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In the design lab, an AE senior works on a three-view drawing of a supersonic fighter. Some students make models of their finished products.
A. E. 440 Requires Original Design

Having recently broadened the scope of the curriculum, Georgia Tech's School of Aerospace Engineering prides itself on being a progressive department. The nine-foot wind tunnel, while often used by industrial concerns, is a good example of the facilities provided for the A.E. student. A mandatory series for seniors, AE 440-1-2 is a nine hour lab that develops the student's creativity towards aircraft design. Given the general type of aircraft, type of engines, range, and several technical specifications, the A.E. must design an airplane. Calculations of lift, drag, altitude, and speed, and a three-view drawing are included in the detailed report on each aircraft.
DR. PAUL HEFFERNAN

"The school can offer a broad academic education, an education designed to expose the student thoroughly to the liberal arts as well as to the sciences and engineering. There can be no compromises in any of these areas. Architects should never be given watered-down courses in anything."

Many hours are spent thinking and sketching ideas before the student is ready to start his final rendering.

The Talented Architect

Few professions demand the broad and lofty qualities in their practitioners as does Architecture. It demands that a man think like an engineer—if he does not want his structures to collapse. It demands that he think like a humanist—if his creations are to be anything but a glorification of his own ego. It demands that he think like an artist—if his composition is to be strong with a sense of order and beauty.

It is demanding a great deal of a man to ask him to think in all of these ways at once. You can't expect him to learn to do it in just five years of college.

All any architectural school can hope to do is to give its students a foundation upon which they can build this kind of thinking—one from which they can eventually develop their own creative ideas.

As the deadline for a project draws near, the lights burn late in a building tense with activity.
Biology, in its attempt to understand the processes and organisms concerned with life, is a science of observation and deduction, with its prime experimental object the living organism itself. In Biology 441 an attempt is made to examine the physiological processes of a live frog. In working with the heart, the frog is first double-pithed, a process which renders his voluntary nervous system useless, and a connection is made between the recording arm of a kymograph and the frog's beating heart. A saline solution which is sprayed onto the frog's exposed organs prolongs his fleeting life until the experimenter is finished. Information that can be obtained from such studies includes a detailed account of the minute workings of the heart and its reaction to electrical or other stimuli.

Using a 2500 volt probe, Dr. Min observes effect of such excitation on rate of heart beat.

A hearty young frog makes the supreme sacrifice for the furtherment of knowledge.
of Life

A recording of the frog's heart-beat is made on the sensitive drum of a kymograph.
Ceramic Engineering: From the Storehouse of the Earth

Ceramic Engineering is on the move at Georgia Tech. With the modern facilities of the new Ceramics building, the school hopes to continue its contributions to the Ceramic world. The Ceramic Engineering department is the only school on campus that requires an undergraduate thesis. In courses 422-3-4 seniors do original research in the Ceramics field, just as Bill Amis is studying the effect of crystallinity on physical properties of a material. In this project, Bill reflects X-rays from the surface of selected materials. The collector gathers the reflected rays and feeds crystallinity information to the computer, which draws a graph. From this graph, Bill is able to tell how the molecules of the substance are arranged—these facts are helpful in determining the practical uses of the material.

DR. LANE MITCHELL

“Ceramic Engineering is old and eternal because the earth is the storehouse of its raw materials.”
Bill crushes a sample for use in his senior project.

As the X-rays are collected from the crystal being examined, the needle on this instrument traces a graph.
New equipment and a new building help make the Tech school of Chemical Engineering the best in the south.

New Home for Ch. E.

Recognized as one of the best schools of its type in the country, the School of Chemical Engineering moved into a new three million dollar building this year. The completely air-conditioned structure contains a library, conference rooms, and three floors of laboratories and classrooms. Director H. V. Grubb claims that the move will put Tech's Ch. E. department in the top five in the nation as far as size and quality goes. Another big advantage of the new facilities is that all of the Georgia Tech Chemical Engineering research is now under one roof rather than being dispersed around Atlanta. Now, more than ever, the Chemical Engineering school will turn out quality graduates in this field.

DR. H. V. GRUBB

"It will be possible to initiate or expand several research areas because of the availability of several unique features in the new facility."
DR. WILLIAM M. SPICER
“Chemistry is the broadest of the sciences, stretching as it does from theoretical physics on the one hand to medicine on the other.”

To insure purity of raw materials prior to use, a fractional distillation is often necessary.

An undergraduate handles pyrophoric materials in a dry oxygen-free atmosphere where they cannot burst into flames.

Ethyl magnesium bromide is prepared from ethyl bromide and magnesium metal in a diethyl ether solvent.
Chemists Research For NASA

One of the several research programs in the chemistry department is under the direction of Dr. E. C. Ashby, who recently received a Sloan Fellowship for his outstanding work. The program has two major aims: determination of the composition and reaction mechanism of Gaignard compounds, one of the most important compound groups in organic synthesis, and the discovery of the properties of high energy complex metal hydrides with reference to their use as the fuel component of solid rocket propellants. The latter phase of the research is sponsored by the National Aeronautics and Space Administration. Working with Dr. Ashby in their Chemistry Annex Building laboratory are graduate and undergraduate students, who are paid for their services by the research grants. The program, which is in its second year has already met with considerable success and is one of the most promising at Tech.

Small quantities of complex mixtures of liquids or gases can be separated and identified quantitatively by vapor phase chromatography.
Civil Engineers Study Soil Mechanics

Civil Engineering is a much broader field than most people realize. It includes structural and construction engineering, sanitary engineering, transportation, soils engineering, municipal and regional engineering, surveying, and mapping. The School of Civil Engineering at Tech attempts to lay basic foundation so that graduates may excel in one of these many branches. CE 409, soil mechanics, is a good example of the practical applications offered in the Civil Engineering curriculum. The course is taught by a nationally-known soils expert, Professor George F. Sowers. Students gather their own "undisturbed" soil samples from strategic places around Atlanta and test them in the Soil Mechanics laboratory, part of the new Highway Research building. Because soil is the ultimate foundation of any structure, the civil engineer must know how to deal with different moisture contents, compressibilities, and other physical characteristics.

The dials measure the compression of soil samples to thousandths of an inch; the force is varied by changing the weights on the lever arm.
The glass cylinder contains an undisturbed soil sample—it has the same moisture content and compactness that it did when it was in the ground. Senior Gordon Coley takes a careful reading of its compression.

In this experiment, a soil specimen is hammered 50 times; then its volume is compared with results of hammering on other samples.
E. E.
Wires, Oscilloscopes, and Tiny Transistors

DR. B. J. DASHER
"Of all the engineering disciplines, Electrical Engineering offers both the greatest challenges and the greatest rewards. Today's society is as much dependent upon the radio, the telephone, and the electronic computer as it is upon our tremendous cross-country power transmission systems."

The oscilloscope is a common measuring instrument to students of Electrical Engineering. Here they check the output of the transistor amplifiers they have built.
The largest of the engineering schools at Georgia Tech is the school of Electrical Engineering. Many of the freshmen entering Tech don't really know what they want to major in and having heard tales of the monetary remuneration connected with electrical engineering, they decide that this is what they want. Many of them soon change their mind when they find that the rigorous study necessary is too much for them.

The school of Electrical Engineering deals mainly with theory. Typical of the course offerings is EE 435, transistor circuit analysis. Given the specifications of a two stage amplifier, students design and build their own transistor circuits. Then in the transistor lab they check their amplifiers to compare the actual with the calculated specifications. The well-equipped laboratory offers each student the use of several thousand dollars worth of electrical instruments at his arms' reach. While the lab instructor does offer advice, students are on their own—they may not collaborate.

Theory becomes reality when Electrical Engineering students design and build their own transistor amplifiers.
"People in the applied sciences look at the humanists as being fuzzy-brained. And the humanists look upon the scientists as robots. Neither statement is necessarily so."

"Every education has two sides: the useful and the valuable. A proper education should do more than teach useful things. Art is not useful, but valuable."

"We're not only educating engineers; we're educating men. It's very challenging to teach English at an engineering school because although the students are intelligent, their attention is diverted to other things."
English: the Useful and the Valuable

Can the humanities be an interesting part of a technical education? They certainly will be at Georgia Tech as long as men like Professor I. R. Foote teach sophomore English. Well-known for his guitar playing in class, Professor Foote tries to destroy the belief that poetry is just for a select group of little old ladies and English professors. He feels that education has two sides: the useful and the valuable. Engineering is useful—it will earn many students a livelihood. "On the other hand, a knowledge of King Lear will probably never make you a dime, but this knowledge is very worthwhile."

DR. A. S. WALKER

"The humanities can serve to widen our vision of the world to include all men—past, present, and future, to humanize us to an acceptance of our kinship with mankind, and to persuade us to prefer kindness and compassion to cruelty and rudeness, and through knowledge teach us humility before the mystery and glory of human life."
Communication Through Engineering Graphics

Freshmen in the various engineering schools of Georgia Tech frequent the Engineering Graphics department. For six hours per week, they find that graphics is an exact type of communication invaluable to the engineer. Engineering schools require three drawing labs, one on the basics of drawing, one on the theory of points, lines, and planes, and the other on graphical conventions. Higher courses on graphical solutions of engineering problems are also offered by Engineering Graphics.

Freshmen quickly find that drawing requires use of the brain as well as the hands.
DR. R. K. JACOBS

"Engineering Graphics, once exclusively the language of the engineer, has emerged from the incrustations of the traditional past to encompass the day-to-day living of all peoples and to establish itself as a basic communications medium in the culture of our science-oriented existence. Our philosophy is well expressed by John Tillotson, who said, 'He that does not know those things which are of use and necessity for him to know is but an ignorant man whatever he may know besides.'"
DR. MILTON E. RAVILLE

"Mechanics is one fundamental science which has been developed largely by engineers for engineers. When one reflects on the permanent importance of Mechanics during these times of rapid change and high rates of obsolescence of engineering subject matter, the true nature of mechanics as a fundamental science becomes apparent."

Engineering Mechanics Conducts

Dr. Stoneking adjusts the light beams which will measure the velocity of the projectile. The black cylinder on the left is the air gun.
Engineering Mechanics combines the theories of physics and mathematics for engineering applications. All engineering curricula at Georgia Tech include courses in this fundamental study. On the practical side, Dr. Charles Stoneking of the Engineering Mechanics department is conducting a study of impact effects on projectiles. One purpose is to formulate empirical relations between rupture velocity (that velocity at which the projectile ruptures) and the material of construction, wall thickness, diameter, and filler. Spheres and cylinders similar to those used in this project will some day contain isotopes, which, for safety reasons, must remain intact. An air gun with pressures up to 200 psi “shoots” hollow projectiles at a hardened steel bar. Because speeds up to 1000 feet per second are reached, Dr. Stoneking and his graduate assistants operate the gun from the adjacent control room. Accurate measurements of velocity are obtained as the projectile breaks two light beams separated a fixed distance. Impact pressure is studied by a high speed camera and by an oscilloscope.

**Impact Studies**

A graduate student in Engineering Mechanics, Mike Heacock focuses the high-speed camera on the target area.

This filmstrip shows the impact of a projectile traveling approximately 600 feet per second. The cylindrical “bullet” enters the picture from the left, makes contact with the target, and shatters.
I.E. —— In Contact

A human being is not an unfeeling machine. He is subject to and at times guided by his sociological environment. He is the one who must make use of the vast amount of knowledge supplied by the pure scientist. The human engineer takes complicated technical facts and complicated human relationships and integrates them into a working system for production. This human engineer is called an Industrial Engineer.

As an undergraduate at Georgia Tech, probably the most comprehensive course he will take is plant layout. The majority of this course is spent in lab actually designing a plant to meet specific production requirements. As Dr. Paul T. Eaton says: “There is no one correct answer to the problem.” The resulting plants all differ greatly giving each student a chance to express creativity.

Plant layout makes use of all previous courses and thus, the student completing I.E. 447 has begun to know what Industrial Engineering is all about.

DR. FRANK F. GROSECLOSE

"Industrial Engineering at Georgia Tech provides the optimum education necessary for all systems which include people."

Professor Paul T. Eaton instructs plant layout students with a typical "zees es plant layout."
With Humanity
Individual opinion is expressed about the problems discussed in Dr. Carney's IM 420 class.
Ken Haynes: "This generosity is a good practice."
Cleves Howell: "We are getting into the hypothetical now. The question is whether or not to invest in the Jones company."
Dr. Carney: "Let me say that I believe we are getting off of the track. The company is . . . . . . ."
And so went the discussion one day in Dr. Carney's IM 420 class. The course is called Integrated Management Problems. Because one third of the students' grade is derived from a group discussion, the ability to carry on an intelligent conversation is practiced by all. These discussions bring the reality of actual situations into the classroom through case records and give the students a chance to solve the problems themselves. The complexities of the problems can be enormous and require the application of concepts learned in all previous IM courses.

Dr. W. S. Buckingham
"In this complex and rapid changing world, university education for industrial leadership must place its major emphasis on developing the thought processes of the student."

Technicalities of a problem can be informally discussed during a break.
Information Science is the field of study concerned with the control and use of information—every area of learning is related to Information Science. This new field is growing out of the revolution in communications technology. The Information Science school at Tech, which is purely a graduate school, was established in 1963 by a grant from the National Science Foundation. Contrary to popular thinking, information scientists are not librarians. For example, Dorothy Gordy, one of 22 students in the department, is currently working on a computer program to change the chemical name of a substance into the chemical formula. To do this she must incorporate her programming talent, her knowledge of chemistry, and her skill with the chemical abstracts in the library. Students also use the computer for the indexing of documents.
Many hours are spent with the computer facilities; here, Dick Austin and Tom Raymer make use of the Burroughs 5500.

In the Rich Electronic Computer Center, Dorothy punches some cards for her program stack.

Third Year on Tech Campus

DR. VLADIMIR SLAMECKA

"The multidisciplinary nature of Information Science—an intersection of mathematics, philosophy, linguistics, the behavioral sciences, systems engineering, computer programming, documentation, and management—connotes a higher generic level of science. It attests to the progress toward unity of science."
Mathematicians Take Problem

Tech's engineers become closely associated with the department of mathematics during their first two years. Four courses in fundamental calculus and one in differential equations are required by most technical departments on campus. The function of the math department is to train these students in the basic theories and their use in engineering applications. For its own students, the school of math gives the seniors a rigorous problem seminar. For three quarters during their last year, math majors are assigned problems restricted only in that they be workable with the undergraduate curriculum. This year math 427-28-29 is being taught by Professor D. M. Friedlen, one of the more colorful, and difficult, math profs. Friedlen feels that the beauty of the course is that assigned problems can be on anything from group theory to differential equations. Some are ridiculously easy and some require days of thought and research—the only rules are that classmates cannot work together. Although the course is good for two hours credit, the class meets only to discuss problems; most of the work is done in conference with Friedlen and in search of solutions.
In highly theoretical math, proofs must be rigorous and complete; Friedlen never fails to give the blackboard a workout during the class period.

Seminar

DR. B. M. DRUCKER

"Mathematics is a vitally growing subject. It is today in many respects an entirely different discipline from what it was at the turn of the century. New developments have been extensive; new concepts revolutionary; new applications numerous and diverse."

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M.E. is Mechanical

The need for Mechanical Engineers is great in almost every conceivable industry. Machines have become the heart and soul of this great American industrial society in which we live. The job of the Mechanical Engineer is to design and integrate these machines into a smooth running production system.

The school of Mechanical Engineering at Georgia Tech gives its students a comprehensive knowledge of the tools and techniques of his profession along with an introductory knowledge of the other sciences such as electricity, chemistry, physics, and math. Much time is spent in the laboratories actually working with the machines for it is essential that the student be thoroughly familiar with the capabilities and limitations of his tools if he is to make optimum use of them.

DR. KENNETH G. PICA

"The young mechanical engineer is often surprised to find that almost all industries, space, chemical, propulsion, and many others, have great interests in the solution of mechanical engineering problems."

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Dr. Samuel Barnett demonstrates the determination of the octane number of gasoline. This is the lab period of ME 420, a course in internal combustion engines.
In the Science and Technology Library at Tech 40% of the books available are in languages other than English. This represents no small part of the research in various technical fields that is going on in the world, and most of this is either never translated into English or at best translated only after a year or more. It is no surprise then that prerequisites for graduate training nearly always include familiarity with at least one foreign language. With this special need of technical persons in mind, the modern language department here attempts to furnish the student tools with which to further his knowledge of today’s rapidly changing technology.

DIXON WRIGHT
“Now that travel between even the most widely separated points on the surface of the earth may be measured in hours, the study of foreign languages is among the most practical aspects of one’s preparation for living in the world.”
Background In Foreign Language
A strange feeling came over me as I entered the large round room. A cylindrical mass of steel rose from the middle of the room in back of which was the control booth. I could see the sign in the control booth as plain as day. In large red letters were the words “REACTOR ON.” I could only think of the immense energy potential before me. All of the talk about hydrogen bombs and nuclear submarines was suddenly all very real.

The mild humming noise and the routine activity about me all seemed quite innocent and yet I knew that if the energy before me was unleashed, the whole city of Atlanta would be nothing more than a gigantic crater. There is something about being so close to objects so small with such awesome power that it dwarfs the mind.

I left the big round room and entered surroundings more familiar to this Tech student. As Dr. Harrison showed me around the laboratory area he explained the vast field of Nuclear Engineering. Programs such as converting sea water to fresh, nuclear propelled space flight, and the more conventional uses of nuclear power for industry are just a few of the projects to be encountered by the Nuclear Engineer. This field of Nuclear Engineering is wide open and Georgia Tech will play a part in its development and growth.
DR. W. B. HARRISON

"Nuclear Engineering is the field in which the production and utilization of nuclear energy is the central theme. It is a relatively new field which has a most challenging and exciting future, and in which Georgia Tech is preparing to play a major role."

Two nuclear engineering students relax after performing a critical experiment analyzing data from the reactor.

Visitors to the Nuclear Engineering building can stand in the lobby and watch people perform experiments in the "hot cells."
P.T.: “What Good is a Dead Genius?”
A. M. COLEMAN

"Our objective is to keep the Georgia Tech student physically fit while here and to inspire him to keep on with this program after he leaves the institution."

Coach Lyle Welser, an outspoken advocate of physical fitness, considers his PT 102 gym course the "most important course at Georgia Tech." He claims that heart attack is the number one killer today and its cause is a lack of exercise. "What good is a dead genius?" Coach Welser emphatically voices his opinion. Designed by Coach Welser, PT 102 is a gym course with emphasis on physical fitness orientation (30%), attitude and sportsmanship (10%), and gymnastic skills (60%). During the class meeting students practice the skills demonstrated by Welser, for much of the grade centers on the number of skills mastered. After each meeting, students enjoy two vigorous rounds of Peters Park.

Expressions make obvious who's on the first lap and who's on the second.

P.T. 102 emphasizes physical fitness and the execution of the skills—there is little emphasis on form.
above: With the aid of the mesovalic arapatheid, two undergraduates determine the number of oles-tamites which can be valescified in the cartenoidal platitude on January 7, 1982.

VERNON CRAWFORD

"The physics school here owes much of its prestige to the large number undergraduates who are exposed to the department during the sophomore year."

Undulating wavamechations are readily illustrated on the turbo-encabulator (a sophisticated Nordon spacer). These WVMs are vibrating at the unfathomable rate of 22.53 megathons per poise.
Physics Untangles the Molecule

In the study of molecular structure, physicists in general begin where the chemists leave off. The study of the very basis of matter requires that man replace his relatively crude senses with more refined instruments, machines that can probe the intimacies of intramolecular space, and help the physicist to come up with answers so vital in the so-called atomic age. At Tech this work takes the form of checking postulated nuclear models by studying the nuclear decay schemes, developing some knowledge of the forces that hold solids together by observing the action of high-energy sound waves on solid objects, the study of actual atomic collisions, and other related projects.

Your conjidulatory Newman truffle is ensorcerating too many laevorotary electrons, son.

Dr. Woodward inspects inverse detractive waves oscillating in a mesotetically spaced tankering block.
DR. E. H. LOVELAND

"The Bachelor's degree simply signifies admission to the intellectual community. It does not signify termination of one's education, formal, or otherwise."
Psychology’s Problem: The Human Factor

The School of Psychology, one of the smallest schools on campus, offers a Bachelor of Science in Applied Psychology. Outside the psychology major’s rigorous requirements in psychology, math, chemistry, physics, and biology, he is encouraged to use his many free electives to follow his own interests. Within the psychology courses, which include study in industrial problems, psychological testing, statistics applied to psychological investigation, experimental method, and learning theory, each individual student has the opportunity to do independent reading and thinking. In his final senior course, the psychology major designs and carries out his own original experiment.

Some of these senior projects have been pure researches intended to expand empirical knowledge and theory. Others have dealt with industrial or military personnel problems.

Such strange species as flatworms, rats, mice, guppies, and sophomores have served as subjects in these studies, and no assumption, theory, or hearsay is sacred before the honest inquiry of the psychology senior. For instance, experimenter George Cauthen and his faculty advisor, Professor Dick Moll, are currently worrying what the processes of simple visual perception can be, particularly when subject Clay Young only has 10 microseconds to spot irregularities in a triangle.

An experiment like this one, using twenty or thirty subjects and simple apparatus, can reject or support a proposed explanation of psychological phenomena within acceptable statistical certainty, and this is the point in general of any experiment in any science.
Air Force cadets pass in review during stiff Thursday morning competition.

Uniformity is the key word... 

... as the advanced cadets will tell you.
The Year of Great Marches

It was a cold Thursday morning. The troops were already in formation anxious to begin the maneuver. Every soldier in the ranks was tense with both fear and excitement. The mission of the battalion was to march across the marshy waste lands of Rose Bowl field to demonstrate the readiness of American youth for any national emergency. At any time they may be called on to give their utmost to protect the honor and dignity of demonstrators in Alabama. Other less dangerous threats such as Vietnam seem to be popping up all the time. To show his ability to withstand hardship and torture, the student often gets married in a display of loyalty and devotion to his Uncle Sam.

The administration of the Georgia Institute of Technology and the board of regents of the state of Georgia have voted to abolish compulsory ROTC training.
Senior Bill Elders spends many afternoons weaving and experimenting with different stretch fabrics.

Textile Machinery Provides

Practical training in all phases of textile manufacturing is offered in modern fully-equipped building.
Practical Training

The A. French Textile School prides itself on being one of the best textile engineering schools in the nation. Founded in 1899, this department was the first school of its type in the South and today houses over $800,000 worth of laboratory equipment. With emphasis on practical training, the school of textiles offers three degrees: Bachelor of Textile Engineering, Bachelor of Science in Textiles, Bachelor of Science in Textile Chemistry. A senior in textiles, Bill Elders is taking TE 455, a course designed to develop the student's initiative. Bill has undertaken a study of strength fabrics and methods for dyeing the special yarns used in these fabrics. The extensive facilities available in the school's Hightower Building make this project (and many others) practical.

DR. J. L. TAYLOR
"You're never far from textiles; even in the bathtub you need a towel. You should be planning your wardrobe for your trip to the moon."
In this class period, students are discussing religious observances in the public schools. Dr. Thornton is on the left.

S.S. is Class Discussion

The school of Social Sciences broadens the Tech student in the fields of sociology, history, government, philosophy, and logic. One of the more interesting courses is Dr. Sandra Thornton’s political theory seminar. For each class period, Dr. Thornton assigns an oral report, which invariably stimulates an intelligent class discussion. She encourages the class to sit in a semi-circle because it induces free and informal talk. This course covers writings on political theory from Plato to John S. Mill.

DR. GEORGE HENDRICKS

"The engineer is more a professional man than a scientist and should be very aware of the society in which he works."