202-203 and the series M.L. 204-205-206. Those who are interested in acquiring a passive knowledge of the language for use as a tool of research are advised to register for M.L. 201-202-203. Those who are interested in acquiring an active knowledge of the language for use not merely as a tool of research but also as a medium of cultural development, may register for the series M.L. 204-205-206. Since the enrollment in this latter series is largely derived from the above mentioned intensive sections of the first-year series, however, M.L. 204-205-206 is more highly recommended for freshmen whose high school training has qualified them for instruction through the medium of the German language than it is for other freshmen. Each of the two series, M.L. 201-202-203 and M.L. 204-205-206, may be taken for full credit toward graduation; and either series may be taken first.

Of the matriculating freshmen who have three or more years of high school credit, an exceptional few may register initially for the series M.L. 304-305-306. When such students do register initially for this series, they are expected to bring qualifications which are of the kind recommended for M.L. 204-205-206 but which naturally represent a higher level of achievement than do those expected for the lower series. In general, however, the placement of such students in this 300 series will occur after registration; in response to application by the students for transfer to the more advanced level of study; and upon recommendation of this transfer by the staff members concerned.

M.L. 10. Elementary German for Graduate Students

5-0-0. Prerequisite: None. (Available in summer quarter only.)

Pronunciation; skeletal presentation of German grammar; translation of scientific literature into English. (By preparing the student in one quarter for admission into the first course of the appropriate second-year series—normally M.L. 201—this course affords him an oppor-
tunity to shorten the period of time usually required for passing the Ph.D. reading-knowledge examination.)


Mr. Canavan.

**M.L. 101. Elementary German**

3-0-3. Prerequisite: None.

- Pronunciation; essential principles of German grammar; rapid acquisition of vocabulary by the reading of simple selections; elementary composition.

Text: DeVries, Schmidt, and Schwartz, *Introduction to German*.

Mr. Wright and Staff.

**M.L. 102. Elementary German**

3-0-3. Prerequisite: M.L. 101 or equivalent.

- Continuation of M.L. 101.

Text: DeVries, Schmidt, and Schwartz, *Introduction to German*.

Mr. Wright and Staff.

**M.L. 103. Elementary German**

3-0-3. Prerequisite: M.L. 101 and 102 or equivalent.

- Reading of German scientific and general material and the acquisition of a large scientific vocabulary; continued study of German grammar; composition.


Mr. Wright and Staff.

**M.L. 201. Intermediate German**

3-0-3. Prerequisite: M.L. 101-102-103 or equivalent.

- Reading of German scientific and technical material; individual problems to conform, whenever possible, with the student’s special branch of engineering.

Texts: Nock, *German Science Reader*; Itter, *German Workbook for Science Students*.

Mr. Wright and Staff.

**M.L. 202. Intermediate German**

3-0-3. Prerequisite: M.L. 201 or equivalent.

- Continuation of training given in M.L. 201.


Mr. Wright and Staff.

**M.L. 203. Intermediate German**

3-0-3. Prerequisite: M.L. 201 and 202 or equivalent.

- Reading of German prose in support of the development achieved in M.L. 201 and 202.

Text: To be selected.

Mr. Wright and Staff.

Note: The series M.L. 201-202-203 is a suitable combination of courses for graduate students who have a knowledge of elementary German and who wish to prepare for reading-knowledge examinations for advanced degrees.

**M.L. 204. Intensive Intermediate German**

3-0-3. Prerequisite: Completion of the intensive courses of the 100 series; otherwise permission of the staff.

- Review of grammar; study of twentieth-century prose; intensive practice in conversation.

Text: To be selected.

Mr. Austin, Mr. Canavan, Mr. Steinhauser.

**M.L. 205. Intensive Intermediate German**

3-0-3. Prerequisite: M.L. 204 or equivalent.

- Continuation of M.L. 204.

Text: To be selected.

Mr. Austin, Mr. Canavan, Mr. Steinhauser.

**M.L. 206. Introduction to the German Novelle**

3-0-3. Prerequisite: M.L. 204 and M.L. 205 or equivalent.

- Collateral and class reading of selected nineteenth- and/or twentieth-century prose *Novellen*; written and/or oral reports; class discussion.

Course conducted in German.
3-0-3. Prerequisite: M.L. 204-205-206 or equivalent.
Texts: Feise and Steinhauer, German Literature since Goethe; selected paperbacks.

Mr. Canavan.

Reading of short literary selections; acquisition of a large vocabulary; oral practice in the language. Review of Russian grammar; analysis of word and sentence structure.
Text: To be selected. Staff.

Russian

Of those students who indicate interest in the study of elementary Russian, only a select few are admitted to the course. Whether they are matriculating freshmen or others, they are restricted in number by the prerequisites for admission which the exacting limits of our Russian program impose. The result of this careful selection is that the competition which the students naturally afford each other makes the Russian program more intensive in character than it otherwise would be.

M.L. 154. Elementary Russian
3-2-4. Prerequisite: For matriculating freshmen and for sophomores, two years or more of high school training in any foreign language(s), ancient or modern, and selection on the basis of departmentally established criteria.
For all other students, college credit for two years’ study of one foreign language or for one year’s study of each of two or more foreign languages.
For all students, exceptions at the discretion of the staff.

During three class hours — to be scheduled at registration — conventional study of grammar and illustrative reading. During two laboratory hours — to be scheduled after registration — intensive familiarization with recorded study material.
Text: Potapova, Russian.

Mrs. Thornton.

M.L. 155. Elementary Russian
3-2-4. Prerequisite: M.L. 154 or equivalent.
Continuation of M.L. 154; introduction of additional reading material as progress of class permits.
Texts: Potapova, Russian; additional reading material. Mrs. Thornton.

M.L. 156. Elementary Russian
3-2-4. Prerequisite: M.L. 154 and M.L. 155 or equivalent.
Continuation of M.L. 154 and 155; emphasis on the reading of simple prose.
Texts: Potapova, Russian; additional reading material. Mrs. Thornton.

Reading of short literary selections; acquisition of a large vocabulary; oral practice in the language. Review of Russian grammar; analysis of word and sentence structure.
Text: To be selected. Staff.
Modern Languages / 163

M.L. 252. Intermediate Russian*
3-0-3. Prerequisite: M.L. 251 or equivalent.
Continuation of reading and conversation; composition; translation.
Reading of Russian newspapers and journals.
*Second-year courses in Russian offered in alternate years only.

M.L. 253. Advanced Russian*
3-0-3. Prerequisite: M.L. 251 and 252 or equivalent.
Reading of Russian scientific literature from various sources.
Text: To be selected. Staff.

Spanish
The second-year series M.L. 213-214-215 and the third-year series M.L. 313-314-315 are intended for all respectively eligible English-speaking students. Depending upon their qualifications, matriculating freshmen may be eligible for either of these two series: those who have two or more years of high school credit in Spanish must register initially for a course not lower in number than M.L. 213; those who have three or more years of high school credit may register initially for the available course of the series M.L. 313-314-315. In general, however, even those matriculating freshmen who have three or more years of high school credit are advised to consult the staff of the Department of Modern Languages before registering initially for any course in this third-year series.

The series M.L. 316-317-318, the most elementary course to which Spanish-speaking students are admitted, is so graded as to afford, for those English-speaking students who have completed with adequate distinction the series M.L. 313-314-315 or the equivalent, a logical opportunity for a fourth year of study.

M.L. 113. Elementary Spanish
3-0-3. Prerequisite: None.
Pronunciation; elementary grammar; reading; composition; simple conversational exercises.
Mr. Zahn and Staff.

M.L. 114. Elementary Spanish
3-0-3. Prerequisite: M.L. 113 or equivalent.
Continuation of M.L. 113; increased emphasis on reading and conversation.
Mr. Zahn and Staff.

M.L. 115. Elementary Spanish
3-0-3. Prerequisites: M.L. 113 and 114 or equivalent.
Continuation of M.L. 114; completion of Spanish grammar.
Mr. Zahn and Staff.

M.L. 213. Intermediate Spanish
3-0-3. Prerequisite: M.L. 113-114-115 or equivalent.
Review of grammar; composition; conversation; reading; vocabulary building.
Mr. Zahn and Staff.

M.L. 214. Intermediate Spanish
3-0-3. Prerequisite: M.L. 213 or equivalent.
Continuation of review of grammar; composition; conversation; reading.
Mr. Zahn and Staff.
M.L. 215. Intermediate Spanish
3-0-3. Prerequisites: M.L. 213 and 214 or equivalent.
Readings from Spanish literature; conversation; composition.
Mr. Zahn and Staff.

M.L. 313. Introduction to Spanish-American Literature (Spanish and aboriginal heritages; colonial literature.)
3-0-3. Prerequisite: M.L. 215 or equivalent.
Spanish-American civilization as reflected in literary masterpieces from the pre-Columbian period to the present. Emphasis on understanding of contemporary problems and developments. Lectures; discussions; collateral readings. Conducted in Spanish.
Text: Del Rio, *Del solar hispanico*.
Mr. Zahn.

M.L. 314. Spanish-American Literature of the Nineteenth Century
3-0-3. Prerequisite: M.L. 215 or equivalent.
Continuation of M.L. 313.
Mr. Zahn.

M.L. 315. Contemporary Spanish-American Literature
3-0-3. Prerequisite: M.L. 215 or equivalent.
Continuation of M.L. 314.
Text(s): To be selected. Mr. Zahn.

M.L. 316. Survey of Spanish Drama
3-0-3. Prerequisite: Native knowledge of or considerable fluency in Spanish.
The evolution of Spanish culture and the place of the Spanish theatre in world literature as reflected in representative Spanish dramas from the Middle Ages to the present. Lectures; collateral reading; reports; discussions.
Texts: To be selected. Mr. Zahn.

M.L. 317. Don Quijote, Part I
3-0-3. Prerequisite: Same as for M.L. 316.
A detailed study of the masterpiece of Cervantes as the vortex of Spanish literature, the prototype of the modern novel, and the essence of Renaissance and Baroque art. Lectures; collateral readings; reports; discussions.

M.L. 318. Don Quijote, Part II
3-0-3. Prerequisite: Same as for M.L. 316.
Continuation of M.L. 317.
Text: Any unabridged edition of Part II of the Quijote. Mr. Zahn.
303. Prerequisite: College credit for one year's study of any language, ancient or modern; exceptions at the discretion of the staff.

Presentation of methodology for scientific analysis of language; examination of data from hypothetical languages of increasing complexity prior to examination of natural languages; emphasis on phonetics and phonemics. Collateral readings; reports.

Text: Pike, Phonemics.

303. Prerequisite: M.L. 332 or equivalent.

Continuation of M.L. 332 with emphasis on morphology and syntax. Collateral readings; reports.

Text: Elson and Pickett, Beginning Morphology-Syntax.
Department of Music

Director—Walter C. Herbert; Band Director—Ben Logan Sisk.

General Information

Musical activities at Georgia Tech have become increasingly important. Courses are offered for credit to those taking part in the Band and the Glee Club.

In addition to strenuous activity during the football season, including at least two out of town trips, the band continues as a symphonic unit during the winter and spring. Each year the Glee Club and the Band join together in an outdoor concert sponsored by the Student Lecture and Entertainment Committee.

The Glee Club, with a history of several trips abroad, annually visits a number of the girls' colleges of Georgia and the Southeast. Some years ago an appearance was made on the Ed Sullivan Show. The club has also visited New Orleans, Miami and Jacksonville numerous times, accompanying the football team to bowl games.

Courses of Instruction

Music 201. Choral Music—History
1-2-1. Prerequisites: 1. Satisfactory completion of three quarters in Glee Club; 2. Approval of the Director of Music.

Course will consist of two hours practical or laboratory work, rehearsing and performing choral music. Third hour will be given to study of the history and development of choral music, from Gregorian chant through Palestrina and Bach to the present.
Text: Stringham, *Listening to Music Creatively.* Mr. Herbert.

Music 202. Choral Music—Conducting
1-2-1. Prerequisites: 1. Satisfactory completion of three quarters in Glee Club; 2. Approval of the Director of Music.

Laboratory work will consist of rehearsal and performance of choral music. Third hour will include practice conducting by the students.
Text: Bauman, *Elementary Musicianship.* Mr. Herbert.

Music 203. Choral Music—Appreciation
1-2-1. Sophomore, Junior or Senior Year, Spring Quarter. Prerequisites: 1. Satisfactory completion of three quarters in Glee Club; 2. Approval of the Director of Music.

The theoretical material of this course is a study of the operas presented during the spring quarter in Atlanta by the Metropolitan Opera Association, which can be attended free of charge by the Glee Club members.

Music 301. Marching Band
0-3-1. Junior or Senior Year, Fall Quarter. Prerequisites: 1. Satisfactory completion of three (3) quarters participation in band as a Freshman or Sophomore; 2. Approval of the band director.

Precision drilling, Special Maneuvers. Military Parade Procedure. (Students completing this course are expected to be able to direct as well as participate in these routines).
Music 302. Concert Band

0-3-1. Junior or Senior Year, Winter Quarter. Prerequisites: 1. Satisfactory completion of three (3) quarters participation in band as a Freshman or Sophomore; 2. Approval of the band director.


Text: "National School Band Manual."

Mr. Sisk.

Music 303. Concert and Marching Band

0-3-1. Junior or Senior Year, Spring Quarter. Prerequisites: 1. Satisfactory completion of three (3) quarters participation in band as a Freshman or Sophomore; 2. Approval of the band director.

Continuation of all procedures listed under Music 302 plus a resumption of the marching drill and performance which is begun in Music 301.


Mr. Sisk.
Department of Naval Science
Established in 1926

Commanding Officer and Professor of Naval Science—Captain Richard Henry Woodfin; Executive Officer and Associate Professor—Commander Lester Don Olson; Assistant Professors—Major Rollin R. Powell, Jr., (USMC); Lieutenant Commander Edward Sanford; Lieutenants Albert T. Scott, Philip S. Kent and Channing E. Jones; Lieutenant (junior grade) Melton E. Rhodes; Instructors—Senior Chief Fire Control Technician Francis P. Dunne, Chief Storekeeper Horace D. Smith, First Sergeant Kenneth E. Beabout (USMC), Chief Gunner's Mate Ariel G. McInville, Chief Quartermaster Roy J. Fluker, and Yeoman First Class Leonard V. Richards; Secretaries—Mrs. Virginia M. McDonald, and Mrs. Mary C. Redd.

General Information

Naval ROTC students are enrolled for the full four-year period since the course is not divided into Basic and Advanced sections. Students desiring commissions in the Marine Corps or Supply Corps follow a different curriculum during the Junior and Senior years. Students may apply for flight training or for a commission in the Civil Engineer Corps during the Senior year. A Flight Indoctrination Program consisting of ground and flight training is conducted by a civilian flying school during the senior year for those Naval ROTC students qualified for naval flight training who agree to apply for Naval Flight Training upon commissioning. Obligated service for flight training graduates is 42 months after designation as a Naval aviator. The NROTC is composed of two types of students: Regular and Contract.

Regular Students

These students are appointed Midshipman, USNR, after nation-wide competitive examinations. They have their tuition, fees and textbooks paid by the Navy for a period not exceeding four years, are uniformed at government expense, and receive retainer pay at the rate of $600.00 per year. They must obligate themselves to complete the prescribed Naval Science curriculum, to make a cruise of from six to eight weeks each summer, to accept a commission as Ensign, USN, or Second Lieutenant, USMC, upon graduation, and to serve on active duty for four years after commissioning unless earlier released by the Navy Department. If they do not desire to remain in the Regular Navy or Marine Corps, they are ordered to inactive duty in the Naval Reserve or Marine Corps Reserve, for two years. At the end of this period their obligation to the Navy, or Marine Corps, is fulfilled. Students in this classification will not be entitled to receive simultaneous education benefits under the G.I. Bill. These students are deferred from the draft.

Contract Students

These students are enrolled under the provision of the prewar legislation which remains in effect. They are uniformed at government expense, and during their junior and senior years are paid one commuted ration a day (currently about $27.00 per month) while under instruction. They must obligate themselves to complete the prescribed Naval Science curriculum, to make one summer cruise of approximately six weeks during the summer between their
junior and senior years, and to accept a commission on graduation as Ensign, USNR, or Second Lieutenant, USMCR. As a result of the Selective Service Act these students are deferred from the draft but must sign an agreement to serve on active duty for three years after commissioning in the Navy or in the Marine Corps if called by the Secretary of the Navy and remain a member of the Reserve Component of the U. S. Naval Service, or Marine Corps, until the sixth anniversary of receipt of original commission. After receiving their commission they may apply for integration in the Regular Navy or Marine Corps. Students receiving these benefits may receive them in addition to G.I. benefits to which they are entitled.

**Naval Science Students**

A limited number of students may enroll as Naval Science students. Normally these students are potential replacements for vacancies among Contract students. Those enrolled as Naval Science students take Naval Science courses as electives and have no contract with the Navy. They have no assurance of ultimate commissioning nor do they derive any of the benefits available to Regular and Contract students. They have no draft deferments.

**Selection Procedure**

Regular Students are selected in nation-wide competitive examinations held in December and the NROTC at Georgia Tech has no part in this selection, although information about the Regular Program is available. In addition, a faculty committee annually nominates one contract freshman to the Chief of Naval Personnel for a regular scholarship.

To apply for the Contract Program, a student must:

1. Be enrolled in Georgia Tech.
2. Be at least 17 and not over 21 years of age.
3. Be unmarried and never have been married.

Applicants are selected to fill the quota based on:

1. Physical qualifications.
2. Interview by Naval officers.
3. Score on Navy examination.
4. High School record.

Applicants for the contract program should apply at the Naval Armory during the first day of Freshman Orientation Week for the Fall Quarter.

Naval Science students are selected in limited numbers only, usually to fill potential vacancies among Contract Students.

Three candidates may be nominated each year by the President of the Georgia Institute of Technology for competitive examinations for entrance to the United States Naval Academy. These nominations are normally made during the Winter Quarter from freshman Contract students.

**Curriculum**

All NROTC students follow the same curriculum during their freshman year, attending three (3) hours of Naval Science class and one (1) hour of associated laboratory or drill each week.

Sophomore students follow the same curriculum, attending three (3) hours of Naval Science class and one (1) hour of associated laboratory or drill each week, except that Mechanical Engineering students in good standing may
substitute upon request of the Professor of Naval Science N.S. 233 (0-1-0) for N.S. 223 (3-1-2) without being required to make up the credit hours. Students desiring Supply Corps or Marine Corps commissions, submit applications to follow subject curriculum during their junior and senior years.

Junior Line students will attend three (3) hours of Naval Science class and two (2) hours of associated laboratory and drill each week.

Junior Marine Option and Supply Option students will attend three (3) hours of Naval Science class appropriate to the type of commission sought and two (2) hours of associated laboratory and drill each week, except that during the first quarter, General Psychology (Psy. 303) or Industrial Psychology (Psy. 401) will be studied in lieu of Naval Science. Students during this quarter will attend the appropriate laboratory or drill sessions with no additional credit being earned.

Senior Line students will attend three (3) hours of Naval Science class and two (2) hours of associated laboratory and drill each week, except during the first quarter, General Psychology (Psy. 303) or Industrial Psychology (Psy. 401) will be studied in lieu of Naval Science. Students during this quarter will attend appropriate Naval Science laboratory and drill for which no additional credit will be earned.

Senior Marine Option and Supply Option students will attend three (3) hours of Naval Science class and appropriate laboratory and drill each week.

No more than a total of nine (9) hours of credit in Advanced Naval Science courses may be applied toward a degree.

Courses of Instruction

Note: 3-2-3 means 3 hours class, 2 hours laboratory, 3 hours credit.

N.S. 111. Naval Orientation and Introduction to History of Sea Power 3-1-2.

A study of the NROTC program and the Naval Service, its mission, ideals, standards, traditions, customs and the duties required of the midshipman. Also an introduction to the study of the influence of sea power on history.


A study of the concepts of sea power from early world history until the rise of the United States as a world sea power stressing: (1) the influence of sea power upon history; (2) the evolution of naval tactics; (3) the rationale of strategic decision; (4) the development of naval weapons; (5) the characteristics of successful leadership; and (6) the evolution of amphibious doctrine.


A study of the concepts of sea power from the rise of the United States as a world sea power until the present, stressing: (1) the influence of sea power upon history; (2) the evolution of naval tactics; (3) the rationale of strategic decision; (4) the development of naval weapons; (5) the characteristics of successful leadership; and (6) the evolution of amphibious doctrine.


A study of the science of ballistics, stressing the application of physics and trigonometry. A study of the design of naval weapons and the principles of hydraulic and pneumatic systems as applied to weapon design. A study of the principles of electrical and electro-hydraulic systems as ap-
plied to the control and operation of naval weapons. Solution of fire control problems by computer systems.

N.S. 222. Naval Weapons—Part II and Naval Engineering—Part I
3-1-2.
A study of the employment of weapon systems in fleet operations with special emphasis on guided missiles. A study of future trends and an introduction to space technology. A study of the general physics and chemistry as applied to naval propulsion plants and ship systems.

N.S. 223. Naval Engineering—Part II
3-1-2.
A study of the principles and applications of marine stability. An introduction to the physics of nuclear power. A study of the principles of nuclear reactors and the problems connected with these power plants. (Mechanical Engineering majors in good standing may be excused from this course upon request.)

N.S. 233. Naval Science Laboratory
0-1-0.
Naval laboratory exercises and military drill. No preparation is required and no tests will be given. The grade of “S” will be given for satisfactory completion of this course. Aptitude marks will be assigned.

N.S. 344. Navigation—Part I
3-2-3.
A study of the sciences and mathematical techniques involved in the solution of navigational aids, instruments, tables, and almanacs. Introduction to celestial navigation.

3-2-3.
A study of the science of celestial navigation by application of the theory and principles of nautical astronomy and spherical trigonometry. Introduction to the elements and principles of operations at sea.

N.S. 346. Naval Operations—Part II
3-2-3.
A study of the elements and principles of operations at sea designed to provide an understanding of command responsibility and to develop command capabilities. The following studies are emphasized: (1) international and U.S. regulations governing waterborne traffic, (2) current tactical doctrine, (3) relative motion problems, and (4) offensive and defensive employment of naval forces, (5) fleet communications and electronic countermeasures, and (6) the relationship of meteorological phenomena to operations at sea.

N.S. 443. Principles and Problems of Leadership—Part II
3-2-3.
This course is divided into two phases, Phase one is a study of the fundamental functions of management—planning, organizing, activating, and controlling; with emphasis upon the responsibility of naval officers in connection therewith. Phase two emphasizes the naval officer’s leadership responsibility in connection with administration, education, training, and morality. Supporting this is a brief study of the naval judicial system and the role of discipline in leadership.

N.S. 444. Naval Science Laboratory
0-2-0.
Naval laboratory and military drill. Laboratory exercises cover case studies of situations requiring exercise of human understanding and leadership; military drill emphasizes leadership. No preparation is required and no tests will be given. The grade of “S” will be given for satisfactory completion of this course. Aptitude marks will be assigned. This course must be taken by all Line Senior Midshipmen during the Fall Quarter. Psychology 303 or 401 should be scheduled concurrently with this course, unless previously scheduled due to requirements of major.
3-2-3.
A study of concepts of leadership, effective group communication, relationships between the leader and the group, motivation of a group, and the role of mental health in management of personnel.

Supply Corps Option

N.S. 351. Naval Science Laboratory
0-2-0.
Supply Corps laboratory exercises and military drill, emphasizing leadership. No preparation is required and no tests will be given. The grade of "S" will be given for satisfactory completion of this course. Aptitude marks will be assigned. This course must be taken by all Junior Supply Corps Option Midshipmen during the Fall Quarter. Psychology 303 or 401 should be scheduled concurrently with this course.

N.S. 352. Supply Organization and Logistics, Naval Finance
3-2-3.
Supply Organization and Logistics is a study of the Naval material logistic support which deals with the procurement and distribution of required material. Naval Finance is a study of the basic fiscal functions of the Department of the Navy and the legislative action involved in the Federal Budget system.

N.S. 353. Naval Accounting, Basic Supply Afloat
3-2-3.
Naval Accounting is a study of the fidelity and statistical accounting methods employed by the Navy. Basic Supply Afloat is a study of the organization and administration of a supply department aboard ship.

N.S. 451. Advanced Supply Afloat—Part I
3-2-3.
A study of the management methods employed by a supply officer aboard ship. It includes the following areas: procurement, inventory control, distribution, and financial management of material.

N.S. 452. Advanced Supply Afloat—Part II
3-2-3.
A continuation of the study of management methods employed by a supply officer covering the procurement, merchandising and accounting procedures for conducting retail sales.

N.S. 453. Principles and Problems of Leadership
3-2-3.
A study of the basic principles, problems, and techniques for effective management and leadership. Includes case studies of leadership situations. The Midshipman is also given an introduction to military law, the administration of courts-martial, and the role of discipline in leadership.

Marine Corps Option

N.S. 361. Naval Science Laboratory
0-2-0.
Marine Corps laboratory exercises and military drill, emphasizing leadership. No preparation is required and no tests will be given. The grade of "S" will be given for satisfactory completion of this course. Aptitude marks will be assigned. This course must be taken by all Junior Marine Corps Option Midshipmen during the Fall Quarter. Psychology 303 or 401 should be scheduled concurrently with this course.

N.S. 362. Modern Basic Strategy and Tactics
3-2-3.
A study of the science of modern strategy and tactics, emphasizing the nine Principles, four Strands, and three Variables of military operations.

N.S. 363. Evolution of the Art of War—Part I
3-2-3.
A study of military history, emphasizing the development of the Art of War from the earliest recorded time through World War I.
N.S. 461. Evolution of the Art of War—Part II and Amphibious Warfare—Part I
3-2-3.
A study of the evolution of the Art of War from the end of World War I to the present, with particular emphasis on amphibious operations.

N.S. 462. Amphibious Warfare—Part II
3-2-3.
A study of the current U. S. amphibious warfare doctrine with particular emphasis on strategic decision in relation to amphibious warfare and the tactical employment of amphibious weapons.

N.S. 463. Principles and Problems of Leadership
3-2-3.
A study of the basic principles, problems and techniques of military leadership. Includes case studies of leadership situations. The midshipman is also given an introduction to military law, the administration of courts-martial and the role of discipline in leadership.
School of Nuclear Engineering  
(Established in 1962)


General Information

The School of Nuclear Engineering administers programs leading to degrees of Master of Science and Doctor of Philosophy. Students with undergraduate backgrounds in Mechanical Engineering, Chemical Engineering and other phases of engineering are eligible to apply for admission. In certain cases, students with backgrounds in Physics or Chemistry may also be considered. The intent of these degree programs in nuclear engineering is to provide suitable educational experience to carefully selected students for careers which require specialized knowledge of nuclear energy and its applications. To reach this goal, the prescribed program at the M.S. level leaves very little latitude for electives. The program does not involve a thesis, but desired laboratory experience is provided within the required courses. A typical M.S. program would include the following courses: Physics 675, Nuclear Physics; Physics 676, Neutron and Reactor Physics; Physics 679, Radiation Attenuation; Civil Engineering 682, Basic Radiological Health; N.E. 601, 602, Reactor Technology; N.E. 610, Radiation Detection; N.E. 611, 612, Nuclear Engineering Laboratory; Chemistry 460, Radiochemistry; Ceramic Engineering 450, Nuclear Engineering Materials; and at least nine quarter-hours work in mathematics.

On the other hand, the Ph.D. program is designed with considerable latitude so as to capitalize on variations in experience as well as interests of each individual student. The graduate bulletin reveals over one hundred additional graduate courses closely relevant to nuclear engineering. Conspicuous among these are courses such as: N.E. 625, Nuclear Reactor Calculations with Digital Computers; N.E. 681, Radioactive Waste Disposal; N.E. 730, Radiation Effects on Materials; Physics 680, Advanced Reactor Theory; Ch.E. 630, 631, Radiochemical Separation Processes; Ch.E. 632, Nuclear Processing Kinetics; Biol. 630, Biological Effects of Radiation; and others.

Excellent facilities now exist for the support of these graduate programs. The Radioisotope and Bioengineering Laboratory and the Frank H. Neely Nuclear Research Center provide Georgia Tech with an outstanding research capability in fields of interest to nuclear engineering. Included are a heavy-water moderated, five-megawatt research reactor, hot cells for handling highly
radioactive materials remotely, a 12,000 curie cesium-137 radiation source, a one-million-volt Van de Graaff accelerator, a reactor simulator, and an array of instruments for radiation measurements. Additional assets of extreme importance are the Price Gilbert Memorial Library, with its collection of A.E.C. documents, and the Rich Electronic Computer Center.

Undergraduate students contemplating future academic programs in nuclear engineering are encouraged to take a course in modern physics, such as Physics 319, and their attention is invited to any one of the pertinent senior-level electives, such as M.E. 447, Ch.E. 411, or Physics 439.

For further information, please contact the Director, School of Nuclear Engineering or the Dean, Graduate Division.
Department of Physical Training

Department Head—A. M. Coleman; Professors—Lyle B. Welser, Frederick R. Lanoue; Associate Professors—Norris C. Dean, James H. McAuley; Assistant Professors—John C. Hyder, Tommy Plaxico, Byron Gilbreath, and Robert Nelson; Instructor—Douglas L. Fowlkes; Secretary—Mrs. Forest H. McGeary.

General Information

All male students entering Georgia Institute of Technology as freshmen or sophomores are required to take Physical Training 4 hours per week, receiving 1 hour credit. The schedule will call for two two-hour periods on alternate days; one hour for physical training, thirty minutes for dressing and thirty minutes for shower. The annual physical examinations (see page 29) will determine any exemptions from physical training. Students bringing certificates of disability from personal physicians must have the certificates endorsed by the school physician before they will be accepted by the department.

All male freshman and sophomore students will be required to take Physical Training, except the following who will be exempt: Students not physically able; students twenty-one years of age, or over, on first admission to the Georgia Institute of Technology; and students transferring from accredited colleges with at least eight quarter credit hours. Students transferring to the Georgia Institute of Technology with sophomore standing will be required to take three quarters of Physical Training only.

NOTE: Men excused from Physical Training are not required to make up the credit hours in additional subjects.

Students taking physical training will be required to purchase a standard uniform consisting of a sweat shirt, gym pants, athletic supporter, socks and shoes. The uniform will be sold at cost and normally should not exceed $12. Locker facilities for those living neither on the campus nor in nearby fraternity houses may be secured by a two-dollar deposit with a refund of $1.50 at the end of the school year if the lock and locker are surrendered in good condition. Dressing room space, showers and towels are provided all students free of charge.

Freshman Physical Training

The object of these courses is to give the students sound basic concepts regarding exercise, physical fitness, and water safety, and to motivate them into achieving and maintaining these goals. One quarter will be devoted to swimming, one to gymnastics, and one to track. Swimming, tumbling, apparatus work, calisthenics, walking and running are basic to well rounded, sound physical development.

At the end of the year, students who make sufficient progress will be sent on to sophomore physical training.
P.T. 101. Swimming

The primary objective of this course is SURVIVAL, and it is designed to "drown-proof" our students. Emphasis is placed on developing the ability to successfully handle typical Armed Forces swimming emergencies, such as cramps, disabling injuries, and long submersions. The application of basic mechanical principles is stressed to make students think for themselves, rather than accept dogmatic statements. Mr. Lanoue, Mr. McAuley, and Mr. Nelson.

P.T. 102. Physical Fitness, Orientation, and Gymnastics

The purpose of the course will be to help orient the student through actual experience to some of the basic factors of physical fitness and to show how these factors tie in with greater achievement, not only in performing gymnastic movements, but with better all around physical performance and with higher social standards through life. Through the medium of 70 carefully chosen skills, it will be the goal to develop an appreciation of the significance of good coordination, efficiency of movement, rhythm, kinesthetic sense, confidence, courage, good form and team work, plus a wholesome, practical philosophy of the real value of exercise and of keeping physically fit. Each student shall earn his grade points and 60 points is essential as a minimum to pass the course. Points shall be distributed as follows:

<table>
<thead>
<tr>
<th>Points</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. First fitness test</td>
<td>10</td>
</tr>
<tr>
<td>2. Second fitness test</td>
<td>20</td>
</tr>
<tr>
<td>3. Sixty of the seventy skills</td>
<td>at 1 point each</td>
</tr>
<tr>
<td>4. Attitude, hygienic practices and sportsmanship</td>
<td>10</td>
</tr>
</tbody>
</table>

Mr. Nelson, Mr. Wesler and Mr. McAuley.

P.T. 103. Track

Instruction and practice will be given in starting, striding, use of the arms in running, and body lean. The object of the course is to build strong legs and to increase lung and heart capacity. The minimum score to pass the course is an average grade of 60.

Grade Scale:

<table>
<thead>
<tr>
<th>Yd. Dash</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Yd. Dash</td>
<td></td>
</tr>
<tr>
<td>A 11 to 11.5 sec.</td>
<td>10</td>
</tr>
<tr>
<td>B 11.5 to 12 sec.</td>
<td></td>
</tr>
<tr>
<td>C 12 to 12.5 sec.</td>
<td></td>
</tr>
<tr>
<td>D 12.5 to 13 sec.</td>
<td></td>
</tr>
<tr>
<td>220 Yd. Dash</td>
<td></td>
</tr>
<tr>
<td>A 26 to 27 sec.</td>
<td>10</td>
</tr>
<tr>
<td>B 27 to 28 sec.</td>
<td></td>
</tr>
<tr>
<td>C 28 to 29 sec.</td>
<td></td>
</tr>
<tr>
<td>D 29 to 30 sec.</td>
<td></td>
</tr>
<tr>
<td>Quarter Mile Run (440 Yds.)</td>
<td></td>
</tr>
<tr>
<td>A 58 to 63 sec.</td>
<td></td>
</tr>
<tr>
<td>B 63 to 68 sec.</td>
<td></td>
</tr>
<tr>
<td>C 68 to 73 sec.</td>
<td></td>
</tr>
<tr>
<td>D 73 to 78 sec.</td>
<td></td>
</tr>
<tr>
<td>Half Mile Run (880 Yds.)</td>
<td></td>
</tr>
<tr>
<td>A 2 min. 30 sec. to 2 min. 40 sec.</td>
<td></td>
</tr>
<tr>
<td>B 2 min. 40 sec. to 2 min. 50 sec.</td>
<td></td>
</tr>
<tr>
<td>C 2 min. 50 sec. to 3 min.</td>
<td></td>
</tr>
<tr>
<td>D 3 min. to 3 min. 10 sec.</td>
<td></td>
</tr>
<tr>
<td>Mile Run</td>
<td></td>
</tr>
<tr>
<td>A 5 min. 30 sec. to 5 min. 50 sec.</td>
<td></td>
</tr>
<tr>
<td>B 5 min. 50 sec. to 6 min. 10 sec.</td>
<td></td>
</tr>
<tr>
<td>C 6 min. 10 sec. to 6 min. 30 sec.</td>
<td></td>
</tr>
<tr>
<td>D 6 min. 30 sec. to 6 min. 50 sec.</td>
<td></td>
</tr>
</tbody>
</table>

Mr. Dean and Mr. Fowlkes.

Sophomore Physical Training

This is a maintenance course. The condition developed in the freshman year will be maintained and at the same time skills will be taught in games and other events that appeal to young men. One quarter will be devoted to indoor games, one to outdoor games and one to recreative sports.
P.T. 201. Indoor Games
Basketball will be the game on which the majority of effort will be concentrated. As the physical training facilities are expanded other games may be added. The basic fundamentals of the games will be demonstrated and practiced. After the class has developed, some skill teams will be organized for actual competition.

Mr. Plaxico, Mr. Gilbreath, and Mr. Ryder.

P.T. 202. Outdoor Games
Softball, touch football and soccer are the basic games for this course. This course is an exact parallel to the Indoor Games in the methods used and in the instruction and play arrangement.

Mr. Gilbreath and Mr. McAuley.

P.T. 203. Recreative Sports
The class will receive instruction in the fundamentals of tennis, volleyball, and paddle ball. The purpose of the course is to provide recreational exercise and to develop an appreciation of these carry-over sports as recreation and as a means of maintaining a moderate level of physical fitness.

The student shall be graded on the proficiency he demonstrates in these sports. Attendance, attitude, and effort—except when inadequate—shall be considered only to the extent that their diligent application invariably results in greater proficiency.

Mr. Plaxico.
School of Physics
(Established in 1939)


General Information

Physics is primarily known as a basic science, but in recent years it has become increasingly important as an applied science in industry. Each year brings new increases in the volume of research work in industry and in the government laboratories, and scientific discoveries lead so quickly to practical applications that industry needs physicists to work side by side with engineers. There are also many industrial fields so new or so highly specialized that no specific engineering training is available, and for these physics offers the necessary background of high level general technical training. All of these factors, along with the increasing complexity of industrial and military equipment, calls for the education of more physicists, and for the education of engineers with more fundamental training in physics.

The School of Physics meets the need for training in physics by offering basic service courses to all sophomores and by offering advanced work leading to a bachelor's, master's, or doctor's degree in physics. The curriculum for the B.S. degree covers the general field of physics with provision for a liberal choice of electives to meet individual interests. In the undesignated option, the student may either choose electives from engineering courses that will prepare him for direct participation as a physicist in industry, or he may elect more advanced courses in science and mathematics to prepare him for a scientific career of the more traditional type.

Registration for Junior and Senior work leading to the Bachelor's Degree in Physics will be limited to those who have demonstrated appropriate ability in their Freshman and Sophomore work.

Option in Geophysics

A designated option in Geophysics is available, and students who wish this specialization should follow a different course of study in the junior and senior years as indicated below for this option. This course of study prepares students for work in geophysics, including the application of scientific methods to geophysical exploration.
### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem.</td>
<td>101-2-3</td>
<td>Inorganic Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
<td>3-3-4</td>
</tr>
<tr>
<td>Draw.</td>
<td>113</td>
<td>Engineering Graphics</td>
<td></td>
<td>0-6-2</td>
<td></td>
</tr>
<tr>
<td>Eng.</td>
<td>101-2</td>
<td>Composition and Rhetoric</td>
<td>3-0-3</td>
<td>3-0-3</td>
<td></td>
</tr>
<tr>
<td>Eng.</td>
<td>105</td>
<td>Literature</td>
<td></td>
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<td>3-0-3</td>
</tr>
<tr>
<td>Math.</td>
<td>100</td>
<td>Algebra-Trigonometry</td>
<td>5-0-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math.</td>
<td>104</td>
<td>Analytical Geometry and Calculus</td>
<td>5-0-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math.</td>
<td>201</td>
<td>Calculus</td>
<td></td>
<td></td>
<td>5-0-5</td>
</tr>
<tr>
<td>M.L. **</td>
<td>Modern Language OR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.S.</td>
<td>111-12-13</td>
<td>Social Science</td>
<td>3-0-3</td>
<td>3-0-3</td>
<td>3-0-3</td>
</tr>
<tr>
<td>P.T.</td>
<td>101-2-3</td>
<td>Physical Training</td>
<td>0-4-1</td>
<td>0-4-1</td>
<td>0-4-1</td>
</tr>
<tr>
<td>ROTC ***</td>
<td>ROTC</td>
<td></td>
<td>3-1-2</td>
<td>3-1-2</td>
<td>3-1-2</td>
</tr>
<tr>
<td>Cien.</td>
<td>101</td>
<td>Orientation</td>
<td>1-0-0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Choice of M.L. 101-2-3, German; M.L. 107-8-9, French; or M.L. 113-14-15, Spanish. Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series. German is recommended for students who expect to take graduate work after obtaining the bachelor's degree. It may be taken in the Freshman year, or in any other year as an approved elective.

***For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng.</td>
<td>201-2-3</td>
<td>Survey of the Humanities</td>
<td>3-0-3</td>
<td>3-0-3</td>
<td>3-0-3</td>
</tr>
<tr>
<td>Math.</td>
<td>202-3</td>
<td>Calculus</td>
<td>5-0-5</td>
<td>5-0-5</td>
<td></td>
</tr>
<tr>
<td>Math.</td>
<td>305*</td>
<td>Differential Equations</td>
<td></td>
<td></td>
<td>3-0-3</td>
</tr>
<tr>
<td>Phys.</td>
<td>207-8-9</td>
<td>Physics</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>217-18-19</td>
<td>or Physics</td>
<td>5-3-6</td>
<td>5-3-6</td>
<td>5-3-6</td>
</tr>
<tr>
<td>P.T.</td>
<td>201-2-3</td>
<td>Physical Training</td>
<td>0-4-1</td>
<td>0-4-1</td>
<td>0-4-1</td>
</tr>
<tr>
<td>ROTC ***</td>
<td>ROTC</td>
<td></td>
<td>3-1-2</td>
<td>3-1-2</td>
<td>3-1-2</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3-0-3</td>
</tr>
</tbody>
</table>

**Math. 304, plus an additional hour of elective credit, may be substituted for Math. 305 and 306.

***For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng.</td>
<td>315</td>
<td>Public Speaking</td>
<td>3-0-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math.</td>
<td>306</td>
<td>Differential Equations</td>
<td></td>
<td></td>
<td>3-0-3</td>
</tr>
<tr>
<td>Phys.</td>
<td>305</td>
<td>Laboratory Electronics</td>
<td></td>
<td>3-6-5</td>
<td></td>
</tr>
<tr>
<td>Phys.</td>
<td>308</td>
<td>Intermediate Electricity</td>
<td>3-0-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys.</td>
<td>310</td>
<td>Electricity and Magnetism</td>
<td>5-6-7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys.</td>
<td>320</td>
<td>Mechanics</td>
<td></td>
<td>5-0-5</td>
<td></td>
</tr>
<tr>
<td>Phys.</td>
<td>331</td>
<td>Quantum Mechanics of Solids</td>
<td>3-0-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys.</td>
<td>409</td>
<td>Atomic Physics</td>
<td></td>
<td></td>
<td>3-0-3</td>
</tr>
<tr>
<td>Phys.</td>
<td>422</td>
<td>Light</td>
<td></td>
<td>5-6-7</td>
<td></td>
</tr>
<tr>
<td>I.M.</td>
<td>204</td>
<td>Economics</td>
<td></td>
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<td>3-0-3</td>
</tr>
<tr>
<td>Approved</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Electives**</td>
<td></td>
<td></td>
<td>3-0-3</td>
<td>5-0-5</td>
<td>3-0-3</td>
</tr>
</tbody>
</table>

Totals | 17-6-19 | 16-6-18 | 17-6-19
### Senior Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. 320</td>
<td>Technical Writing</td>
<td></td>
<td></td>
<td>3-0-3</td>
</tr>
<tr>
<td>Phys. 313</td>
<td>Nuclear Physics</td>
<td>5-0-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 315</td>
<td>Experimental Physics I</td>
<td>0-6-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 412*</td>
<td>Electricity and Magnetism</td>
<td></td>
<td></td>
<td>5-0-5</td>
</tr>
<tr>
<td>Phys. 415</td>
<td>Experimental Physics II</td>
<td>0-6-2</td>
<td></td>
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</tr>
<tr>
<td>Phys. 416*</td>
<td>Experimental Physics III</td>
<td></td>
<td></td>
<td>0-6-2</td>
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<tr>
<td>Phys. 424</td>
<td>Thermo. and Kinetic Theory</td>
<td>5-0-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 427*</td>
<td>Quantum Mechanics</td>
<td>3-0-3</td>
<td></td>
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</tr>
<tr>
<td>Phys. 431*</td>
<td>Molecular and Solid State Phys.</td>
<td>3-0-3</td>
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<td></td>
</tr>
<tr>
<td>Electives **</td>
<td>9-0-9</td>
<td>9-0-9</td>
<td>9-0-9</td>
<td></td>
</tr>
</tbody>
</table>

**Totals** 17-6-19 17-6-19 17-6-19

*Approved electives may be substituted for these courses, but students making such substitutes will not in general be recommended for graduate work.

**Electives must include 6 hours of humanities from list on page 34. Not more than 9 hours of electives may be in advanced ROTC.

### Junior Year (Geophysics Option)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. 315</td>
<td>Public Speaking</td>
<td></td>
<td></td>
<td>3-0-3</td>
</tr>
<tr>
<td>Geol. 201</td>
<td>General Geology</td>
<td>3-0-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geol. 202</td>
<td>General Geology Laboratory</td>
<td>0-3-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geol. 305</td>
<td>Historical Geology</td>
<td></td>
<td></td>
<td>3-0-3</td>
</tr>
<tr>
<td>Geol. 307</td>
<td>Historical Geology Laboratory</td>
<td></td>
<td></td>
<td>0-3-1</td>
</tr>
<tr>
<td>Geol. 310</td>
<td>Crystallography and Tests</td>
<td>1-3-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geol. 414</td>
<td>Mineralogy</td>
<td>2-3-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math. 306</td>
<td>Differential Equations</td>
<td>3-0-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 305</td>
<td>Laboratory Electronics</td>
<td>3-6-5</td>
<td></td>
<td></td>
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<tr>
<td>Phys. 308</td>
<td>Intermediate Electricity</td>
<td>5-0-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 310</td>
<td>Electricity and Magnetism</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 320</td>
<td>Mechanics</td>
<td>5-0-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 409</td>
<td>Atomic Physics</td>
<td>3-0-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Approved Electives</em>**</td>
<td>3-0-3</td>
<td>5-0-5</td>
<td>6-0-6</td>
<td></td>
</tr>
</tbody>
</table>

**Totals** 15-12-19 16-6-18 17-6-19

### Senior Year (Geophysics Option)

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. 320</td>
<td>Technical Writing</td>
<td>5-0-5</td>
<td></td>
<td>3-0-3</td>
</tr>
<tr>
<td>Phys. 313</td>
<td>Nuclear Physics</td>
<td>0-6-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 315</td>
<td>Experimental Physics I</td>
<td>0-3-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phys. 424</td>
<td>Thermo. and Kinetic Theory</td>
<td>5-0-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geol. 313</td>
<td>Economic Geology Laboratory</td>
<td>3-3-4</td>
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</tr>
<tr>
<td>Geol. 418</td>
<td>Petrography</td>
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<td></td>
<td>3-3-4</td>
</tr>
<tr>
<td>Geol. 443</td>
<td>Advanced Engr. Geology</td>
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<td>3-0-3</td>
</tr>
<tr>
<td>I.M. 204</td>
<td>Economics</td>
<td>7-0-7</td>
<td>10-0-10</td>
<td>13-0-13</td>
</tr>
<tr>
<td><em>Approved Electives</em>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Totals** 15-12-19 18-3-19 19-0-19

*Electives must include 6 hours of humanities from list on page 34. Not more than 9 hours of electives must be in advanced ROTC.

**Including a minimum of 9 hours chosen from Phys. 325, 412, 415, 422, 427, and 431.*
Courses of Instruction

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Phys. 207. Mechanics
5-3-6. Prerequisite: Math 201 or concurrent.

Physics 207-8-9 together constitute a thorough course in basic physics for engineers. The five hours of class include one or two demonstration lectures per week. The solution of a large number of problems is required, and the course includes applications of the elements of calculus.

The laboratory work is designed to give practice in the art of making precise measurements, proficiency in the manipulation of apparatus and added familiarity with some of the concepts of physics. The theory of errors is stressed enough to give students the ability to decide under what conditions the greater expense of more precise measurement is justified.

Text: Richards, Wehr, Sears, Zemansky, Modern University Physics.

Mr. Ewalt and Staff.

Phys. 208. Electricity
5-3-6. Prerequisites: Phys. 207, Math. 201.

Electricity and related phenomena taught as a part of the basic physics course described under Physics 207.

Text: Richards, Wehr, Sears, Zemansky, Modern University Physics.

Mr. Ewalt and Staff.

Phys. 209. Heat, Sound and Light
5-3-6. Prerequisites: Phys. 208, Math. 201.

Heat, sound, light and atomic physics taught as a part of the basic physics course described under Physics 207.

Text: Richards, Wehr, Sears, Zemansky, Modern University Physics.

Mr. Prosser and Staff.

Phys. 211, 212, 213. Elementary College Physics
4-0-4. Prerequisite: Math. 102, Phys. 211 is prerequisite to Phys. 212 or 213.

This sequence of courses is designed to meet the needs of the students in the less technical curricula. It includes a basic study of the physical principles of Mechanics, Sound, Heat, Electricity, Light and Modern Physics. Mathematics below the level of calculus is used freely to provide practice in the use of mathematics in logical reasoning. The method of teaching and the subject matter are chosen to give an understanding of the scientific methods and to give a background of scientific information and terminology which is needed today to comprehend the commercial, cultural, and political significance of scientific progress.

Text: Greene, Principles of Physics.

Staff.

Phys. 217, 218, and 219. General Physics
5-3-6. These courses may be used respectively instead of Physics 207, 208, and 209 by engineering and science students who have a particular interest in physics. They may be taken only with the approval of the School of Physics and are restricted to those who can be expected to make a grade of B or better in mathematics and physics.

Text: Resnick and Halliday, Physics for Students of Science and Engineering.

Phys. 244. Introduction to Astronomy
3-0-3. Prerequisite: Math. 201, or concurrently.

A survey of astronomy with special emphasis on the applications of physics to astronomical problems. The nature and behavior of the earth, the other planets, stars, and stellar systems will be examined.

Text: Struve, Elementary Astronomy.

Mr. Williams.

Phys. 305. Laboratory Electronics
3-6-5. Prerequisite: Physics 310. Restricted.

The properties of electronic de-
vices considered as circuit elements, and their use in circuits which are frequently encountered in experimental physics, including power supplies, amplifiers, oscillators, electronic meters, electronic relays and scalers.


**Phys. 308. Intermediate Electricity**
3-0-3. Prerequisites: Phys. 208 and Math. 203.

This course covers electric charge, current, electric fields, potential, resistance, inductance, capacitance and sources of emf. These fundamentals are taught with the free use of differential and integral calculus.


**Phys. 310. Electricity and Magnetism**
5-6-7. Prerequisites: Phys. 209, Math. 305 or concurrently. Restricted.

The definition and measurement of fundamental electric and magnetic quantities, and a study of relationships that exist between them under various conditions of physical constraint. Constant, transient, and sinusoidal currents at all frequencies; capacitive and inductive effects; electric oscillations; and lines with distributed properties.

Text: Lecture and Laboratory Notes. Mr. Howey.

**Phys. 313. Nuclear Physics**
5-0-5. Prerequisite: Phys. 331.


Text: Kaplan, *Nuclear Physics*. Mr. Wyly.

**Phys. 315. Experimental Physics I**
0-6-2. Prerequisite: Concurrent with Phys. 313. Restricted.

A selected group of experiments to parallel Phys. 313. Among those performed are the Oil Drop Experiment, ratio e/m, conduction through gases, X-ray absorption and diffraction, absorption of alpha, beta, and gamma rays, measurement techniques with electroscopes and Geiger counters, half-lives of radioactive materials and artificial radioactivity.

Text: None. Mr. Wyly.

**Phys. 319. Modern Physics for Engineers**
3-0-3. Prerequisites: Phys. 207-8-9 with a minimum grade of C.

This course covers the more recent developments of physics which are of particular importance for engineers. It includes the structure of bulk matter, the structure of atoms, the properties of elementary particles, the fundamentals of nuclear physics, and the interaction of radiation with matter.


**Phys. 320. Mechanics**
5-0-5. Prerequisites: Phys. 308, Math. 306, or concurrently.

Statics and dynamics of rigid bodies, with vector analysis and with application to oscillations, planetary motion, rotation of a rigid body, and impact.


**Phys. 325. Kinetic Theory and Statistical Mechanics**
3-0-3. Prerequisites: Math. 304 or 305 concurrent, Phys. 209 or 219.


Mr. Gersch.

**Phys. 331. Elementary Quantum Theory of Solids**
3-0-3. Prerequisites: Phys. 209, Math. 305 or concurrent or consent of instructor.

Introduction to quantum mechan-
ics of one dimensional systems with applications to elementary solid state physics. Emphasis will be placed on the electrical properties of solids.

**Phys. 405. Electronic Phenomena**
3-0-3. Prerequisites: Phys. 308 or equivalent, Phys. 409.

The physics of electronic phenomena. The subject matter includes the motion of charged bodies in electric and magnetic fields, the basic phenomena of gaseous electronics, the conduction of electricity through gases, electric discharges.


**Phys. 409. Atomic Physics**
3-0-3. Prerequisites: Physics 320, Math. 305.

The mass and charge of atomic particles. The structure of atoms. Optical spectra. Excitation and ionization potentials. Photoelectricity. The production and absorption of X-rays. The wave nature of material particles.


**Phys. 412. Electric and Magnetic Fields**
5-0-5. Prerequisites: Phys. 308 and 310, Math. 306.

Development of Maxwell's equations and their application to radiation problems and to the transmission of guided electromagnetic waves.


**Phys. 415. Experimental Physics II**
0-6-2. Prerequisite: Phys. 315, Phys. 320. Restricted.

Special experiments from various fields of physics. Emphasis is placed on good laboratory technique.

Text: None.

**Phys. 416. Experimental Physics III**
0-6-2. Prerequisite: Phys. 305. Restricted.

A continuation of Phys. 415.

**Phys. 422. Light**
5-6-7. Prerequisites: Phys. 209, Math. 306 or concurrent.


Text: Jenkins and White, *Fundamentals of Optics*.

**Phys. 424. Thermodynamics and Kinetic Theory**
5-0-5. Prerequisites: Phys. 209, Math. 304 or Math. 306, or concurrent.


**Phys. 427. Elementary Quantum Mechanics**

Historical introduction, Schroedinger's equation, and probabilistic interpretation of quantum mechanics. Solutions of Schroedinger's equation in one dimension: free particle, wavepackets, particle in a box, and linear oscillator. Rigid rotator. Applications to atomic structure.

Text: Sherwin, *Introduction to Quantum Mechanics*.

**Phys. 429. Special Problems**
1-3-2. Prerequisite: The scheduling of this course must be approved by the School of Physics.

Each student is required to give extended study to some problem in physics to develop research technique, and to become familiar with the use of the library in physics.

Text: None.
Phys. 431. Elementary Molecular and Solid State Physics
3-0-3. Prerequisite: Physics 409, Phys. 427.
Elementary wave mechanics applied to explain some of the properties of solids and molecular gases. Molecular spectra, binding forces in molecules and solids, the free electron theory of metals, band theory of metals, semi-conductors, and transistors.
Text: Sproull, Modern Physics for Engineers.

Phys. 432. Introductory Diffraction Theory
3-0-3. Prerequisites: Math. 304 or 305, Phys. 209 or 219.
Aspects of crystal symmetry and introductory theory common to electron, neutron, and X-ray diffraction are treated. The reciprocal lattice and geometric portion of the kinematic theory are developed from the Laue-Ewald point of view. Treatment of coherent scattering from continuous distributions is introduced.
Mr. Young.

Phys. 438. Vibrations and Wave Motion
3-0-3. Prerequisite: Phys. 320.
Oscillations and wave motion of discrete and continuous mechanical systems. The course will emphasize the application to physical systems of the Laplace transform, Fourier series, Matrix theory, difference equations, integral equations, and orthogonal functions.
Mr. Ford.

Phys. 439. Introductory Nuclear Reactor Physics
3-0-3. Prerequisites: Phys. 209 and Math. 304 or Math. 306 concurrently.
Review of nuclear physics including binding-energy, fission, neutron cross-sections and interactions. Basic theory of neutron chain reactions and the diffusion approximation. Calculations of critical mass and composition of elementary reactor systems.
Text: Murray, Nuclear Reactor Physics, or Jacobs, Kline, and Remick, Nuclear Science and Reactors.
Mr. Simpson.

Phys. 497. Theory of Measurements and Instrumentation
3-0-3. Prerequisites: Math. 306 and consent of instructor.
An operational consideration of physical measurements and measuring instruments. The topics to be covered include sensitivity; time of response; precision; accuracy; types of errors and the extent to which they may be dealt with by the "theory of errors"; thermal noise as the limit of precision in instruments; instruments that "count" compared with those that give some proportional response; and instrument design. Specific instruments are considered as examples of general principles.
Text: Trimmer, Response of Physical Systems.
Mr. Patronis.
## Graduate Courses Offered

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phys. 616</td>
<td>Statistical Mechanics I</td>
<td>5-0-5</td>
</tr>
<tr>
<td>Phys. 621</td>
<td>Theoretical Mechanics</td>
<td>5-0-5</td>
</tr>
<tr>
<td>Phys. 624</td>
<td>Nuclear Physics</td>
<td>5-0-5</td>
</tr>
<tr>
<td>Phys. 627</td>
<td>Introduction to Quantum Mechanics</td>
<td>5-0-5</td>
</tr>
<tr>
<td>Phys. 628</td>
<td>Electromagnetic Theory I</td>
<td>5-0-5</td>
</tr>
<tr>
<td>Phys. 630</td>
<td>Principles of Modern Physics I</td>
<td>3-0-3</td>
</tr>
<tr>
<td>Phys. 631</td>
<td>Principles of Modern Physics II</td>
<td>3-0-3</td>
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<tr>
<td>Phys. 647</td>
<td>Physics of the Upper Atmosphere</td>
<td>3-0-3</td>
</tr>
<tr>
<td>Phys. 675</td>
<td>Principles of Nuclear Physics</td>
<td>4-0-4</td>
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<tr>
<td>Phys. 676</td>
<td>Neutron and Reactor Physics</td>
<td>4-0-4</td>
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<tr>
<td>Phys. 679</td>
<td>Radiation Attenuation</td>
<td>3-3-4</td>
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<tr>
<td>Phys. 680</td>
<td>Nuclear Reactor Theory</td>
<td>5-0-5</td>
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<tr>
<td>Phys. 707</td>
<td>Solid State Physics</td>
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<tr>
<td>Phys. 716</td>
<td>Statistical Mechanics II</td>
<td>3-0-3</td>
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<tr>
<td>Phys. 721</td>
<td>Advanced Classical Mechanics</td>
<td>3-0-3</td>
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<tr>
<td>Phys. 724</td>
<td>Theoretical Nuclear Physics</td>
<td>5-0-5</td>
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<tr>
<td>Phys. 727</td>
<td>Quantum Mechanics II</td>
<td>5-0-5</td>
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<tr>
<td>Phys. 728</td>
<td>Electromagnetic Theory II</td>
<td>5-0-5</td>
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<tr>
<td>Phys. 731</td>
<td>Molecular Spectra and Structure</td>
<td>5-0-5</td>
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<tr>
<td>Phys. 734</td>
<td>Introduction to Relativity</td>
<td>5-0-5</td>
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<tr>
<td>Phys. 736</td>
<td>Quantum Field Theory</td>
<td>5-0-5</td>
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</table>

(Complete details about these courses are contained in the Graduate Bulletin, a copy of which is available upon request.)
School of Psychology

Director—Edward H. Loveland; Regents’ Professor—Joseph E. Moore; Associate Professors—Richard P. Moll, M. Carr Payne, Jr.; Assistant Professors—Ethel Jo Baker, C. Michael York; Lecturer—George E. Passey; Secretary—Mrs. C. Flora Chinkes.

General Information

The School of Psychology serves a dual function in the Institute. First, it offers courses which permit the student majoring in architecture, engineering, industrial management, and natural sciences to gain training in the basic and applied aspects of the science of behavior. Second, it offers a program of studies leading to the degree, Bachelor of Science in Applied Psychology. The general objective of all courses is to provide an understanding of human behavior within an experimental and scientific frame of reference.

The curriculum in psychology stresses fundamentals, providing opportunity for broad training in mathematics, chemistry, physics, biology, and a number of basic engineering, management, and humanities subjects. The large number of elective courses which the student takes enables the curriculum to fulfill a wide variety of educational and vocational needs. A small portion of elective courses are restricted; the student must choose these from lists of grouped engineering and management courses prescribed by the psychology faculty. The student is encouraged to broaden his educational development by choosing at least a portion of his unrestricted elective courses from course offerings in the humanities and the social sciences.

The graduate of the curriculum in applied psychology will be well prepared to work in personnel and training departments in industry, and to serve with a human factors research team investigating human requirements in equipment design. The curriculum provides an excellent preparation for graduate study in psychology as well as in other fields, such as medicine and labor relations.

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>No.</th>
<th>Subject</th>
<th>1st Q.</th>
<th>2nd Q.</th>
<th>3rd Q.</th>
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<tbody>
<tr>
<td>Chem.</td>
<td>101-2-3</td>
<td>Inorganic Chemistry</td>
<td>3-3-4</td>
<td>3-3-4</td>
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<tr>
<td>Draw.</td>
<td>113-14-15</td>
<td>Engineering Graphics</td>
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<tr>
<td>Eng.</td>
<td>101-2</td>
<td>Composition and Rhetoric</td>
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<td>Eng.</td>
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<td>Introduction to Literature</td>
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<tr>
<td>Math.</td>
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<tr>
<td>Math.</td>
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<tr>
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<tr>
<td>M.L.</td>
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<td>Modern Language OR</td>
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<tr>
<td>S.S.</td>
<td>111-12-13</td>
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<td>P.T.</td>
<td>101-2-3</td>
<td>Physical Training</td>
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<td>Gen.</td>
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<td>Orientation</td>
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Totals: 18-14-20 17-14-20 17-14-20

NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.
*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.
**Sophomore Year**

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<tr>
<td>Eng. 201-2-3</td>
<td>Survey of the Humanities</td>
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<td>Calculus</td>
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<td>Bio. 201-2</td>
<td>Introduction to Biology</td>
<td>3-3-4</td>
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<td>Bio. 203</td>
<td>Comparative Anatomy</td>
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<tr>
<td>Psych. 303-4</td>
<td>General Psychology</td>
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<td>P.T. 201-2-3</td>
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**Junior Year**

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<th>3rd Q.</th>
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<tr>
<td>Math. 205-6</td>
<td>Elementary Statistical Analysis</td>
<td>3-0-3</td>
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<td>Psych. 403</td>
<td>Introduction to Psychological Testing</td>
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<td>3-0-3</td>
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<tr>
<td>Psych. 405</td>
<td>Psychological Aspects of Personnel Management</td>
<td>3-0-3</td>
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<td></td>
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<tr>
<td>Psych. 406</td>
<td>Psychological Statistics</td>
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<td></td>
<td>2-3-3</td>
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<tr>
<td>Psych. 407</td>
<td>Experimental Psychology</td>
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<td>2-3-3</td>
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<td>Psych. 410</td>
<td>Social Psychology</td>
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<td>Phys. 207</td>
<td>Mechanics</td>
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<td>Phys. 208</td>
<td>Electricity</td>
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<tr>
<td>Phys. 209</td>
<td>Heat, Sound, Light</td>
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<td>Electives **</td>
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**Senior Year**

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<tr>
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<tr>
<td>Psych. 412</td>
<td>Psychology of Learning</td>
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<td>3-3-4</td>
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<tr>
<td>Psych. 413***</td>
<td>Applied Experimental Psychology</td>
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<td>3-3-4</td>
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<td>Psych. 415</td>
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<td>Eng. 315</td>
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**Totals**

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<tr>
<th>Sophomore Year</th>
<th>17-8-18</th>
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<td>Junior Year</td>
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<td>18-3-19</td>
<td>18-6-20</td>
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</tbody>
</table>

*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

**A total of not more than 9 hours of electives may be in advanced ROTC.

***Psychology 602 may be substituted for Psychology 413 with the approval of the School of Psychology and the Dean of the Graduate School.
Courses of Instruction

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Psy. 303. General Psychology A
3-0-3. Prerequisite: None.
This course is an intensive coverage of the methods and findings of contemporary psychology. Emphasis will be placed upon the scientific approach to the study of behavior and upon topics of maturation and development, learning, and motivation.
Staff.

Psy. 304. General Psychology B
3-0-3. Prerequisite: Psy. 303.
This is a continuation of Psychology 303. Such topics as individual differences, emotion, perception, and personality will be discussed.
Staff.

Psy. 400. Developmental Psychology
3-0-3. Prerequisite: Psy. 303.
A comprehensive study of the behavior and development of the child from infancy through adolescence. Emphasis will be given to the results of empirical research on experiences and processes which affect child behavior.
Mr. Moore.

Psy. 401. Industrial Psychology
3-0-3. Prerequisite: None.
This course introduces the student to scientific methods of inquiry as they are utilized in the study of human behavior in industry. Emphasis is on scientific and experimental study of individual differences, human relations, psychological aspects of equipment design, learning, and motivation.
Staff.

Psy. 402. Psychology of Adjustment
3-0-3. Prerequisite: Psy. 303.
This course will deal with the typical individual and the social adjustment problems of normal people. Its chief aim will be to assist the student better to understand himself and his fellow man. The primary approach will be from the view point of objective psychology.
Mr. Moore, Mr. Moll.

Psy. 403. Introduction to Psychological Testing
3-0-3. Prerequisite: Psy. 401.
This course deals with psychological tests and measurement. Applications in business and industry are emphasized. Uses and abuses, advantages and limitations of the more commonly used types of tests are discussed. Students have opportunities to administer, take, score, interpret, construct, and evaluate certain tests. Individual problems are assigned. The aim of the course is to provide the student with sufficient background so that, as a businessman or engineer, he will be able to exercise sound judgment concerning the uses of tests and measurements in the management of men.
Mr. Loveland.

Psy. 404. Psychology of Advertising
3-0-3. Prerequisites: Psy. 303 and 401.
An analysis of the psychological factors which govern buying activities of consumers. These and other facts are combined to establish the psychological foundations of effective advertising and selling. The psychological aspects of such topics as product testing, advertising media research, copy testing, and consumer and audience research will be discussed.
Mr. Payne.

Psy. 405. Psychological Aspects of Personnel Management
3-0-3. Prerequisite: Psy. 401.
The purpose of this course is to provide prospective business and industrial executives with a knowledge of the techniques employed by industrial and personnel psychologists in industry. Such topics as the development and use of psychological tests and criterion measures, the applications of principles of learning and motivation to the construction of training programs, interviewing and counseling of employees, and
the theory and construction of rating scales will be discussed in detail.

Mr. Loveland.

Psy. 406. Psychological Statistics
2-3-3. Prerequisite: Permission of the instructor.
A study of the applications of statistical techniques to the description, prediction, and control of human behavior. Methods of evaluating psychological tests, individual differences, merit rating scales and personnel selection and training programs will be discussed in detail. Emphasis will be placed upon the logical aspects of the statistics studied.
Mr. Loveland.

Psy. 407. Experimental Psychology I
2-3-3. Prerequisite: Psy. 303.
An introduction to psychological measurement and laboratory techniques. Students will plan, conduct, evaluate, and report experiments dealing with such topics as visual, auditory, tactual, and kinesthetic perception; sensorimotor coordination; and human feedback systems. Emphasis will be placed on the applications of the methods of science to the experimental study of human behavior.
Mr. Payne.

Psy. 410. Social Psychology
3-0-3. Prerequisite: Psy. 303.
The behavior of the individual in society is the main concern of this course. Emphasis will be placed on the scientific study of the individual in relation to other individuals and groups.
Mr. York.

Psy. 411. Experimental Psychology II
3-3-4. Prerequisites: Psy. 304 and 407, and permission of the instructor.
This course emphasizes quantitative methods in the scientific study of the learning process. Scientific methods of studying related topics such as motivation and thinking will also be treated.
Mr. Moll.

Psy. 412. Psychology of Learning
3-3-4. Prerequisites: Psy. 401 and 411, and permission of the instructor.
The purpose of this course is to familiarize the student with the basic phenomena of learning and to acquaint him with the pertinent contemporary literature. Applications of learning principles currently being made in business, industry, and other fields will be emphasized and the possibilities of additional future applications will be discussed.
Mr. Moll.

Psy. 413. Applied Experimental Psychology
3-3-4. Prerequisites: Psy. 406 and 412, and permission of the instructor.
Consideration of the applications of the methods and data of experimental psychology to practical behavior problems.
Mr. Loveland and Mr. Passey.

Psy. 415. Special Problems
3-3-4. Prerequisite: Permission of instructor.
Students will work, under the direction of the instructor, on projects adding to their development beyond the scope of existing courses. Staff.

Psy. 601. Advanced Industrial Psychology
3-0-3.
Psy. 602. Applied Experimental Psychology
3-0-3.
Psy. 603. Social Psychology
3-0-3.
Psy. 604. Human Information Processing
3-0-3.
Psy. 704. Special Problems in Industrial Psychology
Credit to be arranged.
Department of Social Sciences

Department Head—George Hendricks; Professors—Robert Scharf, Glenn N. Sisk; Associate Professors—Edward A. Gaston, John C. Gould, Malcolm G. Little, Willard E. Wight; Assistant Professors—Patrick Kelly, Charles B. Pyles; Instructors—John H. Burnett, Thomas D. Philips, Raymond D. Ricks, Mrs. Charlotte Tatro, Mrs. Sandra Thornton; Lecturer—Morris Mitzner; Secretary—Mrs. Agnes Doster.

General Information

The Department of Social Sciences gives Freshman courses describing contemporary society and the American government. To upperclassmen, it offers courses in sociology, history, government, philosophy and logic. Its courses in industrial sociology examine the community of the factory and the social roles of professional men, especially engineers. The department participates in the graduate City Planning program.

Freshmen are required to take either Social Sciences 111, 112 and 113, or Modern Languages. Transfer students may substitute for SS 111 and 112 any two of the following: SS 305, 306, 319, 327, 328.

Courses of Instruction

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

S.S. 111. Contemporary American Society
3-0-3. Prerequisite: None.
Description of contemporary society, with comparative and theoretical examination of developments in society.
Text: Selected paperback books on personality and culture. Staff.

S.S. 112. Contemporary American Society
3-0-3. Prerequisite: None.
Continuation of S.S. 111.
Text: Selected paperback books on contemporary institutions. Staff.

S.S. 113. Government of the United States
3-0-3. Prerequisite: None.
A study of the structure and functions of the United States and Georgia governments. IT GIVES EXEMPTION FROM THE UNITED STATES AND GEORGIA CONSTITUTION EXAMINATION.
Text: Saye, Pound, Allums, Principles of American Government; and selected paperback books on political institutions. Staff.

S.S. 208. Basic Sociology
3-0-3. Prerequisite: Sophomore standing.
While discussing the various sociological aspects of the modern family, the church, the factory, and other contemporary institutions, this course will provide an introduction to the theory of social organization.
Text: Young, Systematic Sociology. Mr. Gaston, Mrs. Tatro.

S.S. 301. Social Problems of Industry
3-0-3. Prerequisite: Junior standing or Sophomore with permission of instructor.
This course analyzes the factory, and the business enterprise as social institutions, with particular attention to the contrasting functions of formal and informal organization, and to the significance of cooperation, authority, communication, status and group norms in the work situation.
Text: Dubin, Human Relations in Administration. Mr. Mitzner.
S.S. 305. Nineteenth Century Europe  
3-0-3. Prerequisite: Sophomore, Junior or Senior standing.  
Modern European History and its impact on world civilization.  

S.S. 306. World Problems Since 1914  
3-0-3. Prerequisite: Sophomore, Junior or Senior standing.  
A continuation of S.S. 305.  
Text: Hughes, *Contemporary Europe*.  
Mrs. Thornton.

S.S. 307. American Economic History  
3-0-3. Prerequisite: Junior or Senior standing.  
Special attention is given to the rise of technology, our industrial system, the westward movement, the development of our banking system, and government regulation of industry.  
Mr. Hendricks, Mr. Wight.

S.S. 313. The Problems of Public Opinion  
3-0-3. Prerequisite: Junior or Senior standing.  
A study of the processes of opinion formation and opinion diffusion in large-scale urban societies. These processes will be examined with reference to situations in which the stimuli for opinion formation are produced (a) planfully, as by propaganda; or (b) without plan, as in the contexts of disaster or mass hysteria.  
Text: To be selected. Mr. Pyles.

S.S. 314. Individual and Society  
3-0-3. Prerequisite: Junior standing or Sophomore with permission of instructor.  
A study of interpersonal relations in the small or informal group, seen in a variety of industrial contexts, such as the family, and in educational, military, or industrial organizations.  

S.S. 319. History of the South  
3-0-3. Prerequisite: Junior or Senior standing.  
The growth of the South's economic, social, and political life since 1820. Special emphasis is given to those factors which have played an important part in the progress of Georgia. Current regional problems are considered. Exemption from *United States and Georgia history examination*.  
Mr. Gaston.

S.S. 323. American Constitutional Problems  
3-0-3. Prerequisite: Junior or Senior standing.  
This is an advanced course in the government of the United States and Georgia, taught largely through the medium of constitutional law. Such significant problems as federalism, separation of powers, and civil liberties are studied. Exemption from *United States and Georgia constitution examination*.  

S.S. 324. Georgia State and Local Problems  
3-0-3. Prerequisite: Junior or Senior standing.  
Through the social, economic and political life of Georgia, the problems which have confronted the state are examined in their historical setting. The relating of Georgia's problems to the national scene gives the student a broader perspective of the state's place in the nation. Exemption for the *United States and Georgia history examination*.  
Text: Coulter, *A Short History of Georgia*. Mr. Wight.

S.S. 325. American Diplomatic History  
3-0-3. Prerequisite: Junior or Senior standing.  
An historical analysis of United States diplomacy from the Revolutionary War to the present. Emphasis is placed upon the political, economic, and social factors of
American history influencing foreign policy and upon the role of the South in world affairs. Exemption from United States and Georgia History Examination.


S.S. 327. American Political and Social History to 1876
3-0-3. Prerequisite: Junior or Senior standing.

Readings on colonial America, the American Revolution, the framing of the Constitution, Jeffersonian democracy, sectionalism, the slavery question, succession, the Civil War, and Reconstruction. Attention is given to the place of Georgia in the history of the United States. Exemption from United States and Georgia history examination.


S.S. 328. American Political and Social History Since 1876
3-0-3. Prerequisite: Junior or Senior standing.

A continuation of S.S. 327. Readings on the restoration of home rule in the South, the Granger movement, business and politics, tariff and trust problems, imperialism and party politics, foreign relations, and international affairs. Exemption from United States and Georgia history examination.

Text: Hicks, *The American Nation: 1865 to Present*. Mr. Sisk.

S.S. 331, 332. Introductory Philosophy
3-0-3. Prerequisite: Junior or Senior standing.

Ancient and modern systems of philosophy as related to political government, social ethics, economics, and comparative religion.

S.S. 332 concentrates on deductive and inductive logic.

Text for S.S. 331: Davidson, *The Search for Meaning in Life*.

S.S. 334. Symbolic Logic
3-0-3. Prerequisite: Junior or Senior standing.

An approach to basic logical notions through use of special symbols.


S.S. 347, 348. Foundations of National Power and International Relations
3-0-3. Prerequisite: Junior or Senior standing.

This course is designed to acquaint the student with the United States' power position in world affairs, relative to that of other powers, and with the events in the world today which have an impact on that position. International relations are emphasized.

Text for S.S. 348: To be selected. Mr. Burnett.

S.S. 351. Statistics for Planning
3-0-3.

Statistical principles for analysis of economic, social, and population data; sampling; measures of central tendencies; normal curve; testing of findings; correlation and arriving at conclusions.


S.S. 401. Municipal and County Government
3-0-3. Prerequisite: Junior or Senior standing.

An analysis of local government, with particular emphasis on the mechanics and functions of city and urban county governmental units.

Text: To be selected.

S.S. 405, 406. Political Theory
3-0-3. Prerequisite: Senior standing. Open to Graduate students.

Beginning with the classical political thought of Plato and Aristotle, this course traces the development of political theory through the Mid-
dle Ages to the present. Special attention is given to the rise of ideology and the theories of Communism and Fascism.

Text: To be selected. Mrs. Thornton.

S.S. 412. Technology and Society
3-0-3. Prerequisite: Senior or Graduate standing. Open to Graduate students.

This course analyzes the social conditions which promote or retard technological activity. Particular emphasis is placed on the historical development of technology in Western Society, and on the social role of the scientific and engineering professions in that development.


S.S. 415. Urban Sociology
3-0-3. Prerequisite: Senior or Graduate standing. Open to Graduate students.

A study of the problems of economic, religious, and social institutions in modern urban life. Field experience and research illustrate and apply the theoretical materials of the course.

Graduate Courses Offered

S.S. 601 Governmental Aspects of Planning 3-0-3
S.S. 605 Planning for People 3-0-3
The A. French Textile School
(Established in 1899)

Director—James L. Taylor; Professors—Herman A. Dickert, Ralph L. Hill, Raymond K. Flege, William L. Hyden, Charles A. Jones (Emeritus); Associate Professors—Gerald B. Fletcher, J. Weldon McCarty, John I. Alford; Assistant Professor—Ralph C. Lathem; Assistant to the Director—Frank J. Clarke; Secretary—Mrs. Sherry Redmon; Clerk-Typist—Mrs. Linda Phillips; Mechanics—Howard G. Adams, Ramsey C. Freeman, James H. Lackey.

General Information
This school, housed in the modern Harrison Hightower Building, offers courses leading to the degrees of Bachelor of Textile Engineering, Bachelor of Science in Textile Chemistry and Bachelor of Science in Textiles. Each degree may be taken as a regular four-year course, or in accordance with the five-year co-operative plan.

Graduate courses are also provided leading to the degrees of Master of Science in Textile Engineering, and Master of Science in Textiles.

The school is vitally interested in serving the expanding textile industry, and the courses provided have as their objective the training of students for employment in this industry and its related branches.

During the first two years the work is largely fundamental, including the basic courses of Mathematics, Physics, and Chemistry, followed by more specialized training in the field of Textiles during the Junior and Senior years.

Instruction through classroom, library, and experimental laboratory practice is arranged to give both a theoretical and practical understanding of textile procedure. Original work on the part of the student is encouraged in both regular and graduate courses.

Supervised visits to textile plants in this area are made periodically by Junior and Senior classes, thus giving the student contact with industry, and textile operations on a production scale.

Program for B. of Textile Engineering Degree
Freshman Year

<table>
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<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
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**Totals** 18-14-20 17-14-20 17-14-20

NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*Choice of M.L. 102-2-3 German; M.L. 107-8-9 French; or M.L. 113-14-15 Spanish.

Three Quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

**For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.
### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
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<td>5-3-6</td>
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<td>Survey of Economics</td>
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**Totals**: 19-8-20 19-8-20 19-8-20

*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

### Junior Year

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<th>3rd Q.</th>
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<td>E.E.</td>
<td>325</td>
<td>Electrical Circuits and Fields</td>
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<td>E.E.</td>
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<td>Elementary Electronics</td>
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<td>E.E.</td>
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<td>Dynamics</td>
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<td>Tex.</td>
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**Totals**: 16-9-19 16-9-19 15-6-17

### Senior Year

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<td>Machine Design</td>
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<td>M.E.</td>
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<td>Dynamics of Machinery</td>
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<td>Ch.E.</td>
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<td>Elementary Heat and Mass Transfer</td>
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<tr>
<td>C.E.</td>
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<td>S.S.</td>
<td>328*</td>
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<td>Tex.</td>
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<td>Tex.</td>
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**Totals**: 16-6-8 13-12-17 14-12-18

*S.S. 319, 325 and 327 may be substituted for S.S. 328.

**Not more than 9 hours of electives may be in Advanced ROTC.**
# Program for B.S. in Textile Chemistry

## Freshman Year

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<th>Course No.</th>
<th>Subject</th>
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<td>Composition and Rhetoric</td>
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NOTE: Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*Chem. 101, 102, 103 may be scheduled. However, a minimum grade of C is required for Chem. 101 and 102 and the prerequisite for Chem. 214 is Chem. 103 with a grade of C or better or Chem. 109.

**Choice of M.L. 101-2-3 German; M.L. 107-8-9 French; or M.L. 113-14-15 Spanish. Three Quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

***For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

## Sophomore Year

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*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.
### Junior Year

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**Totals**: 15-12-19 15-9-18 15-9-18

### Senior Year

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<td>406</td>
<td>Instrumental Analysis</td>
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<td>Weaving</td>
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<td>444</td>
<td>Chemical &amp; Physical Principles of Dyeing Processes</td>
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<td>Preparation &amp; Dyeing of Man Made Fibers</td>
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<td>464</td>
<td>Dyeing Systems</td>
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<td>454</td>
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<td>Textile Printing</td>
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<td>Textile Chemicals—Properties—Selection and Use</td>
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**Totals**: 15-9-18 14-9-17 14-12-18

**Six hours of electives must be taken in humanities from list on page 34. Not more than nine hours of electives may be in advanced ROTC.**
# Program for B.S. in Textiles

## Freshman Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
<th>1st Q.</th>
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<td>Chem. 101-2-3</td>
<td>General Chemistry</td>
<td>3-3-4</td>
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<td>Engineering Graphics</td>
<td>0-6-2</td>
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<td>Draw. 106</td>
<td>Graphic Presentation</td>
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<tr>
<td>Eng. 101-2</td>
<td>Composition and Rhetoric</td>
<td>3-0-3</td>
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<tr>
<td>Eng. 105</td>
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<td>Math. 101</td>
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<td>P.T. 101-2-3</td>
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<td>18-8-18</td>
<td>17-14-20</td>
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</table>

**NOTE:** Under Quarters, 3-3-4 means 3 hours class, 3 hours lab., 4 hours credit.

*Choice of M.L. 101-2-3 German; M.L. 107-8-9 French; or M.L. 113-14-15 Spanish. Three quarters of either M.L. or S.S. are required. A student having had two years of a language in high school and wishing to continue work in this language must schedule courses in the 200 series.

**For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

## Sophomore Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Subject</th>
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<td>Eng. 201-2-3</td>
<td>Survey of the Humanities</td>
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<td>Economic Principles and Problems</td>
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<td>Industrial Organization</td>
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<td>Textile Design</td>
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<td>Yarn Manufacturing</td>
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*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.

## Junior Year

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<td>Fabric Analysis</td>
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*For course numbers, see the course descriptions under the appropriate ROTC sections of this Bulletin.
Senior Year

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<td>Finance Survey for Engineers</td>
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<td>Fiber Technology</td>
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<td>Standard Fabrics</td>
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<td>Chemical &amp; Physical Principles of Dyeing Processes</td>
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**Totals** 17-3-18 17-6-19 15-6-17

**Note:** Not more than 9 hours of electives may be in Advanced ROTC.

Courses of Instruction

Note: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

**Tex. 201. Raw Materials** 3-0-3.
Gives students a thorough survey of natural and synthetic fibers used in the Textile Industry. Covers cotton, wool, synthetics, silk, jute, hemp, flax, kapok, asbestos and miscellaneous fibers. (Not open to Textile students.)

Text: Lecture notes. Staff.

A survey course in Yarn Manufacturing covering the theory and principles of processing natural and synthetic fibers on the cotton, woolen and American worsted systems. (Not open to Textile Students.)

Text: Lecture notes. Staff.

**Tex. 231, 232. Textile Design** 3-0-3.
Consent of instructor for non-textile students.

The first course covers the study of the fundamental weaves, their structures, properties and applications to various types of fabrics. The second course covers the more complex dobby patterns including honeycombs, brighton, diamond, huck, and the multiple warp and/or filling fabrics such as backed, figured, double and triple cloths.

Text: Lecture notes. Mr. Fletcher, Mr. McCarty.

**Tex. 240. Yarn Manufacturing** 3-3-4. Prerequisite: Sophomore standing.

The first in a series of courses designed to give the student the fundamental theory and practice in yarn manufacturing. This course covers the process from opening through carding on both natural and man-made fibers.

Text: Lecture Notes. Mr. Hill, Mr. Lathem.

**Tex. 242, 243, 308. Yarn Manufacturing** 3-3-4. Prerequisite: Tex. 240.

A continuation of Tex. 240 covering drawing, roving, spinning, twisting winding and warping. Goes further into detail on machine construction, theory of processing and meth-
ods of process control. Covers practical machine operation and textile calculations on both convention and long draft equipment.

Text: Lecture notes.

Mr. Hill, Mr. Lathem.

Tex. 251. Survey of Fabric Production 3-0-3.

A survey course in the design, weaving and utilization of fabrics made from both natural and synthetic fibers. The production of knitted and non-woven fabrics and the uses for these materials are also covered. (Not open to Textile Students.)

Text: Lecture notes. Staff.


A survey course covering the dyeing and finishing of textile materials made from both natural and synthetic fibers. Classes of dyes and the methods of application to the different types of fibers are covered as are some of the more common methods of finishing which are used to enhance the saleability of the textile product. (Not open to Textile Students.)

Text: Lecture notes. Mr. Dickert.

Tex. 314. Fabric Analysis 2-3-3. Prerequisite: Tex. 231.

Course covers a study of yarn and cloth calculations and fabric analysis.

Text: Lecture notes.

Mr. Fletcher, Mr. McCarty.

Tex. 328, 329. Weaving 3-3-4. Prerequisite: Junior standing.

Courses covering theory and practice of weaving with cam, dobby and box looms. A detailed study is made of loom mechanism, nomenclature, and automatic attachments.

Text: Lecture notes.

Mr. Fletcher, Mr. Alford.


A continuation of Tex. 329 covering a study of some of the more complex automatic loom attachments. A study is also made of sizing materials and their application to natural, synthetic and blended yarns. Also covers cloth room machinery and dry finishing operations.

Text: Lecture notes.

Mr. Fletcher, Mr. Alford.

Tex. 352. Physical Textile Testing 2-3-3. Prerequisite: Junior standing.

A course covering the methods and techniques of testing yarns and fabrics made from natural and synthetic fibers. Standard A.S.T.M. method and practices for the testing of textile materials are followed and a study is made of the various machines and apparatus employed in standard testing laboratories.

Text: Lecture notes. Mr. McCarty.

Tex. 420. Standard Fabrics 3-0-3. Prerequisite: Senior standing.

Course acquaints the student with the staple and fancy fabrics of the Textile Industry and covers those made from natural and synthetic fibers. It covers the description, construction, finishes, properties, uses, etc.

Text: Lecture notes.

Staff.

Tex. 421. The Engineering of Textile Structures 2-3-3. Prerequisite: Senior standing in Textile Engineering.

This course covers the application of engineering principles to processing and design of textile materials. Basic fiber properties and translation characteristics are studied along with end-use requirements in an endeavor to produce a desired textile structure. Stress-strain analysis, friction characteristics, yarn evenness and thermal transmission properties are among the topics of discussion.

Text: To be selected. Mr. Flege.


A course covering the designing of Jacquard patterns and the techniques involved in the transfer of design to
the loom. Various methods for the production of special figuring effects are covered. The details of the Jacquard head and the mechanisms by which the head is driven from the regular looms are studied.

Text: Lecture notes.

Mr. Fletcher, Mr. McCarty.

**Tex. 423. Fiber Technology**

2-3-3. Prerequisite: Senior Textile standing.

A course covering the technology of fiber testing techniques. Includes a brief study of cotton classing, textile microscopy, the Micronaire, the Fibrograph, fiber arrays, fiber strength studies and other fiber tests.


Mr. McCarty, Mr. Dickert.

**Tex. 437. Chemical Textile Testing**

2-3-3. Prerequisites: Tex. 352 and Tex. 444.

Course designed to familiarize students with chemical and microscopic methods of identifying and investigating natural and synthetic fibers. Also covers size and finish analysis in addition to specialized chemical analysis.

Text: Lecture notes.

Mr. Hyden, Mr. Dickert.

**Tex. 440. Man-Made Fibers**

3-0-3. Prerequisite: Senior textile standing.

This course is designed to give the student an understanding and a working knowledge of man-made fibers in the textile field. The basic concepts of the Chemistry of Polymerization, as related to cellulosic, polyamide, polyester, vinyl, Acrylic and other fibers, are studied. Pertinent manufacturing, economic and appropriate end-use aspects are discussed.


Mr. Hyden, Mr. Dickert.

**Tex. 442. Textile Chemistry**

3-0-3. Prerequisite: Chem, 305.

Designed to give the student specific, working knowledge, using the concepts and principles of Chemistry as related to the composition, properties, manufacture, use and care of textiles. Quantitative and mathematical treatments will be used whenever applicable.

Text: Lecture notes.

Mr. Hyden, Mr. Taylor.

**Tex. 444. Chemical and Physical Principles of Dyeing Processes**

3-3-4. Prerequisite: Text. 442.

Structure, properties and reactions of dyestuffs with natural fibers. Classification of dyestuffs, methods of application, and reaction mechanisms.

Text: Cockett and Hilton, *Dyeing of Cellulosic Fibers*.

Mr. Flege.

**Tex. 463. Preparation and Dyeing of Man-Made Fibers**

3-0-3. Prerequisite: Tex. 444.

Chemical and physical properties of man made fibers are discussed along with methods for preparation of the fibrous materials for dyeing. Chemical properties and reactions of dyestuffs applicable to the fibers and reaction mechanism of the dye fiber system are covered.

Text: Schmidlin, *Preparation and Dyeing of Synthetic Fibers*.

Mr. Flege.

**Tex. 464. Dyeing Systems**

0-3-1. Prerequisite: Tex. 444.

Application of dyestuffs to fibers, yarns and fabrics in pilot scale equipment. Principles of machine operation, application problems, and costs are emphasized.

Text: Instructor's Notes. Mr. Flege.

**Tex. 447. Textile Costing**

3-0-3. Prerequisites: Tex. 329 and Tex. 243.

Covers basic principles, material, labor, overhead, departmentalizing, accumulating costs by departments, allocation of costs, predetermined costs, fabric cost sheet, marketing cost and financial statements.

Text: Lockwood and Maxwell, *Textile Costing*.

Mr. McCarty, Mr. Lathem.
Tex. 449. Textile Costing  
3-0-3. Prerequisite: Tex. 447.  
This is a more advanced course designed to give the student additional work with reference to costs in Textile Mills.  
Texts: Campbell, Typical Cost System for Grey Goods Mill; Campbell, Student Work Book.  
Mr. McCarty, Mr. Hill.

Tex. 450. Calculations and Mechanics of Textile Machines  
3-0-3. Prerequisite: Tex. 243.  
This course supplies the Textile Engineering student with a concentrated course of calculations dealing with machine operations, process control, mill organization and mechanics of textile machines.  
Text: Lecture notes. Mr. Hill.

Tex. 451. Mill Engineering  
3-0-3. Prerequisite: Tex. 308.  
Course includes problems of mill organization, equipment and layout of machinery, equipment cost, problems of conversion when changing machinery to manufacture a different product, etc.  
Text: Lecture notes. Mr. Hill, Mr. Dickert.

Tex. 453. Textile Plant Design  
2-3-3. Prerequisites: Tex. 450 and E.E. 325.  
This course acquaints the students with the selection and cost of process equipment, organization programs, plant layouts and the proper equipment for air-conditioning, lighting, power and material handling. Current design methods are discussed, evaluated and utilized.  
Text: Lecture notes. Mr. Hill and Mr. Dickert.

Tex. 454. Seminar  
1-0-1. Prerequisite: Senior standing.  
Specific topics concerned with scientific literature; what industry expects of graduates; opportunities for professionally trained scientists in textiles and similar subjects are covered by experienced speakers. Students participate in discussions and presentations, both written and oral. Staff.

Tex. 455. Textile Engineering Problems  
1-6-3. Prerequisite: Senior standing in Textile Engineering.  
Special problems involving analytical or experimental investigations in the field of Textile Engineering designed to develop the student’s initiative. Staff.

Tex. 456. Special Problems in Textiles  
1-6-3. Prerequisites: Senior standing in Textile Chemistry or B.S. in Textiles.  
Special problems involving analytical or experimental investigations in the field of textiles and/or textile chemistry. Designed to develop the students’ initiative. Staff.

Tex. 459. Textile Printing  
2-3-3. Prerequisite: Tex. 444.  
A survey course in printing fabrics from natural and synthetic fibers. Covers methods of printing, equipment used and the fundamentals of preparing printing pastes, etc. Involves theory and practice.  
Text: Lecture notes. Mr. Taylor, Mr. Flege.

Tex. 461. Textile Chemicals—Properties, Selection and Use  
3-0-3. Prerequisite: Tex. 444.  
Chemical principles used in the development of process formulae are discussed. Special problems are assigned. Chemical aspects of finishing processes are considered.  
Text: Speel, Textile Chemical and Auxiliaries. Mr. Flege, Mr. Taylor.

Tex. 462. Engineering Analysis of Dyeing and Finishing Systems  
3-3-4.  
Elements of Material Science are applied to Problems in the Selection and Installation of Equipment for Dyeing and Finishing, Design and Operating Principles of Systems employed are covered.  
Text: Lecture notes. Mr. Flege.
Thermal and related structures are analyzed and evaluated.

Operational methods and physical principles employed for conversion of

4. Textiles 4.7 - Fiber Science

N.D. Please Read: Lecture Notes

Text: Lecture Notes

advanced work in the fiber and related sciences.

senior or graduate level students in the physical sciences. This course is intended to prepare

from those fibers are covered. The course is intended to prepare

to perform experiments characterizing or structures produced or developed

Methods for evaluating fiber properties and relating those properties

The physical structure and mechanical properties of fibers are studied.

3-D Textiles 3.7 - Fiber Science

2. Textiles 4.7 - Fiber Science
The physical chemistry that are made use of in fiber manufacture and processes
are in chemical to those basic chemical principles inorganic and
are specifically designed to accommodate students with limited time.

3-0-3. Pretestable - Chem. 103 and Senior Standing.


4. Text: Pretestable - Text. 4-1.

3. Text: Fabric Construction - Analyze and Design

4. Text: Pretestable - Text. 4-1.

Analytical methods for characterizing the yarn and intermediate products
and forecasting yarn performance from fiber properties are studied.
Textiles  

<table>
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<tr>
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<th>Course Title</th>
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<tr>
<td>Tex. 628</td>
<td>Natural and Synthetic High Polymers</td>
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<td>Tex. 646</td>
<td>Advanced Fabric Analysis</td>
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<td>Tex. 700</td>
<td>Master's Thesis</td>
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<td>Tex. 701, 2, 3</td>
<td>Seminar</td>
<td>1-0-0</td>
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<td>Tex. 704, 5, 6</td>
<td>Special problems and topics in Textiles and Textile Engineering</td>
<td>Credit to be arranged. Grad. Staff.</td>
</tr>
</tbody>
</table>

(Complete details about these courses are contained in the Graduate Bulletin, a copy of which is available upon request.)
THE CO-OPERATIVE DIVISION
(Established in 1912)

Co-operative Courses in Aerospace, Chemical, Civil, Electrical, Industrial, Mechanical, and Textile Engineering; Chemistry, Physics and Engineering Mechanics

(A Special Bulletin is available and will be mailed on request)

Director—James Gordon Wohlford; Associate Director—William Henry Hitch; Assistant Director—William Franklin Leslie; Secretaries—Joyce Moore, Maude Turner.

The engineering and science graduate must have an educational background of sound scientific and economic principles, and he must be acquainted with industrial practices in his field of employment before he can assume responsibility for industrial projects. The interlocking of theory and practice is provided in the co-operative plan of education by the integration of technical theory and practical industrial experience. The Georgia Institute of Technology recognizes the value of this plan and has since 1912 offered a Co-operative Course for those students who desire to acquire their education under the co-operative plan. The correlation of the scientific and engineering practices of classroom and laboratory work and practical industrial experience is accomplished in a five-year course. Co-operative students complete twelve academic quarters and their scheduled industrial quarters. The alternation between campus and industry continues until the student has completed the second or third quarter (depending on the student’s section) of the junior year curriculum, at which time the students are scheduled to attend classes continuously until graduation.

Ten courses are available to students under this plan. Originally only Mechanical and Electrical Engineering were offered, but Civil, Textile, and Chemical Engineering were added between 1920 and 1928, and in 1946 Aeronautical (now Aerospace) and Industrial Engineering were included. Chemistry, Physics, and Engineering Mechanics were added in 1963.

Students in the Co-operative Division are selected from men who are in the upper third of their high school or preparatory class, or who have made better-than-average records in the Georgia Tech regular course or at some other accredited institution of higher learning. The entrance requirements for the Co-operative Courses include all “Specified or Required Units” on page 18. Only those students who expect to graduate under the Co-operative Division are accepted for these courses. A co-operative student, of course, must make a creditable scholastic record before being recommended for work in industry, and is allowed to continue under the co-operative plan only if he maintains a good record. Upon graduation a Bachelor’s Degree, Co-operative Plan, is awarded to a co-operative student in his particular field.

Students in the Co-operative Division are divided into two sections, the first beginning classes in June and the second in September. While Section One is at college three months, Section Two is at work in industry for the same length of time. The two sections alternate or exchange places with each other.
every three months until the fifth school year, when they merge and remain at college continuously until graduation. A co-operative student gets three weeks' vacation during each calendar year—one week at Christmas and two weeks during the summer.

The Institute is co-operating with more than two hundred and twenty firms, including power companies, electric and electronic equipment manufacturers, oil companies, airlines, railroads, manufacturers of machinery and mechanical equipment, pulp and paper mills, chemical industries, textile mills, foundries, steel mills, construction and engineering firms, and state and federal agencies. The area covered by those industries includes the Southeastern States and many sections of the Middle Atlantic and Western Central States.

After satisfactory completion of at least three months' classroom work in the Co-operative Division, a student is recommended for work with an industrial company. Since the firms employing co-operative students offer a wide variety of practical training and many lines of specialization, students are afforded the opportunity to secure work in the field in which they are most interested. Although the Co-operative Division does not guarantee work nor stipulate any certain amount of compensation, every effort is made to place students to their best educational and financial advantage.

The co-operative students receive wages for their work at the prevailing rate in the shops in which they are employed, and the employers pay the wages directly to the students. At the present time the average beginning wage for a freshman is around $275.00 per month. The wages increase as the student remains on the job assigned him until he is advanced to a higher grade of work by the company which employs him or by the Co-operative Division. By the time he graduates, a co-operative student will have received training in practically all departments of an industry. A high percentage of students trained in this way follow and succeed in their chosen profession. At the conclusion of the course the co-operative graduate is not obligated to accept employment with the co-operating company; neither is the company obligated to offer employment. In many instances, however, such employment is offered by the company and accepted by the student.

The Director of the Co-operative Division makes frequent visits to employing companies. Through interviews with company officials and shop foremen he brings about co-ordination of industrial work with school curricula and takes care of any adjustments in types of work, wages, and other relevant matters. Before freshmen are sent to work, they attend orientation classes in which they are acquainted with the various aspects of their industrial work and receive pointers on how to succeed on the job, how to make friends with regular shop employees, how to save wisely, and other important factors.

A Georgia freshman should have about $900.00 and an out-of-state student about $1,375.00 for the total expenses of his first two academic quarters. Anyone interested in making application for admission into the Co-operative Division should write to J. G. Wohlford, Director of Co-operative Division, for a bulletin which gives full particulars about fees, courses, living expenses, wages paid the students while at work, discipline, school activities, and other pertinent information.
THE GRADUATE DIVISION

(A Bulletin on Graduate Studies will be sent upon request)

Dean—Mario J. Goglia; Assistant to the Dean—Karl M. Murphy; Secretaries—Florence Carroll, Elizabeth Oxford, Frances Smith, Betty Topmiller.

Graduate Council

MARIO J. GOGLIA, Ph.D. ........................................... Chairman
WILLIAM L. CARMICHAEL, M.S. ................................... Secretary

Ex-Officio

PAUL WEBER, Ph.D. ........................................... Dean of Faculties
JESSE W. MASON, Ph.D. ........................................... Dean of the Engineering College
RALPH A. HEPNER, Ph.D. ........................................... Dean of the General College
WYATT C. WHITLEY, Ph.D. ........................................... Director, Engineering Experiment Station
MRS. J. H. CROSLAND ........................................... Director, Libraries

Appointment Expiring June 30, 1964:
VERNON CRAWFORD, Ph.D., Associate Director, School of Physics
WILLIAM B. HARRISON, Ph.D., Director, School of Nuclear Engineering
JAMES L. TAYLOR, Ph.D., Director of the School of Textile Engineering
JAMES D. WRIGHT, Ph.D., Head, Department of Modern Languages

Appointment Expiring June 30, 1965:
HOMER V. GRUBB, Ph.D., Director of the School of Chemical Engineering
WILLIAM B. JONES, JR., Ph.D., Professor of Electrical Engineering
EDWARD H. LOVELAND, Ph.D., Director, School of Psychology
KENNETH G. PICA, Ph.D., Director, School of Mechanical Engineering

Appointment Expiring June 30, 1966:
SHERMAN F. DALLAS, Ph.D., Associate Director, School of Industrial Management

Appointment Expiring June 30, 1967:
DONALD W. DUTTON, M.S., Professor of Aerospace Engineering
PETER E. GAFFNEY, Ph.D., Associate Professor of Applied Biology
FREDERICK W. SCHUTZ, JR., Ph.D., Director, School of Civil Engineering

Degrees and Fields of Study

The degree of Master of Science is offered with or without designation in the following fields: Aerospace Engineering, Applied Mathematics, Ceramic Engineering, Chemical Engineering, Chemistry, Civil Engineering, Electrical Engineering, Engineering Mechanics, Industrial Engineering, Information Science, Industrial Management, Mechanical Engineering, Metallurgy, Nuclear Engineering, Nuclear Science, Physics, Public Health Engineering, Safety Engineering, Sanitary Engineering, and Textile Engineering. It may be awarded without designation when the student does not major in the field in which he has earned his bachelor's degree. The degrees of Master of Architecture and Master of City Planning are also offered.
The degree of **Doctor of Philosophy** is offered in Aerospace Engineering, Chemical Engineering, Chemistry, Civil Engineering, Electrical Engineering, Engineering Mechanics, Industrial Engineering, Mechanical Engineering, Nuclear Engineering, Physics, and Sanitary Engineering.

In addition to the fields of study listed above for the **Master of Science** degree, collateral study of an advanced nature is available in Industrial Psychology, Modern Languages and Sociology.

**Fellowships are being supported at the**

**Georgia Institute of Technology**

**by**

**A-C Network Calculator**

*Graduate Study and Research in Electrical Engineering*

**American Institute of Steel Construction**

*Graduate Study in Civil Engineering*

**Atlantic Steel Company**

*Graduate Study in Metallurgy*

**Automotive Safety Foundation**

*Graduate Study and Research in Highway Engineering and Civil Engineering*

**Callaway Foundation**

*Graduate Study and Research in Industrial, Mechanical, Electrical, Chemical, or Textile Engineering*

**Celanese Corporation**

*Graduate Study in Textiles and Textile Engineering*

**Dow Chemical Company**

*Graduate Study and Research in Chemical Field*

**Du Pont Program**

*A Postgraduate Teaching Assistant Award in Chemistry*

**Eastman Kodak**

*Graduate Study and Research in Chemistry*

**Ethyl Corporation**

*Graduate Study and Research in Chemical Engineering*

**General Electric Foundation**

*Graduate Study in Chemical, Nuclear Engineering, Engineering Mechanics, Mathematics or Information Science*

**Guggenheim Fellowship**

*Graduate Fellowship in Aerospace Engineering*

**Humble Oil Company**

*Graduate Study in Chemical Engineering*

**Kaiser Aluminum and Chemical Corporation**

*Graduate Study and Research in Chemical Engineering*

**Lead Industries**

*Graduate Study in Ceramic Engineering*

**Mary White Staton Program**

*Graduate Study and Research for a Graduate Student from Colombia, South America*

**Rayonier Corporation**

*Graduate Study and Research in Chemistry or Chemical Engineering*
L. W. Robert & Company
Graduate Study in Architecture and Engineering

Schlumberger Foundation
Graduate Study and Research in Mechanical Engineering

Sears Roebuck Fellowship
Graduate Fellowship in City Planning

Shell Oil Company
Graduate Study and Research in Chemical Engineering and in Civil Engineering

T. E. Stribling Foundation
Graduate Study and Research in Textile Engineering

U. S. Rubber Company Foundation
Graduate Study and Research in Physics and Engineering

United States Steel Foundation
Graduate Study and Research in the Solid State Field

For further information concerning any of the fellowships, write the Dean of the Graduate Division.

Graduate Fellowships

Fellowships may be made available through grants to the Institute from the Ford Foundation, National Aeronautics and Space Administration, National Science Foundation, National Institutes of Health, Research Corporation, the Atomic Energy Commission, and the National Defense Education Program. These are in addition to the fellowships listed on preceding page.

Instructors and Assistants

A number of part-time instructorships and teaching or research assistantships are available for qualified graduate students through the Schools, Departments, and the Engineering Experiment Station. These appointments are normally for one-third full time and carry stipends ranging from $1,500 upward for the academic year.

Admission

In general, applicants for admission to graduate study should hold a bachelor's degree from a recognized university, school, or college and should have graduated with academic standing in the upper half of their class. Those applicants who plan to become candidates for the doctorate should have had academic standing in the upper quarter of their baccalaureate class or must have demonstrated, or be prepared to demonstrate, outstanding ability in their work toward a master's degree.

Length of Study and Graduate Requirements

Thirty-three quarter hours of advanced study past the bachelor's degree plus a thesis, or fifty quarter hours of advanced study past the bachelor's degree without a thesis are necessary in fulfillment of the requirements for the master's degree. At least one full academic year in residence past the bachelor's
degree must be completed on campus before the master's degree can be awarded.

At least three full academic years of advanced study and research past the bachelor's degree are necessary for the award of the doctorate. Ordinarily between 67 and 90 quarter hours of advanced work in course will be undertaken, the balance of the required time being devoted to research and the preparation of the dissertation. At least three full quarters of the doctorate program must be spent in residence at the Georgia Institute of Technology and unless special permission is obtained, these must be the three immediately preceding the award of the degree.

Graduate Bulletin
A copy of the Graduate Bulletin, discussing requirements for advanced degrees in detail and listing advanced work in courses available in the various departments, may be obtained on request from the Dean of the Graduate Division.
Directional Staff

Director—Wyatt C. Whitley;
Chief, Chemical Sciences and Materials Division—Frederick Bellinger;
Head, High Temperature Materials Branch—Jesse D. Walton, Jr.;
Head, Industrial Products Branch—Walter H. Burrows;
Head, Micromeritics Branch—Clyde Orr, Jr.;
Head, Minerals Engineering Group—John E. Husted;
Chief, Electronics Division—Maurice W. Long;
Head, Communications Branch—Douglas W. Robertson;
Head, Radar Branch—Richard C. Johnson;
Chief, Industrial Development Division—Kenneth C. Wagner;
Head, Community Development Branch—Robert B. Cassell;
Head, Manpower Resources Branch—Jerry L. Lewis;
Head, Market Analysis Branch—John R. Peterson;
Head, Northwest Georgia Branch—Ted R. St. Clair;
Area Development Branch—Ross W. Hammond;
Economic Analysis Branch—E. Amy Collins;
Industrial Services Branch—Charles H. Sewell;
Basic Data Section—Mary Edna Anders;
Chief, Mechanical Sciences Division—Thomas W. Jackson;
Head, Electro-Mechanical Devices Branch—Winston C. Boteler;
Head, Mechanical Design Branch—Thomas A. Elliott;
Head, Thermo and Fluid Dynamics Branch—John F. Kinney;
Chief, Nuclear Sciences Division—William B. Harrison;
Head, Bioengineering Laboratory—Thomas W. Ketheley;
Head, Frank H. Neely Research Center—Carlyle J. Roberts;
Head, Radioisotopes Laboratory—James A. Knight, Jr.,
Chief, Physical Sciences Division—Edwin J. Scheibner;
Head, Space Sciences Branch—Howard D. Edwards;
Head, Special Problems Branch—Frederick Dixon;
Head, Solid State Branch—Robert A. Young;
Chief, Rich Electronic Computer Center—William F. Atchison;
Assistant Chief, Rich Electronic Computer Center—John H. MacKay;
Head, Computer Sciences and Programming Branch—Charles P. Reed;
Head, Engineering Analysis Branch—Robert Techo;
Head, Mathematical Analysis Branch—Irwin E. Perlin;
Head, Management Sciences and Business Processing Branch—Clarence C. Miley;
Head, Operations and Maintenance Branch—William A. Bezaire;
Physical Analysis Branch—Lawrence J. Gallaher;
Assistant to the Director—Howard E. Bedell;
Head, Employment, Security, and Property Services—Luther A. McLendon;
Head, Photographic and Reproduction Services—James E. Garrett;
Head, Supply Services—Everett O. Posey;
Head, Publications Services—Robert B. Wallace, Jr.;
Division Secretaries:
CS&M Division—Lois W. Gossette;
Elec. Division—Voncile H. Patrick;
ID Division—Margaret Textor;
MS Division—Joyce B. Caldwell;
NS Division—Eleanor L. Richardson;
PS Division—Lottie L. Diamond;
REC Center—Adele L. Champaign.

Purposes

The Georgia Tech Engineering Experiment Station is the agency of the University System of Georgia which is designed to enhance the general welfare of the people of Georgia by coordinating and conducting investigations in all fields of engineering and in many aspects of the physical, chemical and biological sciences. The Station is charged with: the promotion of research in the Georgia Institute of Technology, the development of a program of assistance to industry and agriculture, and the study and utilization of the natural resources in the State.
Georgia Tech believes that a progressive technological institution should carry on, conjointly, a strong educational program and a coordinated fundamental and applied research program. Teaching and research are complementary. At Georgia Tech, this philosophy is carried out by a full-time Engineering Experiment Station staff composed of competent engineers, scientists, technicians, a large number of associated faculty members, and a strong supporting Graduate Division.

During the year, 1962-63, the Station utilized the full-time services of an average of 298 persons and part-time services of an average of 344 persons in the prosecution of 357 research projects. Included in this personnel total were 23 shared faculty members, 72 Faculty Research Associates, 83 graduate students, and 88 undergraduate students.

Many research activities of great potential value to the State and the South are now underway. Some of these studies concern: the development of Georgia’s industrial economy; the industrial uses of radioisotopes; new processes and uses of Georgia’s ceramic clays and other minerals; nuclear reactor engineering; applications of nuclear physics and chemistry to the health sciences; factors affecting the aerial transmission of disease; applications and development of electronic computers; new methods of electrical power system analysis; the effects of river impoundments on water quality; and protective treatments for cotton textiles.

A number of projects also concern the basic nature of matter and energy. Among these are studies in atmospherics, solid state, and nuclear physics, microwave radar, organic chemistry, microbiology, and mathematical statistics.

The results of most of these investigations are made available to the public by publication in technical periodicals, in the bulletins, reprints, and special reports of the Station, and in Georgia Tech’s regular journal, The Research Engineer.

The Station’s budget for 1963-64 was approximately $4,000,000. In both facilities and finances, it is one of the largest state engineering experiment laboratories in the nation. The principal sources of this support are: the United States Government, by means of research contracts channelled through the Georgia Tech Research Institute; private industry (mostly in Georgia) through contracts for specific research projects; the State of Georgia, by means of appropriations through the Board of Regents; and gifts, grants-in-aid, and endowments.

Advanced and graduate students are employed on projects in the Engineering Experiment Station whenever feasible to afford them direct experience and training in research and development work.

Research Staff

Station faculty members and professional staff are listed among the General Faculty beginning on page 257.
THE ENGINEERING EXTENSION DIVISION

Director—Lawrence V. Johnson; Director Emeritus—Roger S. Howell; Administrative Assistant—Mrs. Minnie N. Mavity; Secretary to Director—Mrs. Jane H. Whitner; Registrar Emeritus—Mrs. Blanche B. Turner; Continuing Education: Director—Richard Wiegand; Associate Directors—James L. Garner and Robert S. Herndon; Principal Clerk—Frederick C. Bischoff, III; Senior Secretaries—Mrs. Martha E. Ballentine and Jo Ann Crotwell; Secretaries—Louise R. Johns, Sandra N. Popham; Industrial Education: Acting Director—Dallas B. Cox; Director Emeritus—Thomas H. Quigley; Head of Plant Training—Harris D. Carpenter; Head of the Fire Institute—Wilford N. Ratcliff; Instructor of the Fire Institute—Harold G. Thompson; Secretaries—Mrs. Elizabeth C. Severance, Mrs. Ruth S. Rogers, Mrs. Catherine I. Pierce.

The Engineering Extension Division is designed both as a campus and an off-campus educational program to serve the people and industry of Georgia where a need exists for industrial training. The scope of its work includes specialized programs in adult education, two-year college Engineering Technology courses designed to train those who wish to qualify as engineering technicians, short courses and conferences, and in cooperation with the State Department of Education, a training program in trade and industrial education within the industries and public services of the state, including supervisory and foremanship conferences.

The Engineering Extension Division consists of three units—Continuing Education, Industrial Education and Southern Technical Institute.

College Credit Subjects

Georgia Tech credit subjects previously offered by the Engineering Evening School are now being offered as a regular part of the Georgia Tech instructional program. Applications for evening credit courses should be submitted directly to the Georgia Tech Registrar.

CONTINUING EDUCATION

Adult Education Subjects

Special subjects in the field of adult education are offered each quarter. These subjects do not carry college credit but are designed as an up-grading program to serve the needs of people interested in additional training in the various technological fields.

Many subjects including air conditioning, engineering and architectural drawing, machine shop, welding, wage and hour administration, quality control, time & motion study, industrial psychology and supervision, industrial safety, cost control, vocabulary building, technical report writing, and various other courses have been offered.

Refresher and Prep Course Series

Remedial and refresher subjects are offered

1. To provide an opportunity for fulfilling entrance requirements.
2. To provide a college adjustment opportunity.
3. To serve as a proving ground for students dubious of their aptitudes for engineering.
Subjects offered include Remedial English, Review Course in Algebra, Practical Plane Geometry, Trigonometry, Elementary Physics, and Chemistry.

Short Courses

Through this department of the Engineering Extension Division special technical and industry-management short courses and conferences are planned and conducted for the benefit of industries in Georgia and the Southeast. This phase of extension service helps to train key industry personnel by providing information and instruction on new developments and best methods.

Short course work emphasizes close cooperation with industry, trade associations, technical, and scientific and business organizations in planning and presenting these special educational programs.

Through the cooperation of the various schools and departments of the Georgia Institute of Technology, the Engineering Extension Division has access to the various school facilities for the classroom and laboratory work of these short courses. Skilled and experienced teaching personnel along with specialists from industry are secured to provide the best in instruction.

Inquiries concerning these services are welcomed.

INDUSTRIAL EDUCATION

In conformity with the provisions of the various vocational education acts, this department, in cooperation with the State Department of Education, has a responsibility for training industrial, fire service, and related technical teachers for the following:

1. Evening and part-time classes in public schools and industrial and fire service organizations.
2. All day public trade schools.
3. Supervision courses.

The activities of the department include research to determine specific industrial and fire service education needs of a community, industry or plant; developing courses of study to meet these needs; selecting teachers of the required occupational experience; training these teachers for specialized service; developing specialized instructional materials for use of such teachers; training local teacher trainers in the larger centers; and improving teachers in service after placement.

Because of the specialized local character of this extension work all activities are conducted under special arrangements between the Georgia Institute of Technology, the Georgia State Department of Education, local boards of education, and industrial and fire service organizations. The following courses and other activities are conducted at many localities in the state: principles and organization of industrial education, conference leading, methods of teaching, industrial education psychology, course planning, practice teaching, industrial plant surveys, teaching related subjects, and occupational analysis.
The Georgia Fire Institute

The Georgia Fire Institute was established in the Industrial Education Depart-
ment in 1958 by the Board of Regents through a special appropriation by the
State. It is a coordination of both the Georgia Institute of Technology and
the State Department of Education, cooperating with local boards of education
and fire departments, for amplifying the program of fire service training
that has been in development for many years by these agencies. Its aim is the
optimum training of Georgia firemen, paid and volunteer, public and private,
to reduce and hold to the minimum Georgia's loss of life and property by fire.

Throughout the State the Fire Institute conducts short and long-time classes
in local fire departments, short intensive zone fire schools in the special fire
service problems of various sections of the State, and short intensive statewide
fire schools. In the latter it is successor to the former Georgia State Fire
College. The training includes the techniques and technologies of fire preven-
tion, inspection, extinguishment, rescue, and investigation, and fire department
officership and administration.

The faculty consists of a Head, twenty-one part-time coordinator-instruc-
tors each of whom is regularly employed as an officer of a leading fire depart-
ment in each area of the State, and many part-time local instructors similarly
employed.
SOUTHERN TECHNICAL INSTITUTE

Marietta, Georgia


General Objectives

The Southern Technical Institute is that unit of the Engineering Extension Division of the Georgia Institute of Technology designed for the student who desires to become an Engineering Technician.

Eleven two year engineering technology programs leading to the Associate in Engineering degree are offered: Air Conditioning Engineering Technology, Architectural Engineering Technology, Civil Engineering Technology (Surveying and Construction Option), Civil Engineering Technology (Structural Materials and Design Option), Electrical Engineering Technology (Electronics Option), Electrical Engineering Technology (Telephone Option), Gas Engineering Technology, Industrial Engineering Technology, Industrial Engineering Technology (Management Option), Mechanical Engineering Technology, and Textile Engineering Technology.

These curricula are designed to provide the basic scientific training, the specialized technical "know-how," and the supervisory and management training needed by the engineering technician. The courses are briefer, more intensive, and more specific in purpose than those of the professional engineering curricula, although they lie in the same fields of industry and engineering. Their aim is to prepare the individual for specific technical positions or lines of activity rather than for broad sectors of engineering practice.

*On leave.
Engineering Technician and Engineering Technology

An Engineering Technician is one whose education and experience qualify him to work in those areas of engineering which require the application of established scientific and engineering knowledge and methods, combined with technical skills, in the support of engineering or scientific activities toward the accomplishment of engineering objectives.

The Engineering Technician is the newest member of the Engineering Team. This team is composed of the scientist, the engineer, the engineering technician and the craftsman. His addition to the team resulted from what may be called the impatience of the 20th century. Prior to World War II the lapse-time between a scientific discovery and its application was of the order of 6 to 10 years. Today our technology is moving so fast that this time is now of the order of 3 to 6 months or less.

This increasing pressure to move more quickly from experiment to product requires engineers to witness, interpret and make use of scientific discoveries almost as they occur. This change in engineer's work requires engineering education to be more and more in the area of advanced mathematics and the physical sciences, and less and less in applied or operational engineering fields. Today an engineer's work is generally concerned with development and design rather than with applied or operational engineering work.

Because the engineering arts and skills are essential to industry, The American Society of Engineering Education has sponsored the Engineering Technology Program with curricula designed to fill the educational gap caused by the change in the engineer's work and to train men qualified to take over much of the operational engineering work formerly done by large segments of the engineering profession, thus freeing engineers for engineering work requiring a much more scientific and mathematical background.

The engineering technician is concerned with the production and operational aspects of engineering and industry, and he performs specific tasks which usually embrace a specialized field of research, design, development, or construction; or of control and operation of production facilities and manpower.

Graduates from engineering technology courses are in great demand. Engineering Technicians with several years experience have advanced to top positions in Engineering, Management and Architectural areas.

Engineering Technology training is available at Georgia Tech on either a full-time or part-time schedule.

A full-time day program is available at the new Southern Technical Institute campus at Marietta, Georgia. Two academic years or six quarters are required to complete the various courses at Southern Technical Institute. For complete information regarding this school write for special catalog.

Southern Tech also makes five of its eleven curricula available on a part-time schedule in evening classes on both the Georgia Tech and the Southern Tech campuses. These are: Architectural Engineering Technology, Civil Engineering Technology, Electrical Engineering Technology (Electronics Option),
<table>
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<tr>
<th>Ducoffe, A. L.</th>
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<td>Grubb, H. V.</td>
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<td>Dasher, B. J.</td>
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<td>Raville, M. E.</td>
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<td>Weber, Paul</td>
</tr>
<tr>
<td>Taylor, J. L.</td>
<td>Whitley, W. C.</td>
</tr>
<tr>
<td>Ajax, F. W.</td>
<td>Wiegand, R.</td>
</tr>
<tr>
<td>Anthony, J. R.</td>
<td>Wohlford, J. G.</td>
</tr>
</tbody>
</table>

___ For your information ___
___ See me ___
___ Please handle ___
___ Your comments ___
___ For your wastebasket ___
___ For your files ___
___ Please note and return ___

J. W. Mason
9 IT
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606
4260
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A E
L E
L E
L E
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2 M
1 E
M I
N E
T F
1a ye
1b ye
Industrial Engineering Technology and Mechanical Engineering Technology. Those who work in Atlanta's metropolitan area may thus avail themselves of the opportunity of obtaining this type of training through evening study.

The job opportunities for engineering technicians are numerous. Studies made by the American Society of Engineering Education reveal that two engineering technicians are needed for every engineer. The Associated Industries of Georgia estimates that there are, in Georgia alone, 5000 well-paying positions for trained engineering technicians, at salaries ranging upward from $5000 per year.

The work offered qualifies the engineering technician graduate for a rapidly expanding number of technical jobs in engineering. His work is closely related to that of the graduate engineer and, in fact, the two usually work as a team.

A special bulletin containing complete information will be sent upon request. Direct such requests to the Registrar, Southern Tech, Marietta, Georgia.

**Entrance Requirements**

Applicants must be high school graduates or equivalent and must have two credits in algebra, one credit in geometry, two credits in science, and four credits in English. Applicants must have also taken the College Entrance Examination Board Scholastic Aptitude Tests (Verbal and Mathematical), and the College Entrance Examination Board Achievement tests in English and Intermediate Algebra.

**Veteran's Program**

Veterans are eligible to enter the Institute under the G. I. Bill of Rights, as established under Public Laws 550, 894, 634, and 815.

**Tuition and Fees**

The rates for fees, board and room are subject to change at the end of any quarter.

### DAY CLASSES

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<tr>
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<th>Matriculation Fee per Quarter</th>
<th>Tuition Fee per Quarter</th>
<th>Medical Activity Fee per Quarter</th>
<th>Student Activity Fee per Quarter</th>
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### EVENING CLASSES

$15.00 Application Fee—non-refundable.

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<td>12 or more hours</td>
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<td>Less than 12 hours</td>
<td>7.00 recitation hour</td>
<td>14.00 recitation hour</td>
</tr>
<tr>
<td></td>
<td>5.00 lab hour</td>
<td>10.00 lab hour</td>
</tr>
</tbody>
</table>

ABOVE RATES SUBJECT TO CHANGE WITHOUT NOTICE.
STUDENT HEALTH SERVICE

Director of Health—John B. Riggsbee, M.D.; Director Emeritus—Leslie Morris, M.D.; School Physician—John Michaels, M.D.; Assistant School Physician—Max Blumberg, M.D.; Medical Consultant and Physician to Athletic Association—Lamont Henry, M.D.; Psychiatrist—George P. Dillard, M.D.; Residents—Matthew Burns, M.D., James Hoffman, M.D., James Logan, M.D.; Interne—Gordon Gibson, M.A.; Head Nurse—Miss Jane Inez Flake, R.N.; Nurses—Mrs. Winifred Cooper, R.N., Mrs. Leslie Beavers, R.N., Mrs. Glendal P. LaRowe, R.N., Mrs. Marie Stiner, R.N., Miss Mary Patricia Hunter, R.N., Mrs. Martha Trnavsky, R.N.; Night Supervisor—Mrs. Sonja West; Laboratory Technician—Joyce K. Gurbingol; X-ray Technician—Mr. William Joe Simonton; Secretaries—Miss Peggy Boleman, Miss Joy Ivens; INFIRMARY CONSULTING STAFF: Dentists—Dr. Irwin T. Hyatt, Dr. Aaron L. King, Jr.; Allergy—Dr. Carl Jones; Dermatology—Dr. Chenault Hailey, Dr. Fred Hardin; Hematology—Dr. Spencer Brewer, Jr.; Internal Medicine—Dr. T. J. Anderson, Jr.; Neurology—Dr. William A. Smith, Dr. Richard Wilson; Neuro-Surgery—Dr. Exum Walker, Dr. Charles Downman; Ophthalmology—Dr. William Campbell, Dr. W. O. Martin, Dr. Jack Stokes; Orthopedic Surgery—Dr. F. J. Funk, Dr. Thomas P. Goodwyn, Dr. H. Walker Jernigan, Dr. R. E. Wells; Otarynology—Dr. Murdock Equeen, Dr. David Smiley; Proctology—Dr. Edgar Boling; Surgery—Dr. Robert Y. Lambert, Dr. Jack Thompson; Thoracic Surgery—Dr. Bedford Davis, Jr.; Urology—Dr. William Bennett, Dr. Reece Coleman, Dr. Major F. Fowler.

The Health Service is located in the Joseph Brown Whitehead Memorial Hospital located on Fifth Street adjoining Rose Bowl Field. The hospital contains the offices of the medical staff, examination and treatment rooms, clinical laboratory, X-ray and physiotherapy departments, plus wards and rooms for seventy patients. Food for patients is normally obtained from the college dining hall but special diets are prepared in the hospital.

The Infirmary staff consists of three full-time physicians, two regularly visiting consultants in Internal Medicine and Psychiatry, four young doctors from Emory University, nine registered nurses, one laboratory technician, one physical therapist and one X-ray technician, two secretaries, three orderlies and three maids. We also have thirty physicians, representing the various medical specialties, on our consulting staff who are available when their services are needed.

Infirmary policy is determined by a faculty committee composed of the Dean of Students, the Assistant Athletic Director, the Dean of Faculties, the Athletic Association physician, and the Director of Health.

The facilities of the Health Service are available to all day school students and all night school students who take twelve or more credit hours of classes. The Health Service is financed by student fees and only those who have paid a health fee for the current quarter are eligible for treatment. Co-op students on their work quarter and night school students with less than 12 credit hours are not charged a health fee and are not entitled to any treatment at the Infirmary. Faculty members and Institute employees are entitled only to emergency first aid treatment.

For those eligible, the Health Service provides unlimited free office treat-
ment. This includes necessary medical care and such minor surgery as deemed necessary and provided by the school physicians. If the illness or injury is of such complexity or severity that a consultation with a specialist is deemed necessary, this will be arranged by the Health Service at school expense. Up to 14 days hospitalization in the school Infirmary each quarter with necessary nursing care, drugs, laboratory and X-ray service is provided free of charge except for a charge of one dollar for each meal served. If the illness or injury requires treatment in a private hospital, arrangements will be made by the Director of Health for such care and the Health Service will help pay such expenses.

All students who are sick or injured are expected to report to the Infirmary for treatment. If the student does not desire treatment by one of the school employed physicians, he may arrange for another physician to care for him at the Infirmary. The Health Service will not be responsible for any charges made by private physicians or private hospitals unless the student was referred by one of the school employed physicians and the charges authorized in writing prior to such visit. In the case of serious injury from an auto accident, telephone approval may be obtained from the physician on duty at the Infirmary.

Medical care is available at the Infirmary 24 hours a day when school is in session but not at all on authorized vacation periods or between quarters. Physicians are on duty for regular clinic visits from 7:30 a.m. to 11:30 a.m. and from 1:00 p.m. to 8:00 p.m. Monday through Friday and from 7:30 a.m. to 1:00 p.m. on Saturdays. The period from 11:30 a.m. to 1:00 p.m. is reserved for the treatment of athletic association students, for consultations by the visiting specialist with pre-selected patients and for staff lunches.

Emergency visits are possible at any hour of the day or night. An emergency is an illness or injury that is likely to become worse if treatment is delayed until the next regularly scheduled clinic period—it has nothing to do with class schedule or convenience of the patient. Students are expected to make their clinic visits during their free periods or before classes begin in the morning. Classes will be excused for the actual time of visit to the physician only if the visit is an emergency.

School regulations prohibit any student staying in his room in a dormitory or fraternity house with a contagious disease. If the school physicians feel that the illness of the student is contagious or is severe enough to justify absence from classes, the student will be put to bed in the Infirmary until such time as he is able to return to classes with safety. School regulations require a class excuse for any absence caused by illness. To be eligible for such an excuse, the student must be confined to the Infirmary or another hospital. The only exception made is in the case of local students who reside in the home with their parents, who may bring in a note from a parent concerning the illness and be given an excuse for one day's classes. If the absence is for more than one day, the student must have a physician's certificate stating the cause for the absence and the period he advised the student to remain at home. The Health Service does not provide any care for students in the home nor do the physicians make house calls.

Only physical training classes will be excused for patients not actually confined to bed and these excuses must be obtained from the Infirmary prior to the hour of the scheduled class. Class excuses for patients confined to bed
will be issued only for the actual period of confinement to bed. If a student is unable to drill, the physician will give the student a chit authorizing other duties to be assigned by the military for the hour.

The Health Service does not have or provide any insurance. Free service is limited to care in the Infirmary, and for injuries received in class. Free service does not apply to elective surgery, specialist treatment, orthopedic appliances, special nurses, or hospitalization. The Health Service will assume no financial responsibility for the treatment of chronic diseases or injury present prior to enrollment, nor will it be responsible for elective surgery such as wart removal, hernia repair, tonsillectomy, pilonidal cyst removal, etc. The Health Service provides no dental care except for the repair of teeth injured in P.T. class, provided such injury is reported within one hour of the injury. It does not pay for eye refraction or for glasses. Only if glasses are broken in P.T. class while wearing protective goggles, will the glasses be replaced by the Health Service. All students who must wear glasses should keep an extra pair on hand and a copy of their prescription for glasses.

If a student has appendicitis or some other condition for which emergency surgery is deemed necessary, the Health Service will pay up to $200 towards the surgeon's fee and $10 per day plus $100 toward the hospital bill, up to a maximum of 14 days in any one quarter. The parents are responsible for the remainder of the bill. The Health Service will assume this financial responsibility only if such service is deemed necessary and authorized in advance by the Health Service. The Health Service will assume no responsibility for any injury received either in flying or parachuting or skin diving.

All students are required to have immunization against tetanus (toxoid), small pox, and polio prior to enrollment. Boosters for tetanus, small pox and polio will be given as needed. Tech does not require typhoid vaccine but advises it for those who intend to do water skiing, skin diving, or other fresh water sports.

Entrance physical examination forms are mailed to students with the notice of their acceptance for enrollment. These forms are to be completed by the prospective student and his personal physician and mailed to the Director of Health in sufficient time to be received prior to the date of initial registration. After review of the medical history and physical examination report, the school physicians determine the assignments to R.O.T.C. and Physical Training. Any student who desires special consideration because of mental or physical disability should have his physician write an explanatory letter to the Director of Health giving full details of the disability and any desired limitations on physical activity. This letter is to be attached to the physical examination form. Any special examinations or reports needed to determine eligibility for enrollment or assignment are at the expense of the student, not the school. Any student who fails to submit the required physical examination and immunization record prior to registration will have the examination ordered by the school at the expense of the student.

The Director of Health as representative of the Institute reserves the right to exclude students with certain infirmities or disabilities which he feels may be detrimental either to the individual or to other students. He also reserves the right to require certain treatment of students in order to qualify for enrollment or to remain in school.
Library

On November 21, 1953, the new Price Gilbert Memorial Library was dedicated. It is an impressive structure of contemporary design. The cost, including equipment and furniture, was approximately $2,000,000. The building, completely air-conditioned, has five floors on the South wall and three on the North wall.

The interior of the building follows the contemporary design of the exterior. Twenty colors have been used throughout the building, giving a feeling of warmth. Comfortable lounge furniture has been interspersed between the large natural birch reading tables. All stacks, except those on the ground floor, are open.

The building has a capacity of about 450,000 volumes and will seat 800. The General Studies Library is on the first and second floors and the Science-Technology Library on the third and fourth floors. The Music Room on the ground floor contains more than 6,500 recordings, a collection which continues to grow because of the generous gifts of alumni. The Music Room offers much enjoyment to both students and faculty. When the folding partition between them is opened, the Music Room and Wilby Room together can serve as an auditorium seating almost 300.

The Library collection today numbers more than 300,000 volumes and approximately 150,000 unbound documents and pamphlets. The greater part of these, which are scientific and technical, are used for study and research. The Library subscribes to the journals of the leading engineering and scientific societies and to the outstanding scientific and technical periodicals in this
country and abroad. There is an author and title and a subject catalog for all books and periodicals.

In August 1962 the Tech Library was designated as one of twelve Regional Technical Report Centers, where unclassified U.S. Government Scientific Technical Reports are deposited to serve users in Alabama, Florida, Georgia, Mississippi, South Carolina, Tennessee, and Puerto Rico. To expedite service the Center has a TWX system, three Xerox 914 copying machines, and a Thermo-Fax Reader Printer for microfilm.

The Library is primarily for the use of students and members of the faculty. All books, not reference or held on reserve, may be withdrawn for home use in accordance with the rules of the Library. The General Library is open from 8:00 a.m. to 11:30 p.m. Monday through Friday. On Saturday the building closes at 6:00 p.m. It is open on Sundays from 2:00 p.m. to 10:00 p.m. Printed Library regulations are given the freshmen at the time of matriculation.
WATER RESOURCES CENTER

Director—Carl E. Kindsvater, Regents' Professor, Civil Engineering.

The object of the Water Resources Center at Georgia Tech is to facilitate and stimulate the development of a broad-based, interdisciplinary program in water resources education and research. The Center, working with the several Schools and Departments concerned, brings to bear on the water resources problem all of Tech's competence in such related fields as hydrology, hydraulics, water-control structures, soil mechanics, sanitary engineering, systems analysis and computer technology, water chemistry and biology, geology, social science, resource economics, city planning, industrial engineering and industrial management, as well as physics, chemistry and mathematics. Related to these objectives, one of the first important activities of the Center has been to expand and strengthen the program in water resources engineering which is centered on hydraulic engineering and water-quality aspects of sanitary engineering within the School of Civil Engineering.

Policies and activities of the Water Resources Center are governed by an Administrative Committee consisting of the Dean of Engineering (Chairman); the Administrator of Research; the Dean of the General College; the Dean of the Graduate Division; the Director of the School of Civil Engineering, and the Director of the Water Resources Center (Secretary).

An Advisory Committee is comprised of faculty representatives from Schools or Departments having a major interest in the social, scientific, and engineering aspects of water resource conservation and development.

Typical of the activities of the Center are the following:

1. Coordinate course offerings on a campus-wide basis.
2. Coordinate search for interdisciplinary staff.
3. Coordinate proposals for interdisciplinary research.
4. Coordinate a water resources publication series.
5. Coordinate contacts with outside individuals and agencies as regards interdisciplinary activities.
6. Collect, review, and circulate information regarding legislative activities, research, technical reports, etc.
7. Coordinate conferences, seminars, short schools, etc.
8. Allocate unrestricted funds appropriated or donated to the Institute for water resources activities.
9. Coordinate reviews and expressions of opinion or position regarding matters of public or professional interest.
10. In general, to serve as the focal point of Georgia Tech's public image as a regional center for water resources education and research.
OFFICE OF DEAN OF STUDENTS

Dean—*George C. Griffin; Acting Dean of Students—James E. Dull; Director of Counseling and Guidance—James A. Strickland; Assistant Deans—W. Eugene Nichols, Edwin P. Kohler; Foreign Student Advisor—Lucien N. Hope, Jr., Assistant Directors, Counseling and Guidance—Mark E. Meadows, Basil Hoover; Senior Clerk—Mrs. Mary Lou Smith; Psychometrist—Miss Martha James; Assistant Psychometrist—Miss Glancy Jones; Secretaries—Miss Mary Alice Lesure, Mrs. Sheron Ann Griser, Mrs. Anne Clough, Miss Alesha Tedder.

The Dean of Students and his associates are interested in the student as an individual. For that reason they attempt to be of service to him in more than just the academic phase of his career at Georgia Tech. Supervision of all campus activities outside of the curriculum is centered in the office. Counseling assistance on personal, vocational, financial, and other problems is provided.

A program of counseling and guidance is provided by the Office of the Dean of Students. The Guidance and Counseling Service is staffed by professionally trained counselors. The main concern of this office is to provide counseling for those Georgia Tech students and alumni who are concerned with questions about their academic adjustment, vocational choice, and personal adjustment. Frequently, in conjunction with counseling, various psychological tests are recommended by the counselor to assist the student in the assessment of his abilities, interests, personality, and achievements. In the main, the Guidance and Counseling Service counsels with normal students who have normal problems and prefers to counsel with those students who choose to come voluntarily for those services offered by this office.

The Counselor's Guide to Georgia Colleges, published by the Office of Testing and Guidance, the Regents, University System of Georgia, contains the most accurate possible estimates of an individual's success during his first year in 28 Georgia colleges.

An employment service is maintained by this office for students who need assistance in paying their college expenses. In providing opportunities for part-time work, however, the staff holds firmly to the belief that a student's first concern is his academic work. It has been found that one who must work in order to meet his college expenses should ask for a lighter schedule and allow more than twelve quarters to secure his degree, the average student being unable to carry a full schedule and work more than two hours per day without failure in one or more subjects.

The office of the Dean of Students is always open to any student who is seeking counsel and advice to enable him to derive the most from his life at Tech. The Dean of Students and his staff are eager to cooperate with his parents in an effort to solve any problems affecting the welfare of Georgia Tech students.

STUDENT ACTIVITIES

Student Council—1963-1964

The Student Council, which was first established in 1922, is the student government organization of Georgia Tech. Through its elected representatives, it exercises supervisory authority over all extracurricular student activities except YMCA and Athletics.

The Student Council officially represents and acts as principal liaison agent between the general student body and the faculty. It controls the use of student activity fees and handles all financial matters involving the general student body.

Also, the Student Council has charge of the chartering of all student organizations. Through a series of standing committees and some temporary committees, the work of the Council is carried on in every field of student activity.

The Student Council is composed of representatives from each class at Georgia Tech. There are four Freshman representatives, six Sophomore representatives, eight Junior representatives, and sixteen Senior representatives (representing and elected by the Seniors in the individual Departments). Supplementing this group are the Senior Class officers. The Associate Dean of Students is Faculty Advisor for the Student Council.

Officers:

John Edward Hayes, President
William W. George, Vice President
Fred M. Hirons, Judiciary Cabinet Chairman
Robert C. Scruggs, Secretary
John W. Kelly, Treasurer
Dean James E. Dull, Faculty Advisor

Senior Class Officers:

Henry G. Thrasher, President
Joel F. Parker, Vice President
J. Charles Lockwood, Secretary-Treasurer

Senior Departmental Representatives:

Barbara F. Gruber, Arch.
Harry S. Edwards, C.E.
B. Douglas Ethridge, Ch.E.
Bayard B. Von Herrmann, I.E.
Albert L. Dean, I.E.
Joseph S. Perusse, I.E.
Evans J. Plowden, I.M.
James C. Chappell, I.M.

Robert R. Rhinehart, E.E.
John W. Fite, E.E.
W. Stuart Smith, M.E.
Randolph M. York, M.E.
Henry C. Taylor, Phys.
Franny Brantley, T.E.
Michael E. Cheaves, Comb.
Richard Lee Mitchell, Co-op.

Junior Class Representatives:

Johnny Greshman, Chairman
Ronald D. Stallings
Robert C. Scruggs
Paul Layton Strong

Gilbert Frank Amelio
John William Kelly
John Phillip Gingrey
Kenneth Eugene Perry
Theodore Titus, Co-op.
Sophomore Class Representatives:
Howard T. Tellepsen, Chairman
Edwin Cook Rodgers
Logan Thomas Gay
Jack Sidney Painter
Tony Lee Yaksh
Patrick F. McMahon
Doug Bodenhamer, Co-op.

Freshman Class Representatives:
John Henry Outland, Chairman
Charles C. Bolte
Swep Taylor Davis
Paul Candler Ellis

Members at Large:
Ronald Earl Corbitt
Fred M. Hirons

Honorary Members:
Harriette Jo Ann Freeman, Coed Representative
Guinn D. Leverett, Jr., Technique Representative
Tibet Giray, International Students Representative

Publications Board
This Board was organized in July 1945, at the request of the Student Council. The purpose of this Board is to be responsible for the student publications on the Georgia Tech campus. Officers of the Board for 1963-64 were:

Chairman and Treasurer: DEAN W. EUGENE NICHOLS; Secretary: BOB RHINEHART

The Technique
GUINN O. LEVERETT .............................................................. Editor
STEVE C. PERRY ............................................................... Business Manager
DR. KARL M. MURPHY ......................................................... Faculty Advisor

The Blue Print
LARRY TUCKER ................................................................. Editor
ALBERT E. PRICE .............................................................. Business Manager
MR. FRANK BECKUM .......................................................... Faculty Advisor

The Georgia Tech Engineer
EARL J. ROBERTS .............................................................. Editor
F. THOMAS TUTTLE ............................................................. Business Manager
WILLIAM W. HINES ............................................................ Faculty Advisor

The Rambler
JACK ROBINSON .............................................................. Editor
ROYLE R. DUFF ................................................................. Business Manager
ROBERT B. WALLACE, JR. .................................................... Faculty Advisor
The Young Men's Christian Association is a lay Christian movement. It seeks to find forms of lay religious expression that will reflect understanding of the teachings and practices of all the churches to which YMCA members belong.

We welcome as members persons of all religious affiliations who wish to join and cooperate in support of the Christian ideals and values for which we stand. Each member is encouraged to be faithful to the teachings and practices of his own church.

In giving effect to our Christian ideals and values, the Georgia Tech YMCA offers, to those who participate in its activities, opportunities for experiences that will help them

... to develop self-confidence and self-respect and an appreciation of their own worth as individuals

... to develop a faith for daily living

... to grow as responsible members of their families and citizens of their communities

... to appreciate that health of mind and body is a sacred gift and that physical fitness and mental well-being are conditions to be achieved and maintained

... to recognize the worth of all persons, and to help others attain their greatest self-fulfillment

... to develop a sense of world-mindedness, and to work for world-wide understanding

... to develop capacities for leadership and use them responsibly in their own groups and in community life.

The Georgia Tech YMCA sponsors purposeful activities, some of which are: Alpha Phalanx Club, Barbell Club, Cabinet, Camp Committee, Chess Club, Executive Roundtable, Gamma Psi, Gene Turner Fund, Photography Club, Recreation Council, Religious Programs Committee, Sigma Phalanx Club, "T" Book Committee, Toastmasters Club, Triangle Club and World Student Fund.

The "T" Book—a handbook of information for new students—contains much of interest and value about the YMCA and other student organizations. A copy is available upon request.
FRATERNITIES

Interfraternity Council—Composed of two representatives from each national fraternity at Georgia Tech, and Assistant Dean of Students as faculty advisor, the Interfraternity Council is the governing body for all social fraternities on the campus. The Council sets such regulations as rush-week rules, house rules, and pledge and membership regulations.

Officers 1963-1964

I. F. C.

THOMAS F. TUTTLE .................................................. President
HUGH A. CARTER .................................................... Vice-President
LANE C. CROCKER .................................................. Secretary
DOUGLAS W. JOHNSON .............................................. Treasurer
DEAN EDWIN P. KOHLER, II ...................................... Faculty Advisor

Fraternity

Alpha Epsilon Pi.................................................... Robert Scharf
Alpha Tau Omega .................................................. Roane Beard
Beta Theta Pi ....................................................... Harry Baker
Chi Phi ................................................................. Peter Sherry
Chi Psi ................................................................. M. Carr Payne
Delta Sigma Phi ..................................................... Walter H. Tripod
Delta Tau Delta ..................................................... James J. Bynum
Delta Upsilon ......................................................... B. A. Gilbreath
Kappa Alpha .......................................................... Beverly M. Leigh
Kappa Sigma .......................................................... Lane Mitchell
Lambda Chi Alpha ................................................... Charles B. Pyles
Phi Delta Theta ..................................................... Mrs. J. H. Crosland
Phi Epsilon Pi ......................................................... William M. Eastman
Phi Gamma Delta .................................................... Harrison M. Wadsworth
Phi Kappa Sigma .................................................... Douglas H. Hutchinson
Phi Kappa Tau ........................................................ Frank M. White
Phi Sigma Kappa .................................................... A. B. Caseman
Pi Kappa Alpha ..................................................... Neil DeRosa
Pi Kappa Phi .......................................................... James D. Landrum
Sigma Alpha Epsilon ............................................... W. C. Bliss
Sigma Chi .............................................................. H. G. Carmichael
Sigma Nu ............................................................... John M. Wallace
Sigma Phi Epsilon ................................................... John D. Neff
Theta Chi .............................................................. Irving F. Foote
Theta Xi .................................................................

Sorority

Alpha Xi Delta ........................................................ R. E. Stiemke
### Professional and Technical Societies

#### Departmental Societies

<table>
<thead>
<tr>
<th>Society</th>
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<tbody>
<tr>
<td>American Association of Textile Colorists and Chemists</td>
<td>R. K. Flege</td>
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<tr>
<td>American Ceramic Society</td>
<td>Lane Mitchell</td>
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<td>American Chemical Society</td>
<td>D. K. Carpenter</td>
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<tr>
<td>American Institute of Architects</td>
<td>Vernon Shipley</td>
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<td>American Institute of Chemical Engineers</td>
<td>H. C. Lewis</td>
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<td>American Institute of Industrial Engineers</td>
<td>H. M. Wadsworth</td>
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<tr>
<td>American Society of Civil Engineers</td>
<td>Paul Mayer</td>
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<tr>
<td>American Society of Mechanical Engineers</td>
<td>Dr. E. Harrison</td>
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<tr>
<td>Association of Industrial Design Students</td>
<td>W. J. Seay</td>
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<tr>
<td>Georgia Tech Planner's Society</td>
<td>M. G. Little</td>
</tr>
<tr>
<td>Institute of Aerospace Sciences</td>
<td>J. E. Hubbardt</td>
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<tr>
<td>Psi Society (Psychology)</td>
<td>R. P. Moll</td>
</tr>
<tr>
<td>Society for Advancement of Management</td>
<td>J. L. Caldwell</td>
</tr>
<tr>
<td>Society of American Military Engineers</td>
<td>Lt. Col. Brookes</td>
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<tr>
<td>Society of Exploration Geophysicists</td>
<td>H. W. Straley</td>
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#### Departmental Honorary Societies:

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<tr>
<th>Society</th>
<th>Faculty Advisor</th>
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<tbody>
<tr>
<td>Alpha Pi Mu (I.E.)</td>
<td>Wm. N. Cox, Jr.</td>
</tr>
<tr>
<td>Armed Forces Chemical Association</td>
<td>Capt. J. F. Hatcher</td>
</tr>
<tr>
<td>Arnold Air Society</td>
<td>Maj. J. L. McCarter</td>
</tr>
<tr>
<td>Chi Epsilon (C.E.)</td>
<td>J. R. Fincher</td>
</tr>
<tr>
<td>Delta Kappa Phi (Textile)</td>
<td>G. B. Fletcher</td>
</tr>
<tr>
<td>Eta Kappa Nu (E.E.)</td>
<td>F. O. Nottingham</td>
</tr>
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<td>Industrial Management Society</td>
<td>G. E. Maddox</td>
</tr>
<tr>
<td>Kappa Kappa Psi</td>
<td>B. L. Sisk</td>
</tr>
<tr>
<td>Keramos (Ceramics)</td>
<td>Lane Mitchell</td>
</tr>
<tr>
<td>Phi Psi (Textile)</td>
<td>R. C. Latham</td>
</tr>
<tr>
<td>Pi Delta Epsilon (Publications)</td>
<td>R. B. Wallace, Jr.</td>
</tr>
<tr>
<td>Pi Mu Epsilon</td>
<td>J. M. Osborn</td>
</tr>
<tr>
<td>Pi Tau Sigma (M.E.)</td>
<td>J. H. Murphy</td>
</tr>
<tr>
<td>Scabbard and Blade</td>
<td>Capt. A. S. Dilts</td>
</tr>
<tr>
<td>Sigma Gamma Tau (A.E.)</td>
<td>D. W. Dutton</td>
</tr>
<tr>
<td>Sigma Pi Sigma (Physics)</td>
<td>James R. Stevenson</td>
</tr>
<tr>
<td>Tau Sigma Delta (Arch.)</td>
<td>J. H. Grady</td>
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#### Honorary

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<th>Society</th>
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<tr>
<td>ANAK</td>
<td>G. C. Griffin</td>
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<tr>
<td>Briaerean Society</td>
<td>I. E. Perlin</td>
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<tr>
<td>Koseme</td>
<td>P. B. Sherry</td>
</tr>
<tr>
<td>ODK</td>
<td>W. A. Flinn</td>
</tr>
<tr>
<td>Phi Eta Sigma</td>
<td>A. H. Bailey</td>
</tr>
<tr>
<td>Phi Kappa Phi</td>
<td>Paul Weber</td>
</tr>
<tr>
<td>Tau Beta Pi</td>
<td>D. W. Dutton</td>
</tr>
</tbody>
</table>
Religious

Baptist Student Union .............................................. E. Warren Woolf
Canterbury Association ............................................ Rev. H. Bartlett
Christian Science ................................................... W. J. Clemence
Georgia Tech Christian Fellowship .............................. Dewey Carpenter
King's Men ............................................................ R. E. Green
Lutheran Student Association ................................. Pastor Philip Schulz
Newnan Club ......................................................... Father T. T. McNulty
Pi Tau Chi (Religious Honorary) ............................... Rev. Harwood Bartlett
Wesley Foundation ................................................. Rev. Lon Chesnutt and Rev. Wm. Landis
Westminster Fellowship ........................................... Al Jepson

Miscellaneous

Alpha Kappa Psi .................................................... M. V. Law, P. Adler
Alpha Phi Omega .................................................... W. N. Cox, Jr.
American Marketing Association—Collegiate Chapter ........ W. A. Flinn
American Materials Handling Society ........................ J. M. Apple
American Rocket Society .......................................... F. M. White, Jr.
Band ................................................................. B. L. Sisk
Bulldog Club ......................................................... Tommy Plaxico
Cheerleaders ......................................................... J. E. Dull
Chinese Club ........................................................ K. L. Su
Circle K. Club ....................................................... H. W. Sturgis
Collegiate Civitan Club ........................................... G. C. Griffin
Colombian Student Organization ................................ R. F. O' Connor
Co-op Club .......................................................... J. G. Wohlford
Debating Club ....................................................... J. D. Young
Drama Tech .......................................................... B. M. Drucker
Flying Club ........................................................... R. B. Logan
Foil and Mask ....................................................... G. C. Griffin
Georgia Tech Political Forum .................................. C. B. Pyles
Georgia Tech Sailing Club ....................................... Robert Nelson
Georgia Tech Soccer Club ......................................... P. G. Mayer
Georgia Tech Wrestling Club .................................... W. E. Nichols
Glee Club .............................................................. W. C. Herbert
Graduate Student Senate .......................................... M. J. Goglia
International Students Organization ......................... L. W. Hope
Judo Club ............................................................. M. N. Dunham
Pan-American Club ................................................ L. J. Zahn
Pershing Rifles ....................................................... Capt. Walker
Philosophy Club ..................................................... Robert Scharf
Pi Sigma Epsilon ...................................................... W. A. Flinn
Radio Club ............................................................ R. A. Martin
Rambling Reck Club ............................................... J. E. Dull
St. Patrick's Council ............................................... B. J. Dasher
Semper Fidelis ....................................................... Maj. F. W. Harris
Society of Automotive Engineers .............................. Mrs. B. R. VanLeer
Society of Women Engineers ...................................... G. C. Griffin
Sons of Tech Club .................................................. G. C. Griffin
T. Club ......................................................... J. A. Carlen
Veterans Club ................................................. F. W. Ajax
Women's Student Association ................................ J. E. Dull
Young Americans for Freedom ................................ Lane Mitchell

YMCA Groups

Alpha-Y-Phalanx ................................................. R. E. Winn
Barbell Club .................................................... W. E. Nichols
Chess Club ...................................................... Mrs. J. H. Crosland
Executive Roundtable ......................................... Edward Foster
Gamma Psi ........................................................ Mrs. Clyde Lyon
Gavel Club ....................................................... R. E. Winn
Photography Club ............................................. Mrs. Clyde Lyon
Recreation Council ............................................ Gerald K. Irminger
Sigma-Y-Phalanx ............................................... Mrs. Wilma Lyon
T. Book Staff .................................................... Mrs. Clyde Lyon
Triangle Club .................................................... Mrs. Clyde Lyon
World Student Fund .......................................... R. C. Commander
Y.M.C.A. Cabinet ............................................... R. C. Commander
SCHOLARSHIPS AND LOAN FUNDS

Rules and Regulations Governing Scholarships and Fellowships

1. The majority of the scholarships available through the Georgia Institute of Technology are restricted to those undergraduates who have high academic ability and good character but lack sufficient funds to continue their college education. Fellowships are available to graduates of recognized colleges and universities who have demonstrated an interest in creative work and advanced professional work in order to extend the boundaries of their knowledge.

2. An application in writing on a form obtainable from the Georgia Institute of Technology is required of each applicant. Scholarship forms are available from the Registrar or the Dean of Students, and fellowship forms from the Dean of the Graduate Division. Prospective students must also submit in advance the necessary applications for admission to the Institute.

3. The Georgia Institute of Technology is a member of the College Scholarship Service. All new students who are applicants for financial aid must submit the Parents' Confidential Statement to the College Scholarship Service at Box 176, Princeton, N. J., or Box 27896, Los Angeles 27, California. Forms may be obtained at high schools or from the Office of the Registrar, Georgia Institute of Technology, Atlanta, Georgia 30332. Georgia Tech students may secure the required forms from the Office of the Registrar.

4. Each application must be approved by the appropriate committee before a scholarship or fellowship will be deposited with the Controller of the Georgia Institute of Technology who will release the necessary funds to the recipient upon proper authorization from the appropriate committee.

5. Certain scholarships and fellowships are renewable provided the recipients demonstrate high scholastic ability in their studies and outstanding character.

6. All entering freshmen are required to take the College Entrance Examination Board Scholastic Aptitude Test and three Achievement Tests (English, mathematics, and physics or chemistry) prior to acceptance at the Georgia Institute of Technology. Results of these tests will be considered by the Committee on Student Grants-In-Aid and Scholarships in making scholarship awards to entering freshmen.

Aluminum Company of America Scholarships
Five $625 engineering scholarships to any student. Need, ability, and scholastic standing are the prime factors in the selection of candidates. Scholarships are renewable.

American Enka Corporation Scholarship
A $600 scholarship for an entering freshman, renewable for three additional years. Awarded on a competitive basis in a technical field to a high school student from Western North Carolina or Eastern Tennessee by the Scholarship Committee of the Enka Foundation. Selection after consideration of character, need, and especially on the basis of ability and potential as demonstrated by scores from competitive examination.

Anonymous Alumnus Scholarship
(Class of 1962)
A $400 annual scholarship to any deserving student. Recipient must acknowledge receipt of the award to the Scholarship Committee.
Armco Foundation Scholarships
Two scholarships, one junior and one senior, per year. Each scholarship amounts to $300 per year for a Georgia student or $600 per year for an out-of-state student. Restricted to Civil Engineering students. Selection is made from candidates who have demonstrated scholarship, character, and other potentialities for success in a technical industry. Selection is made by the Scholarship Committee subject to the approval of donor. Scholarship awarded junior recipient is renewable.

David J. Arnold Scholarships
Scholarships to be awarded from the interest on a fund established by Robert O. Arnold in memory of his brother. Award is unrestricted as to field of study and is awarded on the basis of financial need.

Atlanta Federal Savings Scholarships
Two annual $500 scholarships, one made to a freshman and one to a senior. Freshman award is made on basis of financial need and high school academic excellence. Senior award is made from upper 25% of his class on basis of financial need. Recipients must be male graduates of Atlanta and Fulton County High Schools, and enrolled in the School of Industrial Management.

Atlanta Textile Club Scholarship
One $300 scholarship to be awarded to a junior or senior in the A. French Textile School. Preference will be given to students from the Atlanta area.

Eugene O. Batson Scholarship Fund
This fund of $10,000 was created by Mr. E. O. Batson in memory of his son, the income to be given to deserving students. Unrestricted as to field of study.

Borden Freshman Prize
An award of $200 to the student finishing the freshman year with the highest average.

Burlington Industries Foundation Scholarships
Two annual $500 scholarships to a rising junior and a rising senior. Selection on basis of leadership, scholarship, and financial need. Prefer Textiles, Industrial Management, Industrial Engineering and related fields. Scholarship awarded junior recipient is renewable.

Callaway Scholarships
One annual $500 scholarship to be awarded a rising junior in the upper third of his class and majoring in Textile Engineering, Textiles, or Textile Chemistry. Award is renewable. Selection by Scholarship Committee and Callaway Scholarship Plan Committee. Scholarship is renewable provided recipient maintains satisfactory class standing.

Chemstrand Corporation Scholarship
An award of $500 restricted to a senior in the A. French Textile School. Awards are made on basis of leadership, need, and ability to a U.S. citizen desiring a career in industry. Recipient must have B average or better.

Coats & Clark Scholarships
Two $500 scholarships to be awarded each year. These scholarships are renewable for three additional years, provided student maintains proper requirements. Award will be made to a high school graduate entering Georgia Tech for his freshman year in Chemical, Mechanical, Textile, Industrial, Electrical Engineering, as well as Chemistry, Textiles, and Textile Chemistry. If possible, one award will be made to an applicant from North Georgia and one to an applicant from South Georgia with preference to children of employees of Coats & Clark, Inc. Awards will be made on basis of academic ability and financial need.

John Cochran Scholarship
One or more scholarships to students in the field of Aerospace, Ce-
ramic, Chemical, Civil, Electrical, or Mechanical Engineering. Awarded by Scholarship Committee on basis of need.

**Crown Zellerbach Scholarship**
Two scholarship grants of $600 each unrestricted as to field of study for a junior or senior. Merit and ability are the primary considerations without regard to financial need. Scholarships are non-renewable.

**Damar, Incorporated Scholarship**
One $400 scholarship awarded to a Cobb County, Georgia, resident. Award is made on basis of need and ability.

**Douglas Aircraft Company, Inc. Scholarship**
One $750 Scholarship awarded to a senior student in Aerospace, or Electrical (electronics) Engineering. Selection by Scholarship Committee subject to approval of Douglas Scholarship Committee Board, Preference to student willing to accept employment in California.

**Ethyl Corporation Scholarship**
One scholarship for any student majoring in Industrial Engineering. The amount of the award is determined by the Scholarship Committee. Scholarship is renewable.

**John and Mary Franklin Scholarships**
Three thousand dollars annual scholarship fund established to aid worthy students from the State of Georgia. Awards are made on the basis of need, ability, evidence of good character and scholastic standing.

**Fulton Federal Savings Scholarship**
Three scholarships of $250 each for students majoring in the School of Architecture who are residents of Georgia. Ordinarily one award will go to a sophomore, one to a junior, and one to a senior.

**Geigy Dyestuffs Scholarship**
A $250 scholarship for a student, preferably a junior, majoring in Textile Chemistry, Chemical or Textile Engineering. This award will be granted on the basis of financial need, academic ability and evidence of good character.

**General Motors Scholarships**
Three scholarships are awarded each year to any entering freshmen. Amount of the award will range from $200 to $2,000 per year, depending on the financial need of the recipient. Scholarships are renewable. Unrestricted as to field of study.

**Gilman Foundation Scholarship**
An award of $1000 for an entering freshman, renewable for three additional years. Preference will be given in the order indicated:

1. Male resident of St. Marys, Georgia who is employed by, or who is a son of an employee of, St. Marys Kraft Corp., St. Marys Railroad Co., of Kraft Bag Company.
2. Any male employee or son of an employee of above mentioned companies, Gilman Paper Co., The Cellucord Corp., or Gilman Electric Light and Power Co., regardless of residence.

**Goodyear Foundation Scholarship**
An award of $1000 for a junior or senior majoring in Mechanical or Chemical Engineering. Selection on basis of need, leadership, scholarship and ability.

**Dean George C. Griffin Scholarships**
Income from property amounting to $1,000 a year has been made available for 99 years by Mr. Lonnie Allen Morris, Class of 1936, a resident of Miami, Florida, to set up in honor of George C. Griffin, Dean of Students at Ga. Tech. First preference for award of the scholarships will be given to residents of Miami or Dade County, Florida. Second preference will be to those from other sections of Fla. The main qualifications for the scholarships will be academic ability and financial need.
The Robert E. Gross/Lockheed Aircraft Corp. Scholarship
Income from $30,000 to be awarded annually by the Scholarship Committee to any student in scientific, engineering, economic or other fields applicable to the aerospace, electronic, marine, manufacturing, or construction industries. Recipient must be U. S. citizen.

The John P. Holmes Scholarships Honoring Ben Z. and Sallie P. Holmes
This scholarship was set up by John P. Holmes in memory of his parents to provide one or more scholarships annually to undergraduates on the basis of academic ability and financial need.

Keever Starch Scholarship
One scholarship of $400 per year to be awarded to a qualified student in the A. French Textile School (manufacturing or finishing of textiles) requiring financial assistance.

C. D. LeBey Memorial Scholarship
(Class of 1922)
One scholarship each year, unrestricted as to field of study, has been established in memory of Mr. C. D. LeBey, President, Class of 1922. First preference to residents of Florida, Alabama, or Tennessee. Value, approximately $250.

Lockheed Leadership Fund
One annual scholarship covering tuition and fees plus $500 to any student under 25 and majoring in any field applicable to aircraft manufacturing. Selection on basis of leadership, scholarship, and ability. Scholarships are renewable.

Monsanto Chemical Company
One $500 scholarship to be awarded to an outstanding student in the field of engineering.

R. L. "Bob" MacDougall Scholarship
One scholarship each year, unrestricted as to field of study, has been established in the name of R. L. MacDougall by the Class of 1925 and friends. Value, approximately $300.

Martindale Freshman Tuition Scholarships
One or more annual scholarship grants to cover full tuition for entering freshmen for the cooperative plan during the freshman year. Recipients must be from the Maryland, District of Columbia, or Orlando, Florida areas. Special consideration should be given to sons of employees.

Kenneth E. (Babe) McIntosh Scholarship
One $400 scholarship awarded to high school student from Fulton, Dekalb, Clayton, Cobb, or Gwinnett Counties. The award is renewable and unrestricted as to course of study. Selection is by Scholarship Committee on the basis of scholarship, leadership, and financial need.

Mclendon Scholarship Fund
Fund of $500 established to be awarded to qualified students of good character, in financial need, and who would be otherwise unable to pursue their education. Unrestricted as to field of study.

The Mead Corporation Scholarship
One scholarship each year, unrestricted as to field of study. This award is granted on the basis of financial need and academic ability. The amount is to be determined.
of Chemical Engineering. Selection of recipient will be made by the Scholarship Committee on recommendation of the School of Chemical Engineering.

Owens-Illinois Scholarship
One scholarship for a non-resident student or two scholarships for resident students to be awarded each year. Each scholarship will cover tuition, other college fees, and the cost of required textbooks and laboratory supplies. Award will be made to a male high school graduate and will be renewable for three additional years under certain conditions.

Patterson and Dewar Engineers, Inc.
A fund of $400 per year, established by Patterson and Dewar Engineers, Inc., to be awarded to a deserving student. The scholarship is made in behalf of the clients of the firm in lieu of the Christmas gifts of earlier years. The recipient is requested to assume the responsibility to repay voluntarily to the scholarship the funds received if practical in the future.

Pennsylvania Glass Sand Corporation
Merit Award Scholarship
An award covering tuition and fees for the senior year to the student in Ceramic Engineering who completes the junior year with the highest average.

Annie Laura Galloway Phillips Scholarship
A $200 annual scholarship established to help deserving boys. Award will be made on the basis of scholastic record and financial need.

Jack Phinizy Educational and Charitable Foundation Fund
Awards of $200 each for a freshman and a sophomore student in engineering. Restricted to students from Florida, Georgia, or North Carolina, with preference given to students of Richmond County, Georgia. Granted on the basis of academic ability, engineering, aptitude, and financial need.

Procon, Incorporated Scholarships
Two annual scholarships of $500 each to be awarded to senior students, one in the School of Civil Engineering and one in the School of Mechanical Engineering.

The Rayonier Scholarships
Two scholarships of $500 each established by The Rayonier Foundation. One of the scholarships is available for a senior in the School of Chemical Engineering and the other for a senior in the School of Industrial Management.

Regents' State Scholarships
A fund of approximately $19,000, Georgia Tech’s share of a $200,000 fund appropriated by the General Assembly for the University System in accord with the Board of Regents. Scholarships are for students with average grades and/or predicted grade point average in the upper 25% who possess superior ability and require financial need. The amount of each scholarship is determined by the Scholarship Committee up to a maximum of $750 per year. Scholarships are renewable and with the provision that recipients must agree to stay and work in the State of Georgia one year for each $1,000 received under this program.

Rotary Club of Buckhead Scholarship
An award of approximately $300 to an entering freshman. Applicant must be from one of these high schools: Chamblee, North Fulton, Northside.

Schlumberger Foundation
Two $500 scholarships. Awards are to be made to students of high academic standing in their junior or senior year in the Schools of Electrical or Mechanical Engineering or Physics. Students must complete, prior to earning his undergraduate degree, at least twelve hours study in electricity.
Schroeter-Ergenxinger Foundation
Two scholarships in the amount of $1,000 each for entering freshmen in the scientific or engineering fields. Recipients must be of good moral character and scholastic ability with economic or financial need. Scholarship is renewable and selection is by the Scholarship Committee.

Seydel-Woolley & Company Scholarship
One $300 scholarship to be given to an outstanding male junior or senior studying in the field of Textile Engineering or Textile Chemistry.

Shaheen Foundation Scholarship
The interest from $5,700 to be awarded to engineering students on the basis of need and ability. Selection by scholarship committee with preference to students from Whitfield County, Georgia.

Alfred P. Sloan Foundation Scholarships
Two awards (amount to be determined) for matriculating male freshmen who plan to major in one of the traditional engineering disciplines or in basic science. The recipients must have established a record of high character, leadership potential, and scholarly promise. The awards may be renewed for three additional years.

Socony Mobil Oil Scholarships
Two scholarships covering tuition and fees to a maximum of $400, plus $500 cash each. One each given in the field of Civil Engineering and Geophysics with preference to students interested in the exploration and production activities of the petroleum industry. Selection by the Scholarship Committee and the Socony Mobil Producing and Fellowship Committee based on scholastic and personal qualifications with interest in the petroleum industry. The award may be given to one junior or senior, or divided among two or more freshmen. A $500 unrestricted grant to the major school of the recipient accompanies the award.

Square D Scholarship
One annual scholarship of $600 per year to a rising junior in Electrical or Mechanical Engineering. Scholarship renewable for senior year.

Starke Petteson Scholarship
One or more annual scholarships to be awarded on the basis of academic ability and financial need. Recipients are to be selected from boys in the Cooperative plan from Memphis or Shelby County, Tennessee, high schools. Awards are made on the basis of academic record and financial need.

T. E. Stribling Memorial Textile Fellowship/Scholarship Fund
Entire annual net income from Stribling Trust Fund for one fellowship to include tuition and fees, not less than $2,000 nor more than $2,500, plus $500 misc. expenses. Any excess income may be used for undergraduate scholarships of not more than $600 to members of the junior and senior classes of the Textile Department.

Texaco Scholarship
A grant of $1,800 to be awarded at the discretion of the Scholarship Committee. Preference will be given to juniors and seniors in Civil, Chemical, Electrical, Industrial, Mechanical and Metallurgical Engineering and juniors and seniors in the Schools of Chemistry and Physics.

The Textile Engineering Scholarship Plan of the Textile Education Foundation, Inc.
The Textile Education Foundation, Inc., of Atlanta, Georgia, established this scholarship plan in 1952 for the purpose of encouraging and assisting worthy young men who seek to obtain an education in textile engineering. A maximum of six scholarships will be awarded annually, each scholarship amounting to $600 per scholastic year for each of four scholastic years provided the recipient maintains the requirements. For further information write to: The Di-
rector, A. French Textile School, Georgia Institute of Technology, Atlanta, Georgia 30332.

The Trans Company Scholarship
One $500 scholarship to be awarded annually to a student, preferably a mechanical engineer, for his senior year of study. Recipient must be a citizen of the United States and must have a standing in the upper 25% of his class. Good character, outstanding technical and administrative potential, extracurricular activities and the need of the student will be given consideration.

Tri-ton Community Scholarship
One $300 scholarship to be awarded an entering male freshman on basis of need and ability. Recipient must have attended an Atlanta area high school (Atlanta, Smyrna, Marietta, DeKalb, Forest Park, East Point, College Park, Hapeville) for his junior and senior years.

Union Bag-Camp Paper Corporation
A $500 scholarship for a junior which is renewable for the senior year. The selection must alternate annually between Industrial and Chemical Engineering students. Scholastic ability and leadership potential are the major considerations.

Union Carbide Engineering Scholarship
A $500 scholarship for an entering freshman who will major in Chemical or Mechanical Engineering. Renewable for three additional years. Students entering in the co-operative plan are not eligible for this scholarship.

Universal Oil Products Company Scholarship
$1000 per year scholarship fund established to aid worthy students in their junior or senior years of study in the School of Chemical Engineering. Awards are made on the basis of academic record and financial need.

Western Electric Fund Scholarships
Three scholarships awarded to upper-classmen in the field of Engineering. Awards can be given to first or second year students. Scholarships include tuition, fees, books to a maximum amount of $800. Scholarships are renewable.

R. K. Whitehead Foundation
$2,500 to $3,000 in Scholarships to be awarded to outstanding freshmen with financial need.

Wilcox-Connally Scholarship
An award of $250 for a student in the School of Architecture.

Woman's Aero Club of Atlanta Scholarship
An award of $300 for a junior or senior majoring in Aerospace Engineering.

Women's Chamber of Commerce Scholarship
A $300 per year scholarship fund to be conferred upon any needy Georgia woman student at the Georgia Institute of Technology with the specification that the same student may be eligible to receive the fund for more than one year; scholarship is to continue until such time as the organization deems it necessary to withdraw.

GEORGIA TECH CLUB SCHOLARSHIPS

Albany, Georgia Alumni Club
Three $300 scholarships (Co-op) for freshmen from the Albany, Georgia area. Engineering courses only available.

Greater Atlanta, Georgia Tech Club
Fifteen or more freshmen scholarships of $360 each for qualified needy students from the Metropolitan Area. Students are urged to attend on the Co-operative plan. Scholarships are extended for the sophomore year to those students who make a point average of 3.0 or better in their first year.

Augusta, Georgia Tech Club
One, possibly two, $300 scholarships available to freshmen from the Augusta area.
Birmingham, Alabama Georgia Tech Club
One $850 scholarship for freshmen from Birmingham and vicinity.

Macon, Georgia Tech Club
One, possibly two, $300 scholarships available to freshmen from the Macon area.

Savannah, Georgia Tech Club
Two $300 scholarships for students from the Savannah area.

South Texas Alumni Association
One $500 scholarship (Co-op) for freshmen from Houston, Texas and nearby cities. Engineering courses only available.

Rules and Regulations Governing Regular Short Term Student Loans

1. A written application will be required of each applicant for a student loan. Forms may be obtained in the Student Loan Office and should be submitted two weeks before you desire the money.

2. Each applicant under 23 years of age and single must have the approval of his parents. Each applicant under 21 years of age and married must have the approval of his parents.

3. Each application must be approved by the Committee on Student Loans before the loan will be granted.

4. Each student to whom a loan is granted will be required to sign a promissory note covering the principal and interest.

5. Georgia Tech students, faculty and staff members may not be used as references.

6. All short term student loans must be repaid ten days before the end of the quarter in which the money is received.

7. There will be a set schedule of repayment which will be made a part of the application for the loan, and will also be made a part of the note to be signed by the student.

8. All short term notes bear interest at the rate of 5% per annum from the date of the note.

9. A student may make application for a loan to be used for the following purposes:

   - Tuition and fees
   - Room Rent
   - Board
   - Books and Supplies

10. The note given by the student will be to secure money to pay tuition and fees, room rent, board, and books and supplies for a certain period. If the maker of the note should leave the Georgia Institute of Technology for any reason at any time before the expiration of said period, it is distinctly understood and agreed that there is to be no credit or refund therefor on the note given to the Georgia Institute of Technology.
Rules and Regulations Governing National Defense Loans

With the enactment of the National Defense Education Act in September, 1958, a new long-term financial aid program was created for college students. This act makes it possible for many students denied a college education because of financial need an opportunity to receive such an education.

Applications for this loan must be submitted two months prior to the quarter the money is desired. A new application must be submitted for each quarter.

In order to be eligible for a loan under this plan, a student must:

1. Be a full-time college student or be accepted for admission as a full-time student at Georgia Tech.

2. Be in good standing and capable of maintaining such a standing.

3. Show evidence of financial need in order to complete his course of study.

4. Sign a loyalty oath.

The National Defense Loan bears simple interest upon the unpaid balance at 3% a year.

The principal amount of the loan, together with the interest, should be repaid to the institution in ten equal installments. The repayment period begins one year after the date the borrower ceases to be a full-time student at an institution of higher education.

Applications may be secured by writing to the Student Loan Office at the Georgia Institute of Technology.
## LOAN FUNDS

Applicants for loans must qualify in scholarship and character besides presenting evidence of bona fide need of financial assistance.

<table>
<thead>
<tr>
<th>Loan Fund</th>
<th>Amount</th>
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<tr>
<td>Geo. W. Adair Loan Fund</td>
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<tr>
<td>Wm. Ott Alston, Jr., Memorial Loan Fund</td>
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<td>T. P. Branch Memorial Fund</td>
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Arthur Williams Estate Emergency Trust ........................................... 668.00
Mrs. Fannie D. Wright Loan Fund ............................................... 1,060.00

The Lewis H. Beck Fund
The Lewis H. Beck Scholarship Fund is a student loan fund created by the late Mr. Lewis H. Beck of Atlanta, for the benefit of students attending Georgia Institute of Technology who are residents of Georgia. It is administered by a special Board of Trustees. Applications may be received from the Student Loan Office.

Pickett and Hatcher Educational Fund
The late Mr. Claude A. Hatcher of Columbus, Georgia, created an educational loan fund for the purpose of aiding a large number of worthy students in securing courses in broad liberal college training. Loans are available for students of all classes, including graduates. Limitations prevent loans being granted to students of law, medicine and for the ministry.

Applications and requests for additional information should be addressed to Pickett and Hatcher Educational Fund, P. O. Box 1238, Columbus, Georgia.

Cuban Students Loan Program
The purpose of this loan is to make available non-interest bearing loans to Cuban nationals who are presently unable to receive support from sources within Cuba as a result of actions by the Cuban Government, and who are without sufficient resources in the United States to finance their attendance at institutions of higher education.

In order to be eligible for a loan under this plan, a student must:
(1) Be a Cuban national.
(2) Be enrolled in the Institution as a full-time student on either the undergraduate or graduate level.
(3) Be capable, in the opinion of the Institution, of continuing to maintain satisfactory standing.
(4) Be unable, as a result of action by the Cuban Government, to receive support from inside Cuba.
(5) Be in need of the amount of the loan to pursue his course of study at the Institution.

Each student to whom a loan is granted will be required to sign a promissory note.

Applications may be secured from the Student Loan Office at the Georgia Institute of Technology.

Emergency Loan Funds
Generous friends of the institution have established funds of varying amounts which are used for emergency loans. The Office of the Dean of Students operates twelve Emergency Loan Funds for students. It established the M. L. Brittain Loan Fund started by the President—Emeritus of Georgia Tech; the Bill Busbin Fund started by Mrs. T. E. Busbin; the Edward W. Navickas Fund; the Edward W. Navickas, Jr., Fund; the John Jarrell Loan Fund; H. O. Henry "Ozzie" Ward Fund; Major General Haywood Shepherd Hansell Fund; Bob Eskew Fund; Billy Reese Fund; George C. Griffin Fund; T. G. Reeves Fund; and the Tech Women’s Club Loan Fund. Loans are made from these funds without interest for emergencies only.

United Student Aid Funds Loan Program
USA Funds is a private, non-profit service corporation which endorses long-term loans made by local banks to needy college students. To be eligible for this loan, a student must have completed his freshman year and be a full-time student in good standing.

A student can borrow up to $1,000 a year but applications must be submitted each quarter to the Student Loan Office. Repayment of this loan begins five months after graduation and extends over a period of three years. These loans bear 6% simple interest.
MEDALS AND PRIZES

The Honor Society of Phi Kappa Phi
Among the prizes offered for scholarship by the Georgia Institute of Technology is membership in the honor society, Phi Kappa Phi, to which a limited number of seniors representing all departments are elected annually. Phi Kappa Phi is a national organization with chapters in many of the leading universities and colleges.

The local chapter of Phi Kappa Phi awards annually a scholarship cup to that member of the senior class who, on the basis of all work taken in this institution, ranks scholastically as one of the first two students in the class.

Tau Beta Pi
Tau Beta Pi is a national honorary engineering fraternity with chapters in most of the leading engineering schools of the country. The Alpha Chapter of Georgia offers membership to approximately twenty-five engineering students of each graduating class who can qualify according to the standards of scholarship, character, loyalty, personality, leadership, and school activities. The fact that Tau Beta Pi is the second oldest honorary fraternity in the country and numbers among its members many of our leading engineers, makes membership in the society a coveted honor.

The local chapter of Tau Beta Pi awards annually a scholarship cup to an outstanding engineering senior who ranks among the first five of his class, on the basis of all scholastic work taken in this institution.

Phi Eta Sigma
Phi Eta Sigma is a freshman honor society in which any male student is eligible for membership who has made an average of at least 3.5 on the work of the first term of the freshman year. The society awards a scholarship cup to the freshman who makes the highest average for the first term.

Chi Epsilon Award
The Chi Epsilon Award is given annually by the Georgia Tech Chapter. The recipient is chosen from the five highest members, based on scholarship of the senior class. The final choice of the recipient is made from the five candidates on the basis of leadership, sociability, practicality and scholarship. The winner receives a certificate and his name is placed on an honor roll in the Civil Engineering Building.

Textile Scholarship Medals
The Georgia Textile Manufacturers' Association awards a watch annually to a member of the senior textile class, based on scholarship throughout his course, and for original effort in the work of the Textile Department during his senior year. The American Association of Textile Technologists makes an award annually in the form of a suitable plaque to a member of the graduating class of the A. French Textile School. The award is based on scholarship and other personal qualities which indicate an outstanding student.

Briaerean Scholarship Cup
The Briaerean Society of the Georgia Institute of Technology presents annually a scholarship cup to an outstanding engineering senior who ranks among the first five of his class, on the basis of all scholastic work taken in this institution.

Fraternity Scholarship Cup
The Interfraternity Council awards quarterly a scholastic cup to the chapter of that organization which makes the highest scholastic average.
Alpha Chi Sigma Prize
The professional chemical fraternity, Alpha Chi Sigma, presents annually a handbook to the junior who has made the best record in the Chemistry or Chemical Engineering course.

Eta Kappa Nu
The Eta Kappa Nu Association, national electrical fraternity, awards annually an electrical engineering handbook to the regular sophomore Electrical Engineering student (on the basis of four quarters) or to the co-op pre-junior electrical engineering student (on the basis of four quarters) having the highest scholastic average.

Delta Kappa Phi
The Delta Kappa Phi Plaque is awarded annually to the graduating senior selected as the outstanding graduate in the textile department. A certificate is presented at the annual Honors Day exercises. Delta Kappa Phi is the oldest national honorary textile fraternity in the country.

Pi Tau Sigma
Pi Tau Sigma, national mechanical engineering fraternity, elects to membership outstanding mechanical engineering students in the junior and senior years.

An annual award of an engineering handbook is made to the highest ranking sophomore student in Mechanical Engineering (based upon at least four quarters of work).

Aerospace Engineering Medal
The James Edward Oglethorpe Chapter of the Daughters of the American Colonists presents annually a medal to the member of the graduating class in Aerospace Engineering who has made the highest scholastic average, based on the work of at least four complete quarters.

Industrial Management Certificate
The Industrial Management Society, senior honorary organization for I.M. students, awards annually a certificate of scholarship to the senior in the School of Industrial Management who ranks first in his class on the basis of all scholastic work taken at Georgia Tech.

The William Gilmer Perry Award
The Department of English awards annually a fifty dollar bond to the student in his first year who has done the best work in freshman English. This award is made through the courtesy of the Georgia Tech Foundation, Inc. in honor of Dr. William Gilmer Perry, late Professor of English.

Alpha Pi Mu Award
The Alpha Pi Mu Award is presented yearly to extend recognition and honor to that senior student in Industrial Engineering who has exhibited outstanding scholastic achievement tempered with those individual characteristics which the members of Alpha Pi Mu consider necessary for success. The recipient of the award is chosen from the three top seniors scholastically, and the presentation is made at the Annual Honors Day Exercises.

The American Institute of Industrial Engineers, Atlanta Chapter Award
The American Institute of Industrial Engineers, Atlanta Chapter, award is presented to the Industrial Engineering junior who is most outstanding in scholastic attainment and who has demonstrated such personal qualities as leadership, character, and breadth of interest. The presentation is made annually at the Honors Day Exercises.

The American Institute of Industrial Engineers, Student Chapter Award
The American Institute of Industrial Engineers, Student Chapter, award is presented to the Industrial Engineering sophomore who is chosen from the top three in his individual engineering class as having the best combination of personal and aca-
demic qualities. This presentation is made annually at the Honors Day Exercises.

**Society for Advancement of Management Award**
The S.A.M. Award is presented at the annual Honors Day Exercises to the Industrial Engineering junior who is most outstanding in scholastic attainment and who has demonstrated such personal qualities as leadership, character, and breadth of interest.

**Georgia Engineering Society Awards**
Four awards consisting of a cash prize and certificate are awarded each year by the Georgia Engineering Society. Three awards are given to Juniors in the College of Engineering who have earned the highest accumulative grade-point average at the end of the Winter Quarter. Not more than one award is given to students in any one of the schools of engineering. One award is given to the junior in the School of Architecture who is judged by a committee to be the most promising all-around student. The recipients must have completed at least six quarters of work at the Institute.

**The American Society of Civil Engineers Award**
The American Society of Civil Engineers Award is given annually by the Georgia Section of the ASCE. The recipient is selected by a committee from a list of three candidates who have the highest point average among the graduating members of the Student Chapter of the ASCE and who have completed at least eight quarters of work at the Institute. The Award consists of the Junior Membership entrance fees and a cash prize of $90.00.

**Army R.O.T.C. Prizes and Trophies**
The A.B. Steele Trophy, a handsome silver cup, the gift of Mrs. Ray Powers and Mr. A. B. Steele, as a memorial to those "Tech" men who made the supreme sacrifice during World War I, is awarded annually to the best drilled company in the regiment.

The Joseph Habersham Chapter of D.A.R. presents annually a medal to the member of the senior class who attains the highest rating in Military Science and Tactics.

The Georgia Society of Daughters of Colonial Wars presents annually a medal to the cadet officer who attains the highest rating for outstanding leadership.

The Reserve Officers' Association of Atlanta gives annually an officer's Saber to the most outstanding student in Military Science and Tactics.

The U. S. Artillery Association presents annually a medal to the member of the junior class, Artillery Unit, who attains the highest rating for proficiency in scholarship and in Military Science.

The Society of American Military Engineers presents annually a gold medal to the outstanding senior engineering student of the Engineer R.O.T.C. Unit. The award is based on academic achievement, attitude, military proficiency in the field, and leadership qualifications.

A gold medal is given annually by the Army Ordnance Association to the member of the junior class of the Ordnance Unit who attains the highest rating in Leadership and Ordnance scholarship.

The Armed Forces Chemical Association presents annually a medal to the most outstanding Chemical Engineering student enrolled in the Advanced Course of Army, Navy, or Air Force R.O.T.C.

The Association of the United States Army presents annually medals to the outstanding 1st year Advanced Course cadets of the Infantry R.O.T.C. battalion.

The Armed Forces Communication Association presents awards annually to the outstanding sophomore, junior, and senior Army, Navy, or Air Force R.O.T.C. cadets who attain the highest ratings for pro-
ficiency in scholarship in Military, Naval, or Air Science in the field of communications.

The Beta Theta Pi Fraternity, Georgia Tech chapter, presents annually medals to those members of the senior class who are selected as the most outstanding of the Distinguished Military Graduates of each branch of service, Army R.O.T.C.

The United States Veterans Signal Corps Association presents annually a medal to the most outstanding of the 2nd year Advanced Course cadets in the Signal Corps battalion.

The ANAK Society, Georgia Tech, presents annually seven medals, one each to the freshman in the Air, Artillery, Chemical Corps, Engineer, Infantry, Ordnance, and Signal Corps Units, who attains the highest rating for proficiency in Military Science.

The Scabbard and Blade Society gives annually a trophy to the captain of the company which wins the Steele Trophy.

An appropriate award is presented annually to each R.O.T.C. member of the Georgia Tech Rifle Team for proficiency in rifle marksmanship.

Gold, silver, and bronze medals are awarded by the Scabbard and Blade Military Society to students who achieve the highest individual rating for excellence in military drill.

The American Legion Medal is presented annually by the Fulton County Voiture 217, 40, and 8, Honor Society of the American Legion, to the outstanding freshman AFROTC cadet who is outstanding in leadership, academic achievement and military proficiency.

The Society of American Military Engineers' Eagle Award is presented to the ten outstanding senior engineering students of the nationwide AFROTC program.

Gold, silver, and bronze medals are awarded by the Scabbard and Blade Military Society to cadets who achieve the highest individual rating for excellence in military drill.

Various aviation trophies are presented by the major aircraft manufacturers.
Naval R.O.T.C. Medals and Awards

The Georgia State Society “United States Daughters of 1812” awards a gold medal each year to the NROTC senior who achieves the highest rating in Naval Science.

The ANAK Society awards annually two medals; one to the NROTC junior showing highest proficiency in Theoretical and Practical Navigation, and the other to the NROTC freshman showing highest proficiency in Naval Science during his freshman year.

The Scabbard and Blade Society gives annually an award to the outstanding NROTC senior.

The McGuire Medal is presented annually to the distinguished senior regular midshipman and to the distinguished senior contract midshipman.

The Atlanta Chapter of the Reserve Officers of the Naval Service presents annually an award to the sophomore NROTC student showing the greatest proficiency in ordnance, gunnery, and fire control.

An appropriate award is presented each year to each NROTC member of the Georgia Tech Rifle Team for proficiency in rifle marksmanship.

The Armed Forces Chemical Association award is presented annually to the junior ROTC student at each of five NROTC schools, having the highest scholastic average in chemistry or chemical engineering.

The Society of American Military Engineers awards annually 10 engineering medals for the outstanding engineering NROTC seniors and 10 medals for the outstanding engineering NROTC junior, selected from all NROTC schools in the United States.

The United States Naval Institute presents awards annually to the senior Regular NROTC student and the senior Contract NROTC student having the highest cruise aptitude marks for summer training.

The Marine Corps Association presents annually an award to the outstanding senior NROTC student who is a candidate for commission in the U. S. Marine Corps.

The Veterans of Foreign Wars of the United States presents the “General Douglas A. MacArthur $1,000 Award” every third year commencing in 1953 to the outstanding Regular NROTC senior in the United States.
GEORGIA TECH ATHLETIC ASSOCIATION

Board of Directors


Intercollegiate Staff


College Athletics

College athletics at the Georgia Institute of Technology are managed by a Board of Directors consisting of seven faculty members, three alumni members, and three student members. The President is chairman of the Board and appoints the faculty and alumni members. The student members are the captain of the football team, the editor of The Technique, and the president of the Student Council. The Business Manager of Athletics is elected by the Board. The head coaches of the various sports are called into Board meetings from time to time. The Athletic Board holds regular monthly meetings and on occasion called meetings at the discretion of the President. The Board aims to secure cooperation of the faculty and students in athletic affairs to maintain a high standard of sportsmanship and to create adequate facilities to give every student an opportunity to take part in some athletic activity.

The liberal policy adopted by the faculty towards athletics has resulted in such interest in college sports that the number engaged in some form of exercise is large.

Intercollegiate schedules are played in football, cross country, basketball, swimming, track, golf, tennis, baseball, and gymnastics.
Athletic Plant

The Hugh Inman Grant Field, the football stadium, is located in the center of the campus and occupies two full city blocks. The U-shaped stadium seats 52,300 and surrounds one football field and a quarter-mile cinder track. At the open end of the U are located the Naval Armory building, the gymnasium and swimming pool building and the athletic administration building. Under the East Stand, dressing rooms and showers to accommodate 1,000 men have been constructed.

The completion of the Alexander Memorial Center in September of 1956 has given our basketball, Physical Training and Intramural programs a great impetus. The coliseum will seat approximately 7,000 spectators for basketball. It has two full-size basketball courts. This building is also used for numerous school functions and is owned by the Georgia Institute of Technology.

The Physical Training Building adjoining the coliseum has dressing rooms and lockers for Physical Training, basketball, visiting teams, and officials. A full-size basketball court and offices for our Physical Training faculty (sophomore) are in this building.

The "old" gymnasium seats 2,000 for athletic indoor events and 3,000 when set up as an auditorium. The swimming pool seats 400 for aquatic events. This building has adequate locker rooms and showers for both men and women.

The Naval Armory houses the Navy R.O.T.C. Unit and in addition furnishes a supplementary gymnasium for intramural and physical training activity.

The athletic administration building houses the athletic and business offices, visitors' dressing rooms, and an adequately designed and equipped wrestling room and corrective exercise room.

The liberality of Mr. John W. Grant and other money furnished by the Georgia Tech Athletic Association, and the government agencies—C.W.A., P.W.A., and W.P.A.—have resulted in a well equipped sports and recreation center worth well over five million dollars. Acknowledgement is also made of the money loaned by Mr. Fred M. Kaufman which made possible the construction of the Naval Armory.

In addition to Grant Field, the Board of Directors in 1930 purchased a ten-acre tract located four hundred yards north of the main plant. This field is known as Rose Bowl Field and contains three football fields, two baseball diamonds, and a baseball stand which seats 5,000.

Some excellent tennis courts have been built on school property directly across from the Gymnasium in Peters Park. Also, twelve additional all-weather courts have been constructed bordering Tenth Street.

The land bounded by 8th Street, 10th Street, Fowler and Cherry Streets has been allocated to athletic purposes by Georgia Tech.
In 1920, under the leadership of William H. Glenn, B.S. in M.E., '91, the various Georgia Tech Alumni Clubs which had been previously organized in Georgia and other states, were banded together into the present Georgia Tech National Alumni Association. Today Georgia Tech alumni, consisting of graduates and former students, are found all over the world.

Some of the worthwhile objectives of the association are to:

1. Maintain an up-to-date record of each alumnus of Georgia Tech.
2. Publish *The Georgia Tech Alumnus*.
3. Organize and expand local Georgia Tech Alumni Clubs.
4. Operate a placement service for Georgia Tech alumni—with cost to either employer or applicant for employment.
5. Organize special events for alumni, such as class reunions, homecoming days, and alumni participation in commencements.
6. Furnish a medium through which alumni may aid and encourage the President of Georgia Tech and his faculty in making it a bigger and better engineering school, and assist in providing scholarships for worthy students.
7. Furnish visiting alumni with information, introduction to local alumni and other such personal services.
8. Through the various media of publicity, acquaint the general public; the people of Georgia; civic, state and federal officials; industries of the United States and institutions of secondary and higher education with the achievements of the Georgia Institute of Technology and its alumni.
9. Raise funds for Georgia Tech through the Annual Alumni Roll Call.

The Alumni Secretary acts in a clearing capacity for Georgia Tech men after their graduation. All Georgia Tech men are urged to keep their files in his office up-to-date, giving their location, activities, and other valuable information, in order that they may be consulted without delay on problems of mutual interest.

Officers and trustees of the Alumni Association for 1963-64: William S. Terrell, '30, Charlotte, N.C., President; Madison F. Cole, '41, Newman, Ga., Vice President; Daniel A. McKeever, '32, Atlanta, Ga., Vice President; W. Roane Beard, '40, Atlanta, Ga., Secretary; W. Howard Ector, '40, Atlanta, Ga., Treasurer; L. Massey Clarkson, '50, Atlanta, Ga.; Charles L. Davidson, Jr., '47, Avondale Estates, Ga.; Robert T. Davis, '47, Columbus, Ga.; James R. Dellinger, Jr., '53, Cartersville, Ga.; Alvin M. Ferst, '43, Atlanta, Ga.; L.
GEORGIA TECH FOUNDATION, INC.

Executive Secretary—Joe W. Guthridge; Bookkeeper—Mrs. Jennie L. Bradley.

The Georgia Tech Foundation, Inc. is a non-profit corporation organized and operated solely for the purpose of soliciting and administering funds for the benefit of the Georgia Institute of Technology and its students. The Georgia Tech Foundation, Inc., is directed by a Board of outstanding alumni business leaders, who administer the funds received in such a way as in their judgment would most effectively improve the standard of the school.

The funds received by the Foundation are used presently for the following purposes:

1. To supplement the compensation of faculty members in order to obtain or retain outstanding faculty members and thus improve the standard of education at the Georgia Institute of Technology.

2. To acquire special supplementary equipment, which cannot be provided by state funds, for the use of the Georgia Institute of Technology.

3. To enable faculty members to improve their professional qualifications and standing by grants to obtain advanced degrees, etc.

The majority of donations received are unrestricted and are used by the Foundation at the discretion of its Board of Trustees. Some donations are received for designated purposes and are used by the Foundation only for the purpose designated, provided they are for the use of the Georgia Institute of Technology and within the charter purposes of the Foundation.

Members of the Foundation Board of Trustees are: John C. Staton, '24, Atlanta, President; Oscar G. Davis, '22, Atlanta, Vice President; Henry W. Grady, '18, Atlanta, Treasurer; Joe W. Guthridge, Exec. Secretary; Ivan Allen Jr., '33, Atlanta; John P. Baum, '24, Milledgeville, Ga.; Fuller E. Callaway Jr., '26, LaGrange, Ga.; John O. Chiles, '23, Atlanta; Robert H. Ferst, '38, Atlanta; Y. Frank Freeman*, '10, Hollywood, Calif.; Jack F. Glenn, '32, Atlanta; Ira H. Hardin, '24, Atlanta; Julian T. Hightower, '19, Thomaston, Ga.; Wayne J. Holman, Jr., '28, New Brunswick, N. J.; Howard B. Johnson, '34, Atlanta; George T. Marchmont*, '07, Dallas, Texas; George W. McCarty, '08, Atlanta; Jack J. McDonough, '23, Atlanta; Walter M. Mitchell, '23, Atlanta; Frank H. Neely*, '04, Atlanta; William A. Parker, '19, Atlanta; Hazard E. Reeves, '28, New York, New York; I. M. Sheffield, '20, Atlanta; Hal L. Smith, '26, Atlanta; Howard T. Tellepsen, '34, Houston, Texas; Robert Tharpe, '34, Atlanta; William C. Wardlaw, Jr., '28, Atlanta; Robert H. White*, '14, Atlanta; George W. Woodruff, '17, Atlanta; Charles R. Yates, '35, Atlanta.

Income Tax Provisions of Contributions

Funds held by the Georgia Tech Foundation, Inc. are exempt from taxation by both State and Federal Governments, because it is a non-profit educational organization. Contributions made by individuals and industries to the Foundation are deductible from income for income tax purposes. For full details about limitations and savings in income tax, latest State and Federal tax regulations should be consulted.

*Trustee Emeritus.
Bequests
There are various forms of bequests that can be used. Due to differences in the various state laws, an attorney-at-law should be consulted. A suggested simple form that will serve in some cases is as follows:

*I hereby give and bequeath to the GEORGIA TECH FOUNDATION, INC., Atlanta, Georgia, the sum of ................dollars to be used by the Board of Trustees in whatever way will best advance the interests of the Georgia Institute of Technology.*

If the bequest is intended to leave the Foundation the remainder of any estate, the form may be: *All the rest, residue, and remainder of my real and personal property of any kind whatsoever, I give and bequeath to the GEORGIA TECH FOUNDATION, INC., Atlanta, Georgia, et cetera.*

All money received by the Foundation will be administered and directed by the Board of Trustees according to the wishes of the donors and in the best interests of the Georgia Institute of Technology.

Georgia Tech Annual Alumni Roll Call
The rising cost of higher education has made it imperative that colleges and universities get all possible aid from outside sources. In 1947, the Foundation originated the Georgia Tech Annual Alumni Roll Call, a vehicle by which all Tech men can contribute to their Alma Mater according to their means. The annual Alumni Roll Call began its seventeenth year, July, 1963.

The results of the first sixteen years of the Roll Call have proved the soundness of this plan. The renewed spirit of giving to Georgia Tech by alumni has been very gratifying to all concerned. Additional support is being received from industry and foundations within the state. The Joint Tech-Georgia Development Fund is proving to be very helpful to both Georgia Tech and Georgia.

For the past three years, the Georgia Institute of Technology has been recognized nationally with the first place award “for sustained alumni support” among all public institutions of higher learning. In 1962, the Institute also received the national runner-up award “for sustained alumni support” among all colleges and universities.

The aid realized through the Roll Call supports the work of the National Alumni Association as well as the Georgia Tech Foundation, Inc. The only use to which these funds are put by the Foundation is for the advancement and benefit of Georgia Tech. The work of the Georgia Tech Foundation, Inc. continues to be one of the most vital factors in the growth and development of the Georgia Institute of Technology.
Administrative Council—1964-1965*

FRED W. AJAX
Director of Public Relations

JAMIE R. ANTHONY
Controller

WILLIAM F. ATCHISON, Acting
Director, School of Information Science

W. ROANE BEARD
Alumni Secretary

WALTER S. BUCKINGHAM, Director
School of Industrial Management

WILLIAM L. CARMICHAEL
Registrar

ARTHUR M. COLEMAN, Head
Department of Physical Training

VERNON D. CRAWFORD, Director
School of Physics

MRS. J. HENLEY CROSLAND
Director of Libraries

BENJAMIN J. DASHER, Director
School of Electrical Engineering

ROBERT L. DODD
Director of Athletics

BERTRAM M. DRUCKER
Director, School of Mathematics

ARNOLD L. DUCOFFE, Acting
Director, School of Aerospace Engineering

JAMES E. DULL
Acting Dean of Students

MARIO J. GOGLIA
Associate Dean of Faculties
Dean of Graduate Division

CHARLES W. GORTON (2)
Faculty Representative

FRANK F. GROSECLOSE, Director
School of Industrial Engineering

HOMER V. GRUBB, Director
School of Chemical Engineering

JAMES B. HAMAN (3)
Faculty Representative

EDWIN D. HARRISON
President

WALTER HERBERT, Head
Music Department

ROBERT S. INGOLS, Director
School of Applied Biology

R. KENNETH JACOBS, Head
Department of Engineering Graphics

ALEXANDER K. JOHNSON, Lt. Col., USAF
Professor of Air Science

LAWRENCE V. JOHNSON, Director
Engineering Extension Division

WILLIAM B. JONES (1)
Faculty Representative

BEVERLY M. LEIGH, JR., Col., USA
Professor of Military Science

EDWARD H. LOVELAND, Director
School of Psychology

JESSE W. MASON, Dean
Engineering College

HOYT L. McCLURE, Director
Southern Technical Institute

LANCE MITCHELL, Director
School of Ceramic Engineering

KENNETH G. PICHIA, Director
School of Mechanical Engineering

MILTON E. RAVILLE, Director
School of Engineering Mechanics

FREDERICK W. SCHUTZ, Director
School of Civil Engineering

WILLIAM M. SPICER, Director
School of Chemistry

ROBERT E. STEMMKE
Associate Dean of Faculties
Administrator of Research

JAMES L. TAYLOR, Director
A. French Textile School

ANDREW J. WALKER, Head
Department of English

PAUL WEBER
Dean of Faculties

WYATT C. WHITLEY, Director
Engineering Experiment Station

JAMES G. WOHLFORD, Director
Cooperative Division

RICHARD H. WOODFIN, Capt., USN
Professor of Naval Science

J. DIXON WRIGHT, Head
Department of Modern Languages

Three Student Representatives

*Number in parentheses after faculty representative's name indicates years to be served on Administrative Council.
Standing Committees of the General Faculty—1964-1965*

ADVANCED PLANNING—Mason, Cushman, Heffernan, Hefner, Rainey (2), Finn (1), Whitley (1).
FACULTY COUNCIL—Su (3), Topp (3), Almon (2), Hochman (2), Gaffney (1), Mayer (1).
INFIRMARY—Riggsbee, Coleman, Henry, Weber, Dean of Students, Student Representative.
LIBRARY—Atchison (3), Ducoffe (2), Osborn (1), Crosland.
PUBLIC RELATIONS—Ajax, Bellinger (3), Garner (3), Welser (2), Flege (1).
PUBLICATIONS—K. Murphy (3), Eberhardt (2), Hubbhartt (1), Crosland, Wallace.
STATE RESIDENCE—Anthony, Carmichael, Dean of Students.
STATUTES—Almon (3), Loveland (3), Stoneking (2), Coleman (1), Sowers (1), Carmichael.
STUDENT LECTURE AND ENTERTAINMENT—Foote (3), F. M. White (2), Mayer (1), Ajax, Herbert, 4 Student Representatives.
STUDENT LOANS—Anthony, Dean of Students, Guthridge.

Special Committees of the Faculty—1964-1965*

CIVIL DEFENSE—Fincher, Caseman, Covault, Cushman, Wang, Zimmerman.
FACULTY AWARDS—Goglia, Atchison, Carstens, Dallas, T. H. Hall.
FOREIGN STUDENTS—Wright, Comer, Dull, Hope, Spillman, Sturgis, Zahn.
INSTRUCTION MANUAL—Jacobs, Chaikin, Loveland, McClure, Sisk.
INSURANCE—Groseclose, Eaton, Marshall, Starrett.
NON-ACADEMIC PERSONNEL—Marshall, Helms, Logan.
NUCLEAR SAFEGUARDS—Zimmerman, Eichholz, Fleming, Harmer, Kirkland, McGee, C. J. Roberts.
PARKING—Anthony, Cox, Cushman, Dean of Students, W. B. Harrison, Moll, 2 Student Representatives.
PRE-MEDICAL ADVISORY—Ingols, Loveland, Spicer.
SAFETY AND FIRE PROTECTION—Cox, Cushman, Fleming, McKinley, McLendon, Ratcliff, Schutz.
STUDENT ACTIVITIES BUILDING—Dean of Students, Ajax, Anthony, Cushman, Dull, Finn, Savini, 3 Student Members.
STUDENT RECRUITING—Carmichael, Ajax, Beard, Wohlford, Dean of Students.

*Number in parenthesis after faculty representative’s name indicates years to be served on the committee.
Standing Committees of the Academic Senate—1964-1965*

ADMISSIONS—Carmichael, Hefner, Mason, Dallas (2), Barnett (1).
CURRICULUM—Weber, Carmichael, Hefner, Mason, Grovenstein (3),
Kindsvater (3), Moll (2), Gorton (1).
EXECUTIVE—Weber, Carmichael, Hefner, Mason, Dean of Students, Dutton (3), Crawford (2), Cox (1).
GUIDANCE AND TESTING—Loveland, Carmichael, Commander, Hefner,
Mason, Nichols, Dean of Students, Smythe (3), Barnett (2), Slaughter.
HONORS AND PRIZES—Carmichael, Gaston (3), Immel (2), Harper (1).
STANDING—Weber, Hefner, Mason, Dean of Students (non-voting).
STUDENT ACTIVITIES—Dean of Students, Ajax, J. D. Young (3), Maddox (2), McCarty (1), Student Representative.
STUDENT-FACULTY HONOR—Vail (3), Finn (2), J. H. Murphy (1),
3 Student Members.
STUDENT GRANTS-IN-AID AND SCHOLARSHIP—Carmichael, Anthony,
Weber, Dean of Students, Howey (3), Mitchell (2), Dyer (1).
STUDENT RULES AND REGULATIONS—Jacobs (3), Prosser (2), Case-
man (1), Carmichael, Dean of Students.

*Number in parenthesis after faculty representative’s name indicates years to be served on the committee.
GENERAL FACULTY

(As of April 1, 1964)

Note: After the name of each faculty member is listed his highest degree and the name of the institution conferring it. Professional engineers among the faculty are indicated with the authorized abbreviation of P.E. followed by the name of the state in which they are registered. Practicing architects among the faculty are indicated with the abbreviation of Reg. Arch, followed by the name of the state in which they are registered.

A. F. Abril, Ph.D.
(University of Havana)
Associate Professor, Industrial Management

Henry W. Adams, M.A.
(Columbia University)
Professor, English

Joseph W. Adams, B.S.
(U. S. Naval Academy)
Lecturer, Engineering Graphics

Philip Adler, M.B.A.
(University of Miami)
Assistant Professor, Industrial Management

R. Martin Ahrens, Ph.D.
(Washington University)
Associate Professor, Physics

Fred Wesley Ajax, M.A.
(Emory University)
Director, Public Relations

John I. Alford, B.S.
(Georgia Institute of Technology)
Associate Professor, Textile Engineering

Estelle Allen, B.C.S.
(Georgia Tech Evening School)
Associate Registrar (Retired)

Lamar Allen, M.S.
(Georgia Institute of Technology)
Instructor, Electrical Engineering

*Robert Lewis Allen, M.S.
(Georgia Institute of Technology)
P.E. (Georgia)
Professor, Mechanical Engineering

Tom F. Almon, M.A.
(Peabody College)
Assistant Head and Associate Professor, English

Henry L. Andel, M.S.
(Georgia Institute of Technology)
Athletic Trainer

Mary Edna Anders, D.L.S.
(Columbia University)
Special Research Scientist
Engineering Experiment Station

Jamie R. Anthony, Controller

Frederick C. Apple, B.S.
(Purdue University)
Research Engineer
Engineering Experiment Station

James M. Apple, M.S.
(Michigan State University)
P.E. (Georgia)
Professor, Industrial Engineering

Frances T. Armstrong, B.S.
(University of North Carolina)
Research Assistant
Engineering Experiment Station

James Hal Armstrong, Ph.D.
(Iowa State University, Ames)
Associate Professor, Engineering Mechanics

Eugene C. Ashby, Ph.D.
(University of Notre Dame)
Assistant Professor, Chemistry

William F. Atchison, Ph.D.
(University of Illinois)
Research Professor of Mathematics; Engineering Experiment Station
Chief, Rich Electronic Computer Center, and Acting Director,
School of Information Science

*Deceased, October 12, 1963.
JOHN S. AUSTIN, JR., B.A.  
(Emory University)  
Instructor, Modern Languages

ALSON HUNNICUTT BAILEY, Ph.D.  
(Ohio State University)  
Professor, Mathematics

JOHN ALBERT BAILEY, Ph.D.  
(University of Wales)  
Assistant Professor, Mechanical Engineering

ETHEL Jo BAKER, Ph.D.  
(Emory University)  
Assistant Professor, Psychology

HARRY L. BAKER, JR., B.S., LL.B.  
(Georgia Institute of Technology, Emory University) P.E. (Georgia)  
Associate Professor; Assistant Controller (contracts); President, Georgia Tech Research Institute

JERRY O. BANGE, B.S.  
(University of Arizona)  
Research Assistant, Engineering Experiment Station

BOBBY F. BARFIELD, M.S.  
(Georgia Institute of Technology) P.E. (Georgia)  
Assistant Professor, Mechanical Engineering

DALE L. BARKER, M.S.  
(University of Illinois)  
Associate Director, Libraries and Information Science  
Assistant Professor, Information Science

A. H. BARNES  
Assistant Director of Dining Halls

EWELL I. BARNES, B.S.  
(Berry College)  
Associate Controller

NEWTON H. BARNETTE, Ph.D.  
(Cornell University)  
Associate Director, Electrical Engineering

SAMUEL C. BARNETT, Ph.D.  
(Georgia Institute of Technology) P.E. (Georgia)  
Associate Professor and Assistant Director, Mechanical Engineering

JULIO R. BASTIDA, Ph.D.  
(University of Georgia)  
Assistant Professor, Mathematics

HELMUT F. BAUER, Ph.D.  
(Institute of Technology, Darmstadt)  
Professor, Engineering Mechanics

W. ROANE BEARD, B.S.  
(Georgia Institute of Technology)  
Executive Secretary, Georgia Tech National Alumni Association

GEORGE BEATTIE  
(Cleveland Institute of Art)  
Lecturer, Architecture

ARTHUR FRANKLIN BECKUM, JR., M.F.A.  
(Princeton University)  
Associate Professor, Architecture

HOWARD E. BEDELL, B.S.  
(University of Alabama)  
Assistant to the Director, Engineering Experiment Station

JOHN ROBERT BELL, B.S.  
(Georgia Institute of Technology)  
Assistant in Football

RICHARD B. BELL, M.A.  
(State University of Iowa)  
Instructor, English

FREDERICK BELLINGER  
Dr. Engrg. (Yale University) P.E. (Georgia)  
Professor, Chemical Engineering; Chief, Chemical Sciences & Materials Division, Engineering Experiment Station

RICHARD B. BELSER, M.S.  
(Emory University)  
Research Associate Professor, Engineering Experiment Station

ARTHUR L. BENNETT, Ph.D.  
(Princeton University)  
Research Professor, Physics, Engineering Experiment Station

RISDEN T. BENNETT (Maj. U. S. Army—C.E.), B.S.  
(Missouri School of Mines)  
Assistant Professor, Military Science
RALPH BERGAMO, A.M.
(Columbia University)
Assistant Professor, English

JESSE S. BERRY, A.B.
(University of South Carolina)
Assistant in Football

J. AARON BERTRAND, Ph.D.
(Tulane University)
Assistant Professor, Chemistry

WILLIAM A. BEZARE, B.S.
(University of Detroit)
Special Research Engineer
Engineering Experiment Station
Head, Operations and Maintenance Center

FRANK C. BIGGER, A.B.
(University of South Carolina)
Assistant Head, Publications
Engineering Experiment Station

JACKSON H. BIRDSONG, B.I.E.
(Auburn)
Lecturer, Industrial Engineering

RICHARD C. BIRKEBAK, Ph.D.
(University of Minnesota)
Assistant Professor, Mechanical Engineering

WALLACE B. BISHOP, JR., B.A.
(University of Arizona)
Research Assistant
Engineering Experiment Station

WILLIAM CARL BIVEN, Ph.D.
(St. Louis University)
Associate Professor, Industrial Management

WILLIAM C. BLISS, M.E.
(Cornell University)
Lecturer, Engineering Graphics
(Retired)

FRANK BOGLE, M.S.
(Georgia Institute of Technology)
P.E. (Georgia)
Associate Professor Engineering Mechanics (Retired)

ROY B. BOGUE, M.S.
(Auburn University)
Instructor, Mathematics

EVERETT R. BOLLINGER, JR., D.B.A.
(Indiana University)
Associate Professor, Industrial Management

STEVE H. BOMAR, JR., M.S.
(Georgia Institute of Technology)
Research Assistant
Engineering Experiment Station

GEOFFREY BOOTHRoyD, Ph.D.
(University of London)
A.M.I. Mech.E. (London)
Visiting Associate Professor
Mechanical Engineering

EARLE EDGAR BORTELL, M.S.
(Emory University)
Professor-Emeritus, Physics

WINSTON C. BOTELER, M.S.
(Georgia Institute of Technology)
Research Engineer and Head, Electro-Mechanical Devices Branch
Engineering Experiment Station

ALBERT W. BOWERS, B.S.
(Georgia Institute of Technology)
Assistant Research Engineer
Engineering Experiment Station

ROBERT M. BOYD, B.S.
(Arkansas A&M College)
Health Physicist
Engineering Experiment Station

CHARLES H. BRADEN, Ph.D.
(Washington University)
Professor, Physics

FRANCIS COOLIDGE BRAGG, M.S.
(Syracuse University)
P.E. (Georgia)
Associate Professor, Engineering Mechanics

HIN BREendonIECK, Diploma
(Bauhaus, Dessau, Germany)
Professor, Industrial Design

HAROLD R. BREWER, Ph.D.
(University of North Carolina)
Associate Professor, Physics

MAURICE R. BREWSTER, M.B.A.
(Northwestern University)
Professor, School of Industrial Management
G. LEON BRIDGER, Ph.D.  
(Iowa State University)  
Professor, Chemical Engineering

*ALPHONSE C. BRILLAT, B.S.  
(Rutgers University)  
Lecturer, Mechanical Engineering

WYTHE P. BROOKES, (Lt. Col. U. S. Army—C.E.), B.S.  
(Virginia Polytechnic Institute)  
Assistant Professor, Military Science

JAMES CLYDE BROOKES, M.A.  
(University of Georgia)  
Assistant Professor, Mathematics

WINFIELD A. BROOKS, M.S.  
(Columbia University, Georgia Institute of Technology)  
P.E. (Georgia)  
Associate Professor, Industrial Engineering (Retired)

BRYAN L. BROWN, M.S. in M.E.  
(Yale University)  
P.E. (Georgia)  
Professor, Engineering Mechanics

JAMES E. BROWN (Capt. U. S. Army—Sig. C.) B.S.  
(Auburn University)  
Assistant Professor, Military Science

JOHN L. BROWN, B.S.  
(Georgia Institute of Technology)  
Research Physicist  
Engineering Experiment Station

MARY ELEAZAR BROWN  
Administrative Assistant to Dean of Faculties (Retired)

LOY Y. BRYANT, M.A.  
(University of North Carolina)  
Registrar, Southern Technical Institute

TONEY W. BRYANT, B.C.S.  
(Georgia State College)  
Chief Accountant  
Engineering Experiment Station

WALTER BUCKINGHAM, Ph.D.  
(Indiana University)  
Director and Professor, Industrial Management

MRS. ANNE P. BUGG, B.A. in L.S.  
(Emory University)  
Assistant Science-Technology Librarian

ROBERT L. BULLOCK, M.A.  
(Indiana University)  
Research Assistant  
Engineering Experiment Station

JOHN H. BURNETT, M.A.  
(Emory University)  
Instructor, Social Sciences

WALTER H. BURROWS, M.S.  
(Emory University)  
Research Associate Professor  
Engineering Experiment Station

JOHN H. BURSON, III, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

HAROLD BUSH-BROWN, M.Arch.  
(Harvard University)  
Professor-Emeritus, Architecture

JOHN C. BUTTERWORTH  
Research Assistant  
Engineering Experiment Station

JAMES J. BYNUM, M.A.  
(University of North Carolina)  
Instructor, English

WILLARD C. BYRD, B.S.  
(North Carolina State)  
Associate Professor (part time), Architecture

GEORGE L. CAIN, JR., M.S.  
(Georgia Institute of Technology)  
Instructor, Mathematics

MRS. BEATRICE R. CAINE, B.A. in L.S.  
(Emory University)  
Acquisitions Librarian

DRURY S. CAINE, III, Ph.D.  
(Emory University)  
Assistant Professor, Chemistry

GEORGE C. CALDWELL, Ph.D.  
(University of North Carolina)  
Associate Professor and  
Associate Director, Mathematics

JAMES L. CALDWELL, Ph.D.  
(Louisiana State University)  
Assistant Professor, Industrial Management

JOSEPH A. CAMPOAMOR, M.A., LL.B.  
(Burgos University)  
Professor-Emeritus, Modern Languages

JOHN R. CANAVAN, M.A.  
(Middlebury College)  
Instructor, Modern Languages

JAMES ANTHONY CARLEN, B.S.  
(Georgia Institute of Technology)  
Assistant in Football

WALTER O. CARLSON, Ph.D.  
(University of Minnesota)  
P.E. (Minnesota)  
Professor, Mechanical Engineering

H. GRIFFIN CARMICHAEL, A.B.  
(Emory University)  
Assistant Professor, Physics

WILLIAM LAWSON CARMICHAEL, M.S.  
(Georgia Institute of Technology)  
Registrar and Director of Admissions

CHARLES W. CARNES (Lt. Col., U. S. Army—Cml C) B.S.  
(Georgia Institute of Technology)  
Assistant Professor, Military Science

ROBERT W. CARNEY, Ph.D.  
(Cornell University)  
Associate Professor, Industrial Management

DEWEY K. CARPENTER, Ph.D.  
(Duke University)  
Assistant Professor, Chemistry

DEWEY E. CARROLL, M.Ln.  
(Emory University)  
Assistant Professor, School of Information Science, and Engineering Experiment Station

MARION ROBERT CARSTENS, Ph.D.  
(State University of Iowa)  
P.E. (Georgia)  
Professor, Civil Engineering

AUSTIN BERT CASEMAN, Sc.D.  
(Massachusetts Institute of Technology)  
P.E. (Georgia)  
Professor, Civil Engineering

ROBERT B. CASSELL, M.A.  
(Vanderbilt University)  
Research Economist and Head, Community Development Branch Engineering Experiment Station

JOHN C. CERNY, M.S.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Research Engineer Engineering Experiment Station

MILTON CHAIKIN, Ph.D.  
(New York University)  
Associate Professor, English

ALICE CHASTAIN  
Administrative Secretary  
Department of Public Relations

TZE I. CHIANG, Ph.D.  
(University of Florida)  
Research Economist Engineering Experiment Station

FRANK J. CLARKE, M.S.  
(Georgia Institute of Technology)  
Assistant to Director, Textile Engineering

JOHN C. CLARK, M.S.  
(Georgia Institute of Technology)  
Assistant Professor Engineering Mechanics

A. M. COLEMAN, M.A.  
(Hardin-Simmons University)  
Assistant Athletic Director, Assistant in Football, Professor and Head, Department of Physical Training

EDITH AMY COLLINS, B.A.  
(Leeds University)  
Assistant Research Economist Engineering Experiment Station

JAMES T. COLLINS, B.E.E.  
(Georgia Institute of Technology)  
Assistant Research Engineer Engineering Experiment Station
DAVID B. COMER, III, Ph.D.
(Duke University)
Professor, English

ROBERT C. COMMANDER, B.D.
(Yale University)
General Secretary, Y.M.C.A.

MARSHALL M. COOKSEY, B.S.
(Georgia Institute of Technology)
Research Engineer
Engineering Experiment Station

ANDREW JACKSON COOPER, III, Ph.D.
(Princeton University)
Assistant Professor, Industrial Management

WILLIAM J. CORBETT, B.S.
(Georgia Institute of Technology)
Research Engineer
Engineering Experiment Station

HENRY A. CORRIHER, JR., M.S.
(California Institute of Technology)
P.E. (Georgia)
Special Research Engineer
Engineering Experiment Station

DONALD O. COVAULT, Ph.D.
(Purdue University)
P.E. (Wisconsin)
Professor, Civil Engineering

WILLIAM B. COWN
Research Assistant
Engineering Experiment Station

DALLAS B. COX, B.S.
(North Carolina State College)
Acting Director,
Industrial Education Department

JAMES R. COX, Jr., Ph.D.
(Harvard University)
Assistant Professor, Chemistry

WILLIAM N. COX, Jr., M.M.E.
(Johns Hopkins University)
P.E. (Georgia)
Professor, Industrial Engineering

THOMAS F. CRAFT, Jr., M.A.
(Emory University)
Assistant Research Chemist
Engineering Experiment Station

MILTON E. CRAM, B.E.E.
(Georgia Institute of Technology)
Research Assistant
Engineering Experiment Station

JEANNE M. CRAWFORD, B.S.
(Morris Harvey College)
Research Assistant
Engineering Experiment Station

WILLIAM J. CORBETT, B.S.
(Georgia Institute of Technology)
Research Engineer
Engineering Experiment Station

HENRY A. CORRIHER, JR., M.S.
(California Institute of Technology)
P.E. (Georgia)
Special Research Engineer
Engineering Experiment Station

DONALD O. COVAULT, Ph.D.
(Purdue University)
P.E. (Wisconsin)
Professor, Civil Engineering

WILLIAM B. COWN
Research Assistant
Engineering Experiment Station

DALLAS B. COX, B.S.
(North Carolina State College)
Acting Director,
Industrial Education Department

JAMES R. COX, Jr., Ph.D.
(Harvard University)
Assistant Professor, Chemistry

WILLIAM N. COX, Jr., M.M.E.
(Johns Hopkins University)
P.E. (Georgia)
Professor, Industrial Engineering

THOMAS F. CRAFT, Jr., M.A.
(Emory University)
Assistant Research Chemist
Engineering Experiment Station

MILTON E. CRAM, B.E.E.
(Georgia Institute of Technology)
Research Assistant
Engineering Experiment Station

JEANNE M. CRAWFORD, B.S.
(Morris Harvey College)
Research Assistant
Engineering Experiment Station

WILLIAM J. CORBETT, B.S.
(Georgia Institute of Technology)
Research Engineer
Engineering Experiment Station

HENRY A. CORRIHER, JR., M.S.
(California Institute of Technology)
P.E. (Georgia)
Special Research Engineer
Engineering Experiment Station

DONALD O. COVAULT, Ph.D.
(Purdue University)
P.E. (Wisconsin)
Professor, Civil Engineering

WILLIAM B. COWN
Research Assistant
Engineering Experiment Station

DALLAS B. COX, B.S.
(North Carolina State College)
Acting Director,
Industrial Education Department

JAMES R. COX, Jr., Ph.D.
(Harvard University)
Assistant Professor, Chemistry

WILLIAM N. COX, Jr., M.M.E.
(Johns Hopkins University)
P.E. (Georgia)
Professor, Industrial Engineering
BARBARA J. DANIELS, B.A.  
(Agnes Scott College)  
Research Assistant  
Engineering Experiment Station

JAMES O. DARNELL  
Research Assistant  
Engineering Experiment Station

BENJAMIN J. DASHER, Sc.D.  
(Massachusetts Institute of Technology)  
P.E. (Georgia)  
Professor and Director, School of Electrical Engineering

EDGAR G. DAVID, JR., (Maj., U.S. Army-Inf.), B.S.  
(University of Georgia)  
Assistant Professor, Military Science

STANLEE L. DAVIS, A.M.  
(University of Michigan)  
Research Assistant  
Engineering Experiment Station

JOHN B. DAY, B.S.  
(University of California)  
P.E. (Georgia)  
Part-time Lecturer, Industrial Engineering (Retired)

MARTHA ANN DEADMORE, B.A.  
(Agnes Scott)  
Research Assistant  
Engineering Experiment Station

NORRIS C. DEAN, B.S.  
(Georgia Institute of Technology)  
Associate Professor, Physical Training

DOROTHY E. DEFOOR, B.S.  
(University of Georgia)  
Research Assistant  
Engineering Experiment Station

HUBERT E. DENNISON, A.B.  
(University of Tennessee)  
Professor Emeritus, Industrial Management

HUGH WAYNE DENNY, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

A. P. DEROZA, B.I.E.  
(Georgia Institute of Technology)  
Director of Placement

HARVEY DIAMOND, B.S.  
(North Carolina State College)  
Assistant Research Engineer  
Engineering Experiment Station

HERMAN A. DICKERT, Sc.D.  
(Newberry College)  
P.E. (Georgia)  
Professor, Textile Engineering

FREDERICK DIXON, M.S.  
(Georgia Institute of Technology)  
Senior Research Physicist and Head, Special Problems Branch  
Engineering Experiment Station

ROBERT L. DODD  
(University of Tennessee)  
Athletic Director and Head Football Coach

BERTRAM M. DRUCKER, Ph.D.  
(University of North Carolina)  
Professor and Director, Mathematics

ARNOLD L. DUCOFFE, Ph.D.  
(University of Michigan)  
P.E. (Georgia)  
Acting Director, Aerospace Engineering

H. G. DULANEY, Ph.D.  
(Georgia Institute of Technology)  
Assistant Professor, Physics

HUGO B. DULING, M.S.  
(Georgia Institute of Technology)  
Professor, Electrical Engineering (Retired)

JAMES E. DULL, M.Ed.  
(Miami University, Oxford, Ohio)  
Associate Dean of Students
PANDELI DURBETAKI, Ph.D.
(Michigan State University)
Associate Professor, Mechanical Engineering

JOSEPH C. DURDEN, JR., M.S.
(Georgia Institute of Technology)
Associate Professor, Engineering Graphics

HOWARD L. DURHAM, JR., M.S.
(Georgia Institute of Technology)
Assistant Professor, Aerospace Engineering and Engineering Experiment Station

DONNELL W. DUTTON, M.S.
(Georgia Institute of Technology)
P.E. (Georgia)
Professor, Aerospace Engineering

FREDERICK B. DYER, M.S.
(Georgia Institute of Technology)
Assistant Research Physicist
Engineering Experiment Station

JOHN R. DYER, Ph.D.
(University of Illinois)
Associate Professor, Chemistry

WILLIAM M. EASTMAN, M.A.
(Columbia University)
Associate Director of Admissions

PAUL T. EATON, Ph.D.
(Aachen Techn. Hochs., University of Frankfort, Germany)
P.E. (Georgia)
Professor, Industrial Engineering

JERRY L. EAVES, M.S.
(Georgia Institute of Technology)
Assistant Research Engineer
Engineering Experiment Station

WILLIAM H. EBERHARDT, Ph.D.
(California Institute of Technology)
Regents' Professor, Chemistry

JOHN P. EDGERLY, B.S.
(U. S. Naval Academy)
Lecturer, Engineering Graphics
(Retired)

H. GRIFFITH EDWARDS, B.S. in Arch.
F.A.I.A., F.C.S.I.
(Georgia Institute of Technology)
Reg. Arch. (Ga., N.C., S.C., Tenn., La., Fla., Ala., Ky., Miss.)
Part-time Associate Professor, Architecture

HENRY LEITNER EDWARDS, Ph.D.
(University of North Carolina)
Professor, Chemistry

HOWARD D. EDWARDS, Ph.D.
(Duke University)
Research Associate Professor, Physics; Head, Space Sciences Branch; Engineering Experiment Station

JOSEPH LEE EDWARDS, M.S.
(Carnegie Institute of Technology)
Assistant Research Physicist
Engineering Experiment Station

GEORGEY G. EICHOLZ, Ph.D.
(University of Leeds)
Professor, Nuclear Engineering and Engineering Experiment Station

JOHN ORAN EICHLER, M.C.E.
(Syracuse University)
P.E. and Reg. Land Surveyor
(New York and Georgia)
Professor, Civil Engineering

WILLIAM C. EISENHAUER, B.S.
(Georgia Institute of Technology)
Assistant Research Engineer
Engineering Experiment Station

(United States Military Academy)
Assistant Professor, Military Science

THOMAS A. ELLIOTT, M.S.
(Georgia Institute of Technology)
P.E. (Georgia)
Research Engineer
Engineering Experiment Station

ISHMAEL LAROY ELLIS, B.S.
(Georgia Institute of Technology)
Assistant Professor, Engineering Graphics

LEWIS W. ELSTON, B.S.
(Mississippi State College)
Assistant Research Chemist
Engineering Experiment Station

MILDRED EMMONS, M.A.
(Emory University)
Physical Processing Librarian
NIELS N. ENGEL, Dr. Ing.
(Max Planck Institute für Eisenforschung)
P.E. (Georgia)
Professor, Chemical Engineering

TOM L. ERB, B.S.
(Georgia Institute of Technology)
Research Assistant
Engineering Experiment Station

ALLEN B. ESCHENBRENNER, M.D.
(Washington University School of Medicine)
Research Associate Professor,
Applied Biology
Engineering Experiment Station

ROBERT E. ESKEW, M.S.I.E.
(Georgia Institute of Technology)
Business Manager-Treasurer,
Athletic Association

JOHN T. ETHERIDGE, M.B.A.
(University of Mississippi)
Assistant Professor, Industrial Management

ANN G. EVANS, M.Ln.
(Emory University)
Assistant Science-Technology Librarian

WALTER P. EWALT, M.A.
(University of Michigan)
Professor, Physics

GEORGE R. FESSLER, JR., (Capt., USAF), M.A.
(Arizona State College)
Assistant Professor, Air Science

ROBERT H. FETNER, Ph.D.
(Emory University)
Research Professor of Applied Biology,
Engineering Experiment Station

DANIEL C. FIELDER, Ph.D.
(Georgia Institute of Technology)
Professor, Electrical Engineering

JAMES H. FINCH, B.S. Arch.
(Georgia Institute of Technology)
Reg. Arch. (Georgia)
Part-time Associate Professor
Architecture

JAMES R. FINCHER, M.S.
(Georgia Institute of Technology)
Assistant Professor, Civil Engineering

DAVID L. FINN, Ph.D.
(Purdue University)
Professor, Electrical Engineering

HERMENEGILDA A. FLASCHKA, Ph.D.
(University of Graz, Austria)
Professor, Chemistry

R. K. FLEGE, M.S.
(Massachusetts Institute of Technology)
Professor, Textile Engineering

JULIAN D. FLEMING, JR., Ph.D.
(Georgia Institute of Technology)
P.E. (Georgia)
Associate Professor, Chemical Engineering

GERALD B. FLETCHER, B.S.
(Georgia Institute of Technology)
Associate Professor, Textile Engineering

WILLIAM A. FLINN, Ph.D.
(Ohio State University)
Associate Professor, Industrial Management

EDWARD R. FLYNT, M.S.
(Georgia Institute of Technology)
P.E. (Georgia)
Special Research Engineer
Engineering Experiment Station

LEON L. FOLSOM, JR., B.S.
(Georgia Institute of Technology)
Research Assistant
Engineering Experiment Station

IRVING F. FOOTE, M.A.
(University of Connecticut)
Assistant Professor, English

JOSEPH FORD, Ph.D.
(Johns Hopkins University)
Associate Professor, Physics

EDWARD FOSTER, M.A.
(Harvard University)
Professor, English

HORACE ORION FOSTER, M.S.
(Georgia Institute of Technology)
Associate Professor, Mechanical Engineering
JOHN T. GODWIN, M.D.  
(Emory University)  
Special Research Scientist  
Engineering Experiment Station

MARIO J. GOGLIA, Ph.D.  
(Purdue University)  
Associate Dean of Faculties,  
Regents' Professor, Mechanical  
Engineering, and Dean, Graduate  
Division

JAMIE J. GOODE, M.S.  
(Georgia Institute of Technology)  
Assistant Professor, Mathematics

WILLIAM L. (DYNAMITE) GOODLOE  
(Georgia Institute of Technology)  
Assistant in Football

ROBERT M. GOODMAN, B.S.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Research Engineer  
Engineering Experiment Station

CLOYD S. GOODRUM, JR., M.A.  
(University of North Carolina)  
Instructor, Mathematics

CHARLES W. GORTON, Ph.D.  
(Purdue University)  
Professor, Mechanical Engineering

MALCOLM GOTTERER, D.B.A.  
(Harvard University)  
Associate Professor, Industrial  
Management

JAMES GOUGH, JR., M.A.  
(Harvard University)  
Assistant Professor, Modern  
Languages

JOHN CHARLES GOULD, M.R.P.  
(University of North Carolina)  
Associate Professor (part-time),  
Architecture, Social Sciences

JAMES H. GRADY, B.Arch.  
(Ohio State University)  
Reg. Arch. (North Carolina)  
Professor, Architecture

WILLIAM M. GRAVES, B.S.  
(Georgia Institute of Technology)  
Assistant Research Mathematician  
Engineering Experiment Station

ROBIN B. GRAY, Ph.D.  
(Princeton University)  
Professor, Aerospace Engineering

ROBERT EARL GREEN, D.B.A.  
(Indiana University)  
Assistant Professor, Industrial  
Management

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(Florida State University)  
Technical Reports Librarian

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(Georgia Institute of Technology)  
Assistant Professor, Architecture

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(University of North Carolina)  
Assistant Professor, Mathematics  
Engineering Experiment Station

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(Georgia Institute of Technology)  
Instructor, Electrical Engineering

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(Georgia Institute of Technology)  
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(Duke University)  
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Assistant Professor, Engineering  
Graphics  

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(Georgia Institute of Technology)  
Assistant to the Administrator of  
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Instructor, English  

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(Columbia University)  
Professor and Head, Department of  
Social Sciences  

WARREN P. HENDRIX, B.S.  
(North Georgia College)  
Assistant Research Physicist  
Engineering Experiment Station  

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(Wofford College)  
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(University of Florida)  
Associate Director, Department of  
Continuing Education  

WALTER H. HICKLIN  
Assistant Research Engineer  
Engineering Experiment Station  

ALBERTO F. HIDALGO, M.S.  
(Georgia Institute of Technology)  
Research Assistant  
Engineering Experiment Station  

HELEN HIER, M.A. in L.S.  
(Florida State University)  
Chief General Studies Librarian  

G. DEWEY HILDING, M.S.  
(Colorado School of Mines)  
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Graphics  

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Professor, Engineering Mechanics  

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Research Assistant  
Engineering Experiment Station  

RALPH LENTON HILL, M.S.  
(Georgia Institute of Technology)  
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(Yale University)  
P.E. (Georgia)  
Professor, Mechanical Engineering  

WILLIAM HENRY HITCH, B.M.E.  
(Georgia Institute of Technology)  
Associate Director, Co-operative  
Division  

DAR-VEIG HO, Ph.D.  
(Brown University)  
Assistant Professor, Mathematics  

DONALD G. HORBS, M.S.  
(Georgia Institute of Technology)  
Research Assistant, Engineering  
Experiment Station  

ROBERT F. HOCHMAN, Ph.D.  
(University of Notre Dame)  
Associate Professor, Chemical  
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FREMONT B. HODSON  
Lecturer, Engineering Graphics  
(Retired)  

HAROLD W. HOLADY, JR., (Capt.,  
USAF), B.S.  
(University of Washington)  
Assistant Professor, Air Science  

ARCHIBALD DINSMORE HOLLAND,  
M.S.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Professor Emeritus, Mechanical  
Engineering
<table>
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<tr>
<th>Name</th>
<th>Title</th>
<th>Institution</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Louis Holliman, Ph.D.</td>
<td>Associate Professor, Mechanical Engineering</td>
<td>Georgia Institute of Technology</td>
<td></td>
</tr>
<tr>
<td>*Albert L. Holliman, M.S.</td>
<td>Research Assistant Professor, Mechanical Engineering</td>
<td>Georgia Institute of Technology</td>
<td></td>
</tr>
<tr>
<td>Chandler H. Holton, M.A.</td>
<td>Associate Professor, Mathematics</td>
<td>Harvard University</td>
<td></td>
</tr>
<tr>
<td>Clarke W. Hook, M.A.</td>
<td>Professor, Mathematics</td>
<td>University of North Carolina</td>
<td></td>
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<td>John W. Hooper, Ph.D.</td>
<td>Assistant Professor, Electrical Engineering</td>
<td>Georgia Institute of Technology</td>
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<td>Basil Hoover, M.A.</td>
<td>Assistant Director, Counseling and Guidance</td>
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<td>Davidson College</td>
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<td>Roger Sheppard Howell, M.S.</td>
<td>Director Emeritus, Engineering Extension Division</td>
<td>Georgia Institute of Technology</td>
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<td>Joseph Herman Howey, Ph.D.</td>
<td>Professor and Director, School of Physics</td>
<td>Yale University</td>
<td></td>
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<tr>
<td>William A. Howington (Maj., USAF) B.B.A.</td>
<td>Assistant Professor, Air Science</td>
<td>University of Georgia</td>
<td></td>
</tr>
<tr>
<td>James L. Hubbard, B.S.</td>
<td>Research Assistant Engineering Experiment Station</td>
<td>Georgia Institute of Technology</td>
<td></td>
</tr>
<tr>
<td>James E. Hubbardt, M.S.</td>
<td>Associate Professor, Aerospace Engineering</td>
<td>Case Institute of Technology</td>
<td></td>
</tr>
<tr>
<td>Ross Brown Hughes, B.S.</td>
<td>Research Assistant Engineering Experiment Station</td>
<td>Georgia Institute of Technology</td>
<td></td>
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<tr>
<td>Harold R. Hunt, Ph.D.</td>
<td>Assistant Professor, Chemistry</td>
<td>University of Chicago</td>
<td></td>
</tr>
<tr>
<td>Ewing Hunter, M.S.</td>
<td>Instructor, Industrial Management</td>
<td>Georgia Institute of Technology</td>
<td></td>
</tr>
<tr>
<td>Zelma Ann Hunttoon, M.A.</td>
<td>Research Mathematician</td>
<td>Columbia University</td>
<td></td>
</tr>
<tr>
<td>F. Kenneth Hurd, Ph.D.</td>
<td>Engineering Experiment Station</td>
<td>University of California</td>
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<td>John E. Husted, M.A.</td>
<td>Associate Professor, Geology</td>
<td>University of Virginia</td>
<td></td>
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<tr>
<td>John D. Hutcheson, M.S.</td>
<td>Engineering Experiment Station</td>
<td>Georgia Institute of Technology</td>
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<td>Joseph Herman Howey, Ph.D.</td>
<td>Assistant Professor, Physical Training and Basketball Coach</td>
<td>University of California</td>
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<tr>
<td>William L. Hyden, Ph.D.</td>
<td>Professor, Textile Engineering</td>
<td>Johns Hopkins University</td>
<td></td>
</tr>
<tr>
<td>John C. Hyder, B.S.</td>
<td>Assistant Professor, Physical Training and Basketball Coach</td>
<td>Georgia Institute of Technology</td>
<td></td>
</tr>
<tr>
<td>Eric R. Immel, Ph.D.</td>
<td>Professor, Mathematics</td>
<td>University of California at Los Angeles</td>
<td></td>
</tr>
<tr>
<td>Robert S. Ingols, Ph.D.</td>
<td>Director, School of Applied Biology, Research Professor,</td>
<td>Rutgers University</td>
<td></td>
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<tr>
<td></td>
<td>Engineering Experiment Station</td>
<td>Georgia</td>
<td></td>
</tr>
</tbody>
</table>
Richard E. Inman, B.S.
(Georgia Institute of Technology)
Assistant in Football

Doris N. Isley, M.A.
(Florida State University)
Librarian, School of Architecture

James L. Jackson, B.S.
(Indiana State)
Procurement Officer

Sarah Evelyn Jackson, Ph.D.
(Emory University)
Assistant Professor, English

Thomas W. Jackson, Ph.D.
(Purdue University)
P.E. (Ohio, Georgia)
Research Professor, Mechanical Engineering and Chief, Mechanical Sciences Division, Engineering Experiment Station

R. Kenneth Jacobs, Ph.D., D.Eng.
(University of Michigan, Ohio Northern University)
P.E. (Georgia and Ohio)
Professor and Head, Department of Engineering Graphics

John W. Jayne, M.A.
(Vanderbilt University)
Assistant Professor, Mathematics

Annibel Jenkins, M.A.
(Baylor University)
Assistant Professor, English

Alton P. Jensen, B.S.
(Georgia Institute of Technology)
Research Engineer
Engineering Experiment Station

William Ben Johns, Jr., M.S.
(Georgia Institute of Technology)
P.E. (Georgia)
Professor Emeritus, Engineering Mechanics

Alexander K. Johnson (Lt. Colonel, USAF), B.S.
(University of Omaha)
Professor, Air Science

Cecil G. Johnson, M.S.
(Georgia Institute of Technology)
Associate Professor, Industrial Engineering

Harold L. Johnson, Ph.D.
(Georgia Institute of Technology)
Assistant Professor, Mechanical Engineering

James W. Johnson, B.S.
(North Georgia College)
Assistant Research Physicist
Engineering Experiment Station

Lawrence V. Johnson, M.S.
(Ohio State University)
Director, Engineering Extension Division

 Lynwood A. Johnson, M.S.I.E.
(Georgia Institute of Technology)
P.E. (Georgia)
Assistant Professor, Industrial Engineering

Norma M. Johnson, A.B.
(University of Georgia)
Assistant Registrar

Richard C. Johnson, Ph.D.
(Georgia Institute of Technology)
P.E. (Georgia)
Research Physicist and Head, Radar Branch
Engineering Experiment Station

Roger D. Johnson, Ph.D.
(University of Virginia)
Associate Professor, Mathematics

Susan A. Johnson, Ph.D.
(Northwestern University)
Instructor, Chemistry

Channing E. Jones (Lt., SC, U.S.N.), B.S.
(Georgia Institute of Technology)
Assistant Professor, Naval Science

Charles Alfred Jones, B.S.
(Georgia Institute of Technology)
Professor-Emeritus, Textile Engineering

Don B. Jones, M.S.
(State University of Iowa)
P.E. (Georgia)
Assistant Professor, Civil Engineering

William B. Jones, Jr., Ph.D.
(Georgia Institute of Technology)
Professor, Electrical Engineering

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FRANCES E. KAISER, M.A.  
(Emory University)  
Interlibrary Services Librarian  

WILLIAM J. KAMMERER, Ph.D.  
(University of Wisconsin)  
Associate Professor, Mathematics  

ROBERT H. KASRIEL, Ph.D.  
(University of Virginia)  
Professor, Mathematics  

MORTIMER I. KAY, Ph.D.  
(University of Connecticut)  
Research Associate Professor of Chemistry  
Engineering Experiment Station  

PATRICK KELLY, M.A.  
(Emory University)  
Assistant Professor, Social Sciences  

THOMAS A. KELLY, Jr., (Capt., U.S. Army-Ord. C.), B.A.  
(Hofstra University)  
Assistant Professor, Military Science  

NISBET S. KENDRICK, M.S.  
(Emory University)  
Assistant Professor, Physics  

PHILIP S. KENT, (Lt., U.S.N.), B.S.  
(Villanova University)  
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(Emory University)  
Associate Professor, English  

THOMAS W. KETHLEY, M.S.  
(Emory University)  
Research Professor of Applied Biology and Head, Bioengineering Laboratory  
Engineering Experiment Station  

ROBERT B. KIMMEL, B.S.  
(Georgia Institute of Technology)  
Assistant Registrar  

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(Northwestern University)  
Assistant Professor, Chemistry  

AUGUSTUS L. KINARD, LL.B.  
(John Marshall Law School)  
Research Assistant  
Engineering Experiment Station  

CARL E. KINDSVATER, M.S.  
(State University of Iowa)  
P.E. (Georgia)  
Director, Water Resources Center; Regents' Professor, Civil Engineering  

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P.E. & L.S. (Connecticut)  
Professor, Civil Engineering  

JOHN F. KINNEY, M.S.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Research Associate Professor and Head, Thermo and Fluid Dynamics Branch  
Engineering Experiment Station  

ROBERT S. KIRKLAND, B.S.  
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Research Engineer  
Engineering Experiment Station  

ARTHUR T. KITTLE, D.L.S.  
(Columbia University)  
Chief Science-Technology Librarian and Assistant Professor, Information Science  

JACK KLEINER, S.J.D.  
(New York Law School)  
Special Lecturer, Industrial Management  

JAMES A. KNIGHT, Jr., Ph.D.  
(Pennsylvania State University)  
Research Professor, Chemistry Head, Radioisotopes Laboratory  
Engineering Experiment Station  

LEE H. KNIGHT, Jr., M.S.  
(Georgia Institute of Technology)  
Research Engineer  
Engineering Experiment Station  

NAN E. KNOWLES, A.B.  
(Women's College of Georgia)  
Research Assistant  
Engineering Experiment Station  

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Professor, Industrial Engineering

DALTON C. KURTS, B.S.
(Louisiana State University)
Research Assistant
Engineering Experiment Station

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Assistant in Football

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(Emory University)
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Professor, Physical Training

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Lecturer, Engineering Graphics,
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Assistant Professor, Textile
Engineering

ALAN G. LAW, M.A.
(University of British Columbia)
Instructor, Mathematics

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(Georgia Institute of Technology)
Assistant Professor, Industrial
Management

ROBERT N. LEHRER, Ph.D.
(Purdue University)
P.E. (Georgia)
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BEVERLY M. LEIGH, JR. (Col. U. S. Army—Arty), B.S.
(Mississippi State University)
Professor, Military Science

S. P. LENOIR, JR., M.S.
(Georgia Institute of Technology)
Special Research Engineer
Engineering Experiment Station

WILLIAM FRANKLIN LESLIE, B.I.E.
(Georgia Institute of Technology)
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Co-operative Division

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P.E. (Georgia)
Professor, Chemical Engineering

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(Emory University)
Research Scientist and Head,
Manpower Resources Branch
Engineering Experiment Station

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Associate Professor, Mathematics

THEODORIC C. LINTHICUM, B.S.
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Lecturer, Engineering Graphics

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(Georgia Institute of Technology)
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Associate Professor, Engineering
Mechanics

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Engineering Experiment Station

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Assistant Research Engineer
Engineering Experiment Station

EDWARD H. LOVELAND, Ph.D.
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School of Psychology
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(Georgia Institute of Technology)  
P.E., Reg. Land Surveyor (Georgia)  
Professor, Civil Engineering  
(Retired)

JAMES KARL LUCK, JR., B.S.  
(Georgia Institute of Technology)  
Head Baseball Coach  
Assistant in Football

JOHN H. MACKAY, Ph.D.  
(University of North Carolina)  
Research Professor of Mathematics;  
Engineering Experiment Station  
Assistant Chief, Rich Electronic  
Computer Center

GEORGE E. MADDOX, M.S.  
(Georgia Institute of Technology)  
Assistant Professor, Industrial  
Management

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Cataloger, Library

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Statistician, Registrar's Office

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Sc.  
(Technische Hochschule, Vienna,  
Austria)  
Professor, Engineering Mechanics

ANDREW W. MARRIS, Ph.D.  
(University of New Zealand)  
P.E. (British Columbia, Canada and  
Georgia)  
Professor, Engineering Mechanics

ALPHEUS R. MARSHALL, Ph.D.  
(University of Virginia)  
Professor, Industrial Management

CHARLES S. MARTIN, M.S.  
(Georgia Institute of Technology)  
Assistant Professor, Civil  
Engineering

DAVID W. MARTIN, Ph.D.  
(University of Michigan)  
Associate Professor, Physics

ROY A. MARTIN, M.S.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Special Research Engineer,  
Engineering Experiment Station  
Lecturer, School of Electrical  
Engineering  
Assistant Secretary, Georgia Tech  
Research Institute

WILLIAM A. MARTIN, M.A.  
(University of Alabama)  
Associate Professor, Mathematics

MRS. HELEN B. MARTINI, M.A. in  
L.S.  
(University of Illinois)  
Cataloger, Library

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(University of Idaho)  
P.E. (Georgia)  
Professor, Mechanical Engineering  
(Retired)

JESSE W. MASON, Ph.D., D. Eng.  
(Yale University, University of  
Louisville)  
P.E. (Georgia)  
Dean, Engineering College and  
Professor, Chemical Engineering

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(Georgia Institute of Technology)  
Assistant Professor, Civil  
Engineering

PAUL G. MAYER, Ph.D.  
(Cornell University)  
P.E. (Georgia)  
Associate Professor, Civil  
Engineering

G. LAFAYETTE MAYNARD, B.S.  
(Georgia Institute of Technology)  
Research Assistant  
Engineering Experiment Station

JAMES A. MCALISTER, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

JAMES HERBERT MCAULEY, B.S.  
(Georgia Institute of Technology)  
Associate Professor, Physical  
Training
JOSEPH L. McCARTER (Maj., USAF), M.S.  
(University of Omaha)  
Assistant Professor, Air Science

JAMES WELDON McCARTY, M.S. in T.E.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Associate Professor, Textile Engineering

HOYT L. MCCLURE, M.S.  
(Georgia Institute of Technology)  
Director, Southern Technical Institute

E. W. MC DANIEL, Ph.D.  
(University of Michigan)  
Professor, Electrical Engineering

HENRY A. McGEE, Jr., Ph.D.  
(Georgia Institute of Technology)  
Research Associate Professor, Chemical Engineering, Engineering Experiment Station

CHARLES W. MCGUIRT, M.S.  
(Georgia Institute of Technology)  
Assistant Professor, Aerospace Engineering

HOWARD L. MCKINLEY, M.S.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Professor, Electrical Engineering

JAMES W. H. MCKoy, B.S.  
(Georgia Institute of Technology)  
Research Engineer and Head, Industrial Location Analysis Section  
Engineering Experiment Station

LUTHER A. McLENDON, Jr., Certificate in Criminology  
(George Washington University)  
Head, Employment, Security, Property Services  
Engineering Experiment Station

J. CONRAD MEADERS, B.A.  
(Emory University)  
Research Assistant  
Engineering Experiment Station

MARK E. MEADOWS, M.A.  
(Peabody College)  
Assistant Director, Counseling and Guidance

FRANCIS J. MEE, M.S.  
(Columbia University)  
Lecturer, Engineering Graphics  
(Retired)

ROBERT E. MEIK, M.S.  
(University of Kentucky)  
Engineering Experiment Station

HOWARD K. MENHINICK, M.L.A.C.P.  
(Harvard University)  
Regents' Professor, City Planning

WILLIAM RICHARD METCALFE, A.M.  
(Emory University)  
Associate Professor, English

CLARENCE C. MILEY, M.S.  
(Georgia Institute of Technology)  
Research Economist  
Engineering Experiment Station  
Head, Management Sciences and Business Processing Branch, Rich Electronic Computer Center

GEORGE A. MILLER, Ph.D.  
(University of Michigan)  
Assistant Professor, Chemistry

GORDON J. MILLIKEN (Capt., USAF), B.A.  
(Bowdoin College)  
Assistant Professor, Air Science

R. WILLIAM MILLMAN, Ph.D.  
(University of Florida)  
Assistant Professor, Industrial Management

HONG SHIK MIN, Ph.D.  
(University of Georgia)  
Assistant Professor, Applied Biology

LANE MITCHELL, Ph.D.  
(Pennsylvania State University)  
P.E. (Georgia)  
Professor and Director, Ceramic Engineering

MORRIS MITZNER, B.S.S.  
(City College)  
Lecturer, Social Sciences

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(Georgia Institute of Technology)  
Assistant Professor, Electrical Engineering
JOSEPH J. MODER, Ph.D.  
(Northwestern University)  
P.E. (Georgia)  
Professor, Industrial Engineering

RICHARD P. MOLL, Ph.D.  
(University of Tennessee)  
Associate Professor, Psychology

WILLIS E. MOODY, JR., Ph.D.  
(North Carolina State College)  
P.E. (Georgia)  
Professor, Ceramic Engineering

JOSEPH E. MOORE, Ph.D.  
(Peabody College)  
Regents' Professor, Psychology

MACK A. MOORE, Ph.D.  
(University of Wisconsin)  
Assistant Professor, Industrial Management

LESLIE MORRIS, M.D.  
(Harvard Medical School)  
Director, Health (Retired)

ROBERT L. MORRIS, B.S.  
(Georgia Institute of Technology)  
Research Assistant  
Engineering Experiment Station

WILLIAM B. MULLEN, Ph.D.  
(Columbia University)  
Associate Professor, English

MRS. MARJORIE H. MULLER, M.S.  
in L.S.  
(Florida State University)  
Assistant Science-Technology Librarian

JOSEPH C. MULLINS, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

JOHN H. MURPHY, Ph.D.  
(Georgia Institute of Technology)  
Associate Professor, Mechanical Engineering

KARL M. MURPHY, Ph.D.  
(Harvard University)  
Professor, English

THOMAS H. MURRAY, (Maj. U. S. Army—Arty.), B.S.  
(Illinois Institute of Technology)  
Assistant Professor, Military Science

ANN E. NAGEL, B.S.  
(Newcomb College of Tulane University)  
Research Assistant  
Engineering Experiment Station

TAKASHI NAKADA, Ph.D.  
(Tokyo Institute of Technology)  
Visiting Professor, Mechanical Engineering

PHIL BLASIER NARMORE, Ph.D.  
(University of Michigan)  
P.E. (Georgia)  
Regents' Professor Emeritus,  
Engineering Mechanics

M. ZUHAIR NASHERD, Ph.D.  
(University of Michigan)  
Assistant Professor, Mathematics

HELEN H. NAUGLE, M.A.  
(University of Mississippi)  
Instructor, English

JOHN D. NEFF, Ph.D.  
(University of Florida)  
Associate Professor, Mathematics

ROBERT NELSON, B.S.  
(Springfield College)  
Assistant Professor, Physical Training

HENRY M. NEUMANN, Ph.D.  
(University of California)  
Professor, Chemistry

WILLIAM MEESSE NEWTON, Ph.D.  
(University of Iowa)  
Professor, Chemical Engineering

W. EUGENE NICHOLS, M.S.  
(Indiana University)  
Assistant Dean of Students

PETER R. NORRIS, M.A.  
(Harvard University)  
Reg. Arch. (North Carolina, Virginia)  
Assistant Professor, School of Architecture

MRS. FRANCES NORTON  
Administrative Assistant, Dean of Engineering College
FRANK O. NOTTINGHAM, JR., Ph.D.  
(Purdue University)  
P.E. (New York)  
Professor, Electrical Engineering

RODERICK F. O'CONNOR, Ph.D.  
(Vanderbilt University)  
Professor, Industrial Management

LESTER D. OLSON (Cdr., U.S. Navy), B.A.  
(Morningside College)  
Executive Officer and Associate Professor, Naval Science

CHARLES R. O'MELIA, Ph.D.  
(University of Michigan)  
Assistant Professor, Civil Engineering

JOHN P. O'NEILL, M.A.  
(New York University)  
Assistant Professor, English

CLYDE ORR, JR., Ph.D.  
(Georgia Institute of Technology)  
Research Professor, Chemical Engineering and Head, Micromeritics Branch, Engineering Experiment Station

James M. Osborn, Ph.D.  
(University of Michigan)  
Associate Professor, Mathematics

RADNOR JOSEPH PAQUETTE, M.S.  
(Michigan College of Mining and Technology)  
P.E. (Michigan, Florida, Georgia, Alabama)  
Professor, Civil Engineering

DEMETRIUS T. PARIS, Ph.D.  
(Georgia Institute of Technology)  
Associate Professor, Electrical Engineering

JOHN F. PARKER, B.C.S.  
(Georgia State College)  
Engineering Assistant  
Engineering Experiment Station

GEORGE E. PASSEY, Ph.D.  
(Tulane University)  
Lecturer, Psychology

E. T. PATRONIS, JR., Ph.D.  
(Georgia Institute of Technology)  
Associate Professor, Physics

JOHN W. PATTILLO, Master of Librarianship  
(Emory University)  
Assistant Physical Processing Librarian

M. CARR PAYNE, JR., Ph.D.  
(Princeton University)  
Associate Professor, Psychology

KENNETH W. PEARCE, (Capt., U.S. Army—Inf.), A.B.  
(Citadel)  
Assistant Professor, Military Science

EDWARD E. PERKINS, M.S.  
(University of Illinois)  
P.E. (Georgia)  
Associate Professor, Electrical Engineering

IRWIN E. PERRIN, Ph.D.  
(University of Chicago)  
Research Professor, Mathematics, Engineering Experiment Station  
Head, Mathematical Analysis Branch, Rich Electronic Computer Center

HERBERT P. PETERS, M.S.  
(Pennsylvania State University)  
Special Research Engineer Engineering Experiment Station

JOHN R. PETERSON, B.S.  
(Carnegie Tech)  
Research Engineer and Head, Market Analysis Branch Engineering Experiment Station

THOMAS D. PHILIPS, A.B.  
(Emory University)  
Instructor, Social Sciences

CHARLES L. PHILLIPS, Ph.D.  
(Georgia Institute of Technology)  
Assistant Professor, Electrical Engineering

KENNETH G. PICHA, Ph.D.  
(University of Minnesota)  
Professor and Director, Mechanical Engineering

ROBERT A. PIEROTTI, Ph.D.  
(University of Washington)  
Associate Professor, Chemistry
MAXIMILIAN J. A. PINL, Dr. Phil, Dr. Rer. Nat. (University of Vienna, University of Prague) 
Visiting Professor, Mathematics

JULIAN HOWARD PITTARD, B.S. (Vanderbilt University) 
Assistant in Football

E. JUANITA PITTS, M.A. (University of Alabama) 
Assistant Professor, Mathematics

TOMMY PLAXICO, B.S. (Georgia Institute of Technology) 
Associate Professor, Physical Training

FREDERICK G. POHLAND, Ph.D. (Purdue University) 
Assistant Professor, Civil Engineering

RICHARD J. POINSETT, B.E.E. (Georgia Institute of Technology) 
Research Assistant Engineering Experiment Station

DEMETROIS A. POLYCHRONE, Sc.D. (Massachusetts Institute of Technology) 
P.E. (Ga., N.Y., Pa., Md., Va., Tenn., Ala.) 
Professor, Structural Design

EVAN D. PORTER, M.S. (Emory University) 
Research Assistant Professor, Applied Biology Engineering Experiment Station

EVERETT O. POSEY, B.S. (The Citadel) 
Head, Supply Services, Assistant Head, Employment, Security, Property Services Engineering Experiment Station

MRS. CHARLES T. POTTINGER, 
Certificate in Library Science (Emory University) 
Music Librarian (Retired)

NICK E. POULOS, M.S. (Georgia Institute of Technology) 
Research Engineer and Associate Head, High Temperature Materials Branch, Engineering Experiment Station

ROLLIN R. POWELL, JR., (Maj., Emory University) 
USMC), B.S. Assistant Professor, Naval Science

MRS. MARY R. POWER, M.Ln. (Emory University) 
Assistant General Studies Librarian

WILLIAM J. PROCTOR, LL.B., M.A. (Vanderbilt University) 
Member, Atlanta Bar Association 
Professor, Industrial Management

EDWARD THERON PROSSER, M.A. (Ohio Wesleyan University) 
Associate Professor, Physics

CHARLES B. PYLES, M.A. (University of Arkansas) 
Assistant Professor, Social Sciences

BERRY OWEN PYRON, M.S. (Georgia Institute of Technology) 
Research Physicist Engineering Experiment Station

THOMAS H. QUIGLEY, A.B. (Indiana University) 
Director Emeritus, Department of Trade and Industrial Education, Engineering Extension Division

ROBERT F. RABUN, B.Arch. (Georgia Institute of Technology) 
Assistant Professor, Architecture

GLENN W. RAINY, M.A. (Emory University) 
Professor, English

GEORGE W. RAMEY, JR., B.S. in Arch. (Georgia Institute of Technology) 
Reg. Arch. (Georgia) Part-time Associate Professor, Architecture

W. NEAL RATCLIFF, B.S. (Oklahoma State University) 
Head, Fire Institute Industrial Education Department

MILTON E. RAVILLE, Ph.D. (University of Wisconsin) 
P.E. (Kansas) 
Professor and Director, Engineering Mechanics
JAMES D. RAY, Ph.D.  
(Stanford University)  
Assistant Professor, Chemistry

WALTER L. REAGH  
Research Assistant  
Engineering Experiment Station

PHILIP G. RECTOR, B.M.E.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Plant Engineer, Physical Plant Department

CHARLES P. REED, JR., M.S.  
(Georgia Institute of Technology)  
Research Engineer  
Engineering Experiment Station  
Head, Computer Sciences and Programming Branch,  
Rich Electronic Computer Center

J. E. RHODES, JR., Ph.D.  
(Johns Hopkins University)  
Senior Research Physicist  
Engineering Experiment Station

MELTON E. RHODES, JR., (Lt.JG., USN), B.S.  
(University of Mississippi)  
Assistant Professor, Naval Science

RAYMOND D. RICKS, M.A.  
(University of Virginia)  
Instructor, Social Sciences

MARY H. RIDDLE, B.A.  
(Hollins College)  
Research Assistant  
Engineering Experiment Station

JOHN B. RIGGSBEE, M.D.  
(Vanderbilt University)  
Director of Health

JAMES C. S. RIVERS, M.A.  
(University of South Carolina)  
Assistant Professor, English

WAYNE K. RIVERS, JR., M.S.  
(Georgia Institute of Technology)  
Research Physicist  
Engineering Experiment Station

T. MAE ROAN, M.L.S.  
(Emory University)  
Research Assistant  
Engineering Experiment Station

CARLYLE J. ROBERTS, Ph.D.  
(University of Rochester)  
Professor, Nuclear Engineering and Applied Biology; Head, Frank H. Neely Nuclear Research Center  
Engineering Experiment Station

EDWARD GRAHAM ROBERTS, Ph.D.  
(University of Virginia)  
Chief of Readers' Services, Library and Assistant Professor, Information Science

DOUGLAS W. ROBERTSON, M.S.  
(Georgia Institute of Technology)  
Research Engineer and Head, Communications Branch  
Engineering Experiment Station

JOHN W. ROBERTSON, B.S.  
(Georgia Institute of Technology)  
Research Assistant  
Engineering Experiment Station

DOUGLAS J. ROBILLARD, M.A.  
(Columbia University)  
Assistant Professor, English

DANIEL A. ROBINSON, M.S.  
(Rensselaer Polytechnic Institute)  
Assistant Professor, Mathematics

FRANK E. ROPER, JR., M.S.I.E.  
(Georgia Institute of Technology)  
Instructor, Industrial Engineering

LAURENCE W. ROSS, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

FRANK M. ROWAN, B.S.  
(Georgia Institute of Technology)  
Assistant Professor, Engineering Mechanics (Retired)

DONALD JACK ROYER, Ph.D.  
(University of Kansas)  
Associate Professor, Chemistry

LARRY J. RUBIN, Ph.D.  
(Emory University)  
Assistant Professor, English

WALTER S. RUSSELL, JR., M.A.  
(Vanderbilt University)  
Assistant Professor, English
WALLACE C. RYAN (Major, USAF), M.S. (Ohio State) 
Assistant Professor, Air Science

PAUL H. SANDERS, Ph.D. (Carnegie Institute of Technology) 
Assistant Professor, Civil Engineering

EDWARD SANFORD, (LCDR, USN), B.A. (Amherst College) 
Assistant Professor, Naval Science

MRS. MARY NELL SANTACROCE, M.A. (Emory University) 
Drama Director, English Department

ISAAC ELIAS SAPORTA, Architekt, Diplom-Ingenieur (Saxon State Polytechnicum, Germany) 
Reg. Arch. (Georgia, South Carolina, Germany, Greece) 
Associate Professor, Architecture

HARRY CLIFTON SAVAGE, JR., M.S.Ed. (The Citadel) 
Associate Professor, Engineering Graphics (Retired)

DOMENICO PIETRO SAVANT, M.S. (Rose Polytechnic Institute, Harvard University) 
Professor-Emeritus, Electrical Engineering

WILLIAM ARTHUR SCHAFFER, B.S. (Georgia Institute of Technology) 
Assistant Professor, Industrial Management

ROBERT S. SCHARF, Ph.D. (University of Kiel, Germany) 
Professor, Social Sciences

EDWIN J. SCHEIBNER, Ph.D. (Illinois Institute of Technology) 
Research Professor, Physics 
Chief, Physical Sciences Division 
Engineering Experiment Station

WILLIAM MCNAIR SCHOFIELD, Ph.D. (University of Cincinnati) 
Research Physicist 
Engineering Experiment Station

H. PAUL SCHRANK, JR., M.S. (University of Illinois) 
Assistant General Studies Librarian

FREDERICK W. SCHUTZ, JR., Ph.D. (University of Illinois) 
P.E. (Georgia) 
Director, Civil Engineering

ALBERT T. SCOTT (Lt. U.S. Navy), B.S. (University of Mississippi) 
Assistant Professor, Naval Science

WILLIAM J. SEAY, B.A. (Alabama Polytechnic Institute) 
Assistant Professor, Architecture

R. FRED SESSIONS, Ph.D. (Stanford University) 
Professor, Chemistry

CHARLES H. SEWELL, B.A. (Emory University) 
Research Scientist and Head, Industrial Services Branch 
Engineering Experiment Station

*PHILLIP G. SEXTON, M.S. (Georgia Institute of Technology) 
Assistant Professor, Mechanical Engineering

ROBERT G. SHACKELFORD, M.S. (Georgia Institute of Technology) 
Assistant Research Engineer 
Engineering Experiment Station

RALPH E. SHARP, B.S. (Middle Tennessee State College) 
Instructor, Applied Biology

WILLIAM S. SHEPARD, M.S. (Georgia Institute of Technology) 
Assistant Professor, Mechanical Engineering

ARTHUR J. SHERIDAN, B.S. (U.S. Military Academy) 
Lecturer, Engineering Graphics (Retired)

PETER B. SHERRY, Ph.D. (University of Virginia) 
Assistant Professor, Chemistry

*On leave.
Vernon M. Shipley, Jr., B.Arch.
(Georgia Institute of Technology)
Reg. Arch. (Georgia)
Associate Professor, Architecture

Nancy C. Shofner, M.Ln.
(Emory University)
Assistant General Studies Librarian

*George J. Simitses, M.S., A.E.
(Georgia Institute of Technology)
Assistant Professor, Aerospace Engineering

William C. Simpson, Ph.D.
(University of Virginia)
Associate Professor, Physics

Ben Logan Sisk, M.A.
(University of Michigan)
Bandmaster

Glenn N. Sisk, Ph.D.
(Duke University)
Professor, Social Sciences

George M. Slaughter, M.S.
(Ohio State University)
P.E. (Georgia)
Assistant Professor, Civil Engineering

Miss Sarah Quinn Slaughter,
M.A.
(Columbia University)
Administrative Assistant Aerospace Engineering

George Slayton, M.S.
(Emory University)
Instructor, Physics

Marvin B. Sledd, Ph.D.
(Massachusetts Institute of Technology)
Professor, Mathematics

Harold E. Smalley, Ph.D.
(University of Pittsburgh)
P.E. (Georgia)
Professor, Industrial Engineering

Charles E. Smith
Engineering Assistant Engineering Experiment Station

Donald H. Smith, B.S.
(Michigan State University)
Assistant Professor, Engineering Graphics

Eleanor Smith, B.S. in L.S.
(University of North Carolina)
Chief Cataloger, Library

James Penny Smith, M.A.
(University of North Carolina)
Instructor, English

Joseph N. Smith, B. Arch.
(Georgia Institute of Technology)
Reg. Arch. (Florida, Georgia)
Assistant Professor and Administrative Assistant, Architecture

Robert Hall Smith, B.S.
(U.S. Naval Academy)
Lecturer, Engineering Graphics

Vedene H. Smith, Ph.D.
(Georgia Institute of Technology)
Research Physicist Engineering Experiment Station

William R. Smythe, Jr., Ph.D.
(Duke University)
Associate Professor, Mathematics

William M. Snyder, M.S.
(Massachusetts Institute of Technology)
Professor, Civil Engineering

Walter Francis Spara, M.A.
(Canisius)
Instructor, English

William Monroe Spicer, Ph.D.
(University of Virginia)
Professor and Director, School of Chemistry

Ralph R. Spillman, M.A.
(University of North Carolina)
Associate Professor, English

William R. Spruill, B.S.
(University of Maryland)
Instructor, English
TED R. ST. CLAIR, B.S.  
(Texas Technological College)  
Assistant Research Economist  
and Head, Northwest Georgia  
Branch  
Engineering Experiment Station  

FRANK W. STALLARD, Ph.D.  
(University of North Carolina)  
Associate Professor, Mathematics  

A. W. STALNAKER, M.S.  
(Georgia Institute of Technology)  
Instructor, Industrial Management  

JAMES A. STANFIELD, Ph.D.  
(University of Tennessee)  
Professor, Chemistry  

AUSTIN L. STARRETT, A.M.  
(Harvard University)  
Professor, Mathematics  

ROCKER T. STATON, JR., Ph.D.  
(Johns Hopkins University)  
Associate Dean, Engineering  
College and Professor, Industrial  
Engineering  

CARL E. STEINHAUSER, M.A.  
(University of Chicago)  
Assistant Professor, Modern  
Languages  

ANNE E. STEPHENS, B.S.  
(Georgia Institute of Technology)  
Research Assistant  
Engineering Experiment Station  

LEROY P. STERLING, M.S.  
(Georgia Institute of Technology)  
Lecturer, Engineering Graphics  
(Retired)  

JAMES R. STEVENSON, Ph.D.  
(University of Missouri)  
Associate Professor, Physics  

ROBERT E. STEIEMKE, M.S.  
(University of Wisconsin)  
P.E. (Georgia)  
Associate Dean of Faculties—  
Administrator of Research  
Professor, Civil Engineering  

CHARLES E. STONEKING, Ph.D.  
(Kansas State College)  
P.E. (New Mexico, Georgia)  
Professor, Engineering Mechanics  

HARRISON W. STRALEY, III, Ph.D.  
(University of Chicago, University  
of North Carolina)  
P.E. (Georgia)  
Professor, Geology  

JAMES A. STRICKLAND, Ed.D.  
(Columbia University)  
Director, Counseling and Guidance  

WILLIAM L. STRICKLAND, B.S.  
(Georgia Institute of Technology)  
Research Assistant  
Engineering Experiment Station  

JAMES A. STRICKLIN, Ph.D.  
(Massachusetts Institute of  
Technology)  
Assistant Professor, Aerospace  
Engineering  

CHARLES W. STUCKEY, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station  

KENDALL L. SU, Ph.D.  
(University of Illinois)  
Chief of Technical Processes,  
Library  

J. EDWARD SUNDERLAND, Ph.D.  
(Purdue University)  
P.E. (Georgia)  
Associate Professor, Mechanical  
Engineering  

CLAUDE B. SUTTON, (Maj. U.S.  
Army—Inf.), B.S.  
(University of Georgia)  
Assistant Professor, Military Science  

RAY L. SWEIGERT, Ph.D.  
(State University of Iowa)  
P.E. (Georgia)  
Dean Emeritus, Graduate Division
C. Robert Swenson, M.A.  
(Emory University)  
Associate Professor, Mathematics

Thomas F. Talbot, Ph.D.  
(Georgia Institute of Technology)  
Assistant Professor, Mechanical Engineering

James M. Tanner, M.S.  
(Georgia Institute of Technology)  
Associate Professor, Physics

Fred A. Tarpley, M.A.  
(Tulane University)  
Assistant Professor, Industrial Management

Mrs. Charlotte Tatro, M.A.  
(Louisiana State University)  
Instructor, Social Sciences

James L. Taylor, Ph.D.  
(University of North Carolina)  
Professor and Director, A. French Textile School

*William Simpson Taylor, Ph.D.  
(Columbia University)  
Professor, Chemistry (Retired)

Robert Techo, Ph.D.  
(Georgia Institute of Technology)  
Research Engineer and Assistant Professor, Chemical Engineering, Engineering Experiment Station; Head, Engineering Analysis Branch, Rich Electronic Computer Center

*R. J. Thiesen, B.S.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Executive Secretary, Georgia Tech Foundation (Retired)

Mrs. Mary Mac E. Thigpen, B.S.  
in L.S.  
(Emory University)  
Cataloger, Library

DAN W. THOMAS  
Machine Shop Foreman  
Engineering Experiment Station

Harold G. Thompson  
Fire Service Training Supervisor

*Deceased, September 26, 1963.  
**Deceased, October 5, 1963.

Mrs. Sandra Thornton, B.A.  
(University of Vermont)  
Instructor, Social Sciences

W. Raymond Tooke, Jr., M.S.  
(Georgia Institute of Technology)  
P.E. (Georgia)  
Special Research Engineer  
Engineering Experiment Station

Calvin W. Tooles, M.S.  
(Iowa State University)  
P.E. (Virginia)  
Associate Professor, Civil Engineering

Allan C. Topp, Ph.D.  
(McGill University, Montreal, P.Q.)  
Associate Professor, Chemistry

Robert D. Trammell, Jr., M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

Richard Adelbert Trotter, M.E.  
(University of Wisconsin)  
P.E. (Georgia)  
Professor, Mechanical Engineering

Raymond N. Trowbridge, M.A.  
(Columbia University)  
Associate Professor, Industrial Engineering (Retired)

Mrs. Blanche B. Turner  
Registrar Emeritus, Engineering Extension Division

John Rich Vail, M.A.  
(University of Michigan)  
Assistant Professor, Mathematics

Louis VanGorder, M.A.  
(George Washington University)  
Assistant Registrar

Aleksandar Vesic, Sc.D.  
(Techn. University of Belgrade, Yugoslavia)  
P.E. (Georgia)  
Associate Professor, Civil Engineering

Joseph Paul Vidosic, Ph.D.  
(Purdue University)  
P.E. (Georgia)  
Regents' Professor, Mechanical Engineering
JOSE VILLANUEVA, M.S.
(Georgia Institute of Technology)
Assistant Professor, Engineering Mechanics

HARRISON M. WADSWORTH, JR., Ph.D.
(Western Reserve University)
P.E. (Ohio)
Associate Professor, Industrial Engineering

KENNETH C. WAGNER, Ph.D.
(University of North Carolina)
Chief, Industrial Development Division,
Engineering Experiment Station

ANDREW J. WALKER, Ph.D.
(Harvard University)
Professor and Head, Department of English

GEORGE FULLER WALKER, II, M.A.
(Vanderbilt University)
Professor, Modern Languages

JAMES R. WALKER (Capt. U.S. Army-Arty.), B.S.
(Drexel Institute of Technology)
Assistant Professor, Military Science

JAMES W. WALKER, Ph.D.
(University of North Carolina)
Professor, Mathematics

JOHN M. WALLACE, JR., M.S.
(Georgia Institute of Technology)
Assistant Professor, Electrical Engineering

ROBERT B. WALLACE, JR., B.S.
(Georgia Institute of Technology)
Publications Director; Editor, The Georgia Tech Alumnus

NANCY W. WALLS, Ph.D.
(University of Michigan)
Research Assistant Professor, Applied Biology
Engineering Experiment Station

JOSEPH R. WALSH, JR., M.S.
(Georgia Institute of Technology)
Research Engineer
Engineering Experiment Station

JESSE D. WALTON, JR., B.S.
(Georgia Institute of Technology)
Special Research Engineer and Head, High Temperature Materials Branch
Engineering Experiment Station

MRS. HELEN S. WALZER, M.S.
(University State Teachers College Geneseo, New York)
Cataloger, Library

JAMES TING-SHUN WANG, Ph.D.
(Purdue University)
Assistant Professor, Engineering Mechanics

HENDERSON C. WARD, Ph.D.
(Georgia Institute of Technology)
Professor, Chemical Engineering

W. BRUCE WARREN, M.S.
(Georgia Institute of Technology)
Research Engineer
Engineering Experiment Station

THOMAS L. WEATHERLY, Ph.D.
(Ohio State University)
Professor, Physics

CHARLES E. WEAVER, Ph.D.
(Pennsylvania State University)
Associate Professor, Geology

R. P. WEBB, Ph.D.
(Georgia Institute of Technology)
Assistant Professor, Electrical Engineering

HOMER S. WEBER, Ph.D.
(Stanford University)
P.E. (Georgia)
Professor Emeritus and Director Emeritus, School of Mechanical Engineering

PAUL WEBER, Ph.D.
(Purdue University)
P.E. (Georgia)
Dean of Faculties

LYLE WELSEY, M.Ed.
(Springfield College)
Professor, Physical Training

FRED B. WENN, M.A.
(Emory University)
Professor-Emeritus, Industrial Management
EDWARD PLUMMER (Ned) West
(St. Petersburg Jr. College)
Director of Sports Information

EDWARD R. WESTON, M.S.
(University of Michigan)
P.E. (Pennsylvania)
Professor, Electrical Engineering

R. D. WETHERINGTON, M.S.
(Georgia Institute of Technology)
Special Research Physicist
Engineering Experiment Station

EARL M. WHEBY, M.S.
(Georgia Institute of Technology)
Assistant Professor, Engineering Graphics

FRANK M. WHITE, JR., Ph.D.
(Georgia Institute of Technology)
Associate Professor, Aerospace Engineering

MARY HARRIET WHITE, M.Lis.
(Emory University)
Cataloger, Library

THOMAS M. WHITE, Jr., Ph.D.
(Georgia Institute of Technology)
Associate Professor, Electrical Engineering

GEORGE I. WHITLATCH, Ph.D.
(Indiana University)
Senior Research Scientist
Engineering Experiment Station

WYATT CARR WHITLEY, Ph.D.
(University of Wisconsin)
Professor, Chemistry
Director,
Engineering Experiment Station

JAMES FREDRIC WHITNEL, M.A.
(University of North Carolina)
Instructor, English

RICHARD WIEGAND, M.A.
(University of North Carolina)
Associate Professor and Director,
Department of Continuing Education

LORNA A. WIGGINS, M.Lis.
(Emory University)
Data Processing Librarian

WILLARD E. WIGHT, Ph.D.
(Emory University)
Associate Professor, Social Sciences

O. B. WIKE, M.S.
(University of Georgia)
Assistant Professor, Physics

MICHAEL K. WILKINSON, Ph.D.
(Massachusetts Institute of Technology)
Professor, Physics

I. EDWIN WILKS, M.S.
(Georgia Institute of Technology)
Assistant Professor, Engineering Mechanics

J. QUITMAN WILLIAMS, Ph.D.
(Duke University)
Professor, Physics

FRANK R. WILLIAMSON, JR., M.S.
(Georgia Institute of Technology)
Assistant Research Engineer
Engineering Experiment Station

WARREN W. WILLINGHAM, Ph.D.
(University of Tennessee)
Director of Evaluation Studies

FRANK B. WILSON, B.S.
(Georgia Institute of Technology)
Coordinator of Housing

RICHARD WILSON, A.A. Dipl.
(Architectural Assn., School of Architecture, London)
Reg. Arch. (Great Britain; Georgia)
Professor, Architecture

JAMES GORDON WOHLFORD, M.S.
(Stanford University)
Director, Co-operative Division

A. ALLEN WOLF, M.A.
(Vanderbilt University)
Instructor, Physics

JOHN M. WOLF, B.S.
(University of Kentucky)
Research Assistant
Engineering Experiment Station

EARLY WENDELL WOOD, M.S.
(Georgia Institute of Technology)
Assistant Research Engineer
Engineering Experiment Station

RICHARD HENRY WOODFIN (Capt., U.S. Navy) B.S.
(U.S. Naval Academy)
Commanding Officer and Professor,
Naval Science
LEWIS C. WOODRUFF, B.S.  
(University of Georgia)  
Assistant in Football

LEROY A. WOODWARD, M.S.  
(University of Michigan)  
Assistant Professor, Physics

WILLIAM E. WOOLF, M.A.  
(Emory University)  
Instructor, Physics

LEWIS J. YBARRONDO, Ph.D.  
(Georgia Institute of Technology)  
Assistant Professor, Mechanical Engineering

RUDOLPH L. YOBS, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

C. MICHAEL YORK, Ph.D.  
(University of Maryland)  
Assistant Professor, Psychology

JAMES DIXON WRIGHT, Ph.D.  
(University of Wisconsin)  
Professor and Head, Modern Languages

JAMES DEAN YOUNG, Ph.D.  
(Rice University)  
Associate Professor, Mathematics

PAUL H. WRIGHT, M.S.  
(University of Tennessee)  
Assistant Professor, Civil Engineering

JOE W. WRAY, Ph.D.  
(University of Illinois)  
Associate Professor, Mathematics

WILLIAM E. WOOLF, M.A.  
(Emory University)  
Instructor, Physics

BENJAMIN BLACKISTON WROTH, Ph.D.  
(Johns Hopkins University)  
Professor-Emeritus, Chemistry

JAMES R. WYATT, B.B.A.  
(University of Texas)  
Research Economist  
Engineering Experiment Station

JAMES R. WYATT, B.B.A.  
(University of Texas)  
Research Economist  
Engineering Experiment Station

ROY O. WYATT, JR., M.A.  
(University of Alabama)  
Assistant Professor, Modern Languages

LOUIS J. ZAHN, Ph.D.  
(University of North Carolina)  
Associate Professor, Modern Languages

LAWRENCE J. YBARRONDO, Ph.D.  
(Georgia Institute of Technology)  
Assistant Professor, Mechanical Engineering

RUDOLPH L. YOBS, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

C. MICHAEL YORK, Ph.D.  
(University of Maryland)  
Assistant Professor, Psychology

JAMES DEAN YOUNG, Ph.D.  
(Rice University)  
Associate Professor, Mathematics

PAUL H. WRIGHT, M.S.  
(University of Tennessee)  
Assistant Professor, Civil Engineering

JOE W. WRAY, Ph.D.  
(University of Illinois)  
Associate Professor, Mathematics

WILLIAM E. WOOLF, M.A.  
(Emory University)  
Instructor, Physics

BENJAMIN BLACKISTON WROTH, Ph.D.  
(Johns Hopkins University)  
Professor-Emeritus, Chemistry

JAMES R. WYATT, B.B.A.  
(University of Texas)  
Research Economist  
Engineering Experiment Station

ROY O. WYATT, JR., M.A.  
(University of Alabama)  
Assistant Professor, Modern Languages

LOUIS J. ZAHN, Ph.D.  
(University of North Carolina)  
Associate Professor, Modern Languages

LAWRENCE J. YBARRONDO, Ph.D.  
(Georgia Institute of Technology)  
Assistant Professor, Mechanical Engineering

RUDOLPH L. YOBS, M.S.  
(Georgia Institute of Technology)  
Assistant Research Engineer  
Engineering Experiment Station

C. MICHAEL YORK, Ph.D.  
(University of Maryland)  
Assistant Professor, Psychology

JOE W. WRAY, Ph.D.  
(University of Illinois)  
Associate Professor, Mathematics

WILLIAM E. WOOLF, M.A.  
(Emory University)  
Instructor, Physics

BENJAMIN BLACKISTON WROTH, Ph.D.  
(Johns Hopkins University)  
Professor-Emeritus, Chemistry

JAMES R. WYATT, B.B.A.  
(University of Texas)  
Research Economist  
Engineering Experiment Station

ROY O. WYATT, JR., M.A.  
(University of Alabama)  
Assistant Professor, Modern Languages

EDMOND F. E. ZEYDEL, DR.Tech.Sc.  
(Institute of Technology, Delft, Holland)  
Professor, Aerospace Engineering

WALDEMAR T. ZIEGLER, Ph.D.  
(Johns Hopkins University)  
Regents' Professor, Chemical Engineering

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(Institute of Technology, Delft, Holland)  
Professor, Aerospace Engineering

WALDEMAR T. ZIEGLER, Ph.D.  
(Johns Hopkins University)  
Regents' Professor, Chemical Engineering

ROBERT L. ZIMMERMAN, B.S.  
(Rensselaer Polytechnic Institute)  
Radiological Safety Officer
### SUMMARY OF ENROLLMENT 1962-1963

**College Day Courses**

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Total Engineering Extension Division: 16,287

Total College Day Courses: 7,098

Grand Total: 23,054
**INSTITUTE STATISTICS**

**Graduates by Schools and by Years**

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*This degree was not given from 1929 to 1935.

+War emergency degree.

**NOTES:** The M.S. Degrees, Ph.D. Degrees, Professional Degrees, and Certificates shown above are distributed among the departments as follows:


2. Ph.D.; Ch.E., 43; Chem., 48; C.E., 3; E.E., 23; I.E., 1; M.E., 9; Phys., 15.

3. Professional Degrees: C.E., 17; Ch.E., 1; E.E., 11; M.E., 15; T.E., 1.

**ABBREVIATIONS:** Met.—Metallurgy; M.T.C.—Motor Transport; M.T.—Manual Training; Nuc.E._—Nuclear Engineering; Nuc.S._—Nuclear Science; S.E._—Safety Engineering; San.E._—Sanitary Engineering.
## General Index

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