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To George C. Griffin

If there is one man who personifies the spirit and traditions of Georgia Tech, it is Dean George Griffin. He has successively been a student, an athlete, a professor, and a dean at Tech. He has been referred to as “Mr. Georgia Tech” and “a Techman turned legend”. There is very little that could be said of him here that hasn’t been said already.

Dean Griffin retires this year, and we will never forget him. This year’s edition of the Blue Print is dedicated to him.
Tech’s Campus: In the Midst of Confusion, Isolated Beauty

Bathed in the pastels of twilight, the Coliseum is strangely serene in the absence of athletic activity within.

The Hill: often a scene of frenzied activity—at dusk, deserted but for occasional night scholars.
The EE building is typical of the new look in the campus' architecture.
Each window is a quest for knowledge.
Lonely Scenes for the Studious

A study in the perspective of loneliness.

The courtyard of the classroom building: a resting place for the study weary.
A myriad of glass tubing intelligible to the researcher only indicates a probing into the design of industrial chemical processes.

New uses for light energy are symbolized by the reddish glow of a laser.
Research: the Servant of Society

Skilled hands are required of the scientist who must fashion his own tools of research.

A book left open to a certain page, a conceptual model made from children’s toys: an experiment is in process to determine the atomic structure of chemical compounds used for rocket fuels.
Computers: A Must for Complex Problems

Reels represent a vast depository of data.

Computer controls: a strange replacement for the slide rule, long the engineer's trademark.

Computers also afford assistance in administrative affairs; thus, the IBM card so familiar to Techmen.
These machines lift the burden of routine calculations from the engineer's mind, leaving it free for creative activity.
Vivid imaginations, fraternity rivalries, and sharp wits combine with engineering skills to produce the famed "ramblin' wrecks".
Dodd deals Duke a death blow, 24-7, to bring the weekend to a fitting climax.

Homecoming 1963: Traditions, Pageantry

Early morning hours are spent in the building of wrecks and fraternity displays.

Homecoming queens add beauty to the already colorful spectacle.
To help develop the human resources of society: this is the ultimate purpose and responsibility of any educational institution. At Georgia Tech this function is closely linked with another: that of the uncovering and application of new forms of scientific, technological, and managerial knowledge. Together, these two functions may be classified broadly as "learning".

A sophomore being exposed for the first time to knowledge that man has possessed for centuries—a graduate student probing the unknown through research for facts that are entirely new to man: both of these extreme forms of learning benefit society in a similar way. When one individual man adds to his knowledge; when he adds to his ability to use his knowledge; when he becomes a little more enlightened—mankind itself has moved an infinitesimal amount towards being truly civilized.
President's Problems: National Recognition, Local Buildings

In the seven years that Dr. Edwin D. Harrison has been President of Georgia Tech, the school has made great advances in her national prestige. Formerly known as “raise-hell school with football team, and by the way a good practical engineering program,” the Tech image has radically changed. Large outside grants have aided the rapid development of an internationally known research program in such diverse areas as textiles, ceramics, and biology.

Highlighting, spurring, and causing much of Tech's recognition has been the zealous building campaign of President Harrison. Thirteen buildings on campus, plus the new Southern Technical Institute facilities at Marietta have been completed, and the Chemical Engineering-Ceramics building is still under construction. Finally, the triangular plot across Hemphill Street from the Mechanics building has been recently purchased; a large Student Activities building is projected for that area.

As Tech's desire for, and receipt of, national recognition grows, so does the stature of probably the most respected young university president in the United States today.

"We at Georgia Tech must look to the future with confidence that energetic leadership and consistent effort will provide good answers to the practical problems facing us."
Administration
Administration

Horace W. Sturgis
Associate Registrar

Rocker T. Staton
Associate Dean of Engineering College

James E. Dull
Associate Dean of Students

Edwin P. Kohler
Assistant Dean of Students
Neal P. DeRosa
Director of Placement

W. Eugene Nichols
Assistant Dean of Students

Wyatt C. Whitley
Director of Engineering
Experiment Station

Joe W. Guthridge
Director of Development
Administration

Mrs. J. Henley Crosland
Director of Libraries

Lawrence V. Johnson
Director Engineering
Extension Division

James A. Strickland
Director of Guidance

Robert B. Logan
Director of Auxiliary Services
School Directors

Joseph H. Howey
Physics

William M. Spicer
Chemistry

James D. Wright
Modern Languages

Benjamin J. Dasher
Electrical Engineering

Paul M. Heffernan
Architecture

Robert S. Ingols
Applied Biology
School Directors

Frank F. Groseclose
Industrial Engineering

Kenneth G. Picha
Mechanical Engineering

William F. Atchison
Information Science
A E Wind Tunnel Serves Industry

In the 1930's, when an increased interest in aeronautics made such a project feasible, the Daniel Guggenheim School of Aeronautics at Tech undertook the construction of a nine-foot wind tunnel. The tunnel, which is still in use today, is of the moderate-speed, moderate-size type which has proved so useful for general experimentation. The tunnel has been used not only for research projects of the department staff, but also by surrounding industry.

Flutter tests for the widely-publicized Starlifter, which was rolled out in the summer of 1963 at Lockheed's Marietta plant, were done by the wind tunnel staff under contract from Lockheed. Facilities for construction of these models are available in the adjoining model shop, which is staffed by experienced modelmakers, and photographic and reproduction laboratories are also available to assist in the tunnel program.

The tunnel, which is of the single-return, atmospheric type, can create air speeds of up to 160 m.p.h. and can accommodate models up to one-ton in weight.
The G141 Starlifter, left, Lockheed's highly publicized transport, undergoes flutter model tests in the Tech wind tunnel.

A number of research programs have been conducted in the tunnel during recent years by staff members from the School of Aeronautics.

The delicately balanced test stand can support loads of up to one-ton.
Their project almost complete, two architecture students prepare to sleep with it.

Most of the materials for the models are fabricated by the students.
Transition Course Gives Architects First Working Experience

Prior to Architecture 351, the students in this department have been working almost completely with basic theory; their work has included such things as color study and small design projects. At this point, however, the architecture student must, from a basic design, formulate all construction details, a complete set of working drawings, and a detailed model.

The course is very intricate in its detail. For example, one project recently included the following: about 100 rough sketches, 20 to 25 finished sketches, 16 large sheets of working drawings, and the model itself. Yet actual time spent on the model and the drawings may be less than that necessary in planning. The starting design of a home is often more a group of ideas than a finished project—much must be added or changed.

Although the model construction occupies only two weeks in the course planning, the average time spent, with three people working on it, is about 500 hours. And the total cost generally is between $100 and $150, borne by the students. This is perhaps indicative of the work required for the whole course.
Biologist Takes Research Award

The use of economic poisons in industrial processes and by farmers is increasing rapidly. The use of these poisons by industry and their presence in industrial waste streams has caused a high rate of poisoning in fish as reported by the State Water Pollution Control authorities. Agricultural use of these poisons has resulted in the death of a large number of birds whose natural food is the insects for which these poisons are intended.

Dr. R. S. Ingols and Miss Paula Stevenson of Tech's Applied Biology Department have been investigating the possibility that bacteria might be able to break down these poisons into their harmless components, and have received the American Chemical Society's Edward Bartow Award for their work.

This process of biodegradation, which could be used to treat industrial waste, depends on the ability of the bacteria to break the carbon-chlorine bond which is usually present in any organic poison. The work which Dr. Ingols and Miss Stevenson undertook was first to prove that such a process could take place with a number of organic poisons and then to discover under what conditions the biodegradation could be accomplished most efficiently.

The work, which is being sponsored by the National Institute of Health, is still incomplete but has met with much success.

Aeration increases the rate of biodegradation considerably.
Chemistry: A Challenge to the Aspiring Engineer

Because chemistry is a basic science, it is important to anyone who has ever tried to get chewing gum out of his hair, wondered why his latex-base paint works so poorly when thinned with turpentine, or tried to kill rats in the cellar. Whether engineer, scientist, or postal clerk, chemistry is not far away from the everyday life of all men. Thus, it is only natural that a freshman at Tech be exposed to this enlightening science. Unfortunately, many aspiring engineers have suffered from overexposure. To these martyrs, the department can only offer its regrets, for it is the purpose of the Chemistry School to teach, not to screen the freshman class.

There are, of course, those who find their chemistry courses a break from the daily drudgery. These few discover in chemistry a fascinating world of color and seething, bubbling excitement that furnishes mankind with the building blocks for his world.
Student identification with the subject is made possible through the opportunity to work with one's hands.
Quest for New Rocket Fuel Approaches Near Absolute-Zero Temperatures

The first experiments in low-temperature chemistry (cryogenics) were performed in 1885 following the invention of the vacuum-jacketed flask. Work in this field, however, saw no significant progress until the early 1950's when a series of striking experiments brought renewed scientific interest and government funds into cryogenic research.

Through a generous grant from NASA Dr. Henry R. McGee, a chemical engineer from M.I.T., has set up a cryogenics laboratory at Georgia Tech. Here, with his staff, he is carrying on several research projects, foremost of which is an attempt to verify the existence of BH, a postulated compound, which would, if found, be of great importance as a rocket fuel.

Basic to their work is the world's only mass spectrometer designed to operate at cryogenic temperatures. This instrument allows the researchers to analyze the products of a cryogenic reaction without exposing it to laboratory temperatures which would supposedly destroy the compound which they are hoping to find.
The products of the reaction at left are fed into the mass spectrometer.

The presence of BH₃ can be determined from an analytic interpretation of the spectrograph.

Diborane gas is reacted at liquid nitrogen temperatures, left.
With the big move to space flight comes the problem: what to do with all the heat? And when temperatures upwards of 2500° F are involved, ceramic materials are the only answer.

The Ceramics Branch of the Georgia Tech Engineering Experiment Station, headed by Mr. J. D. Walton, Jr., is working quite successfully to solve this problem. At the Branch’s Chamblee location work in the line of solid propellant nozzles and radomes has met with unusual success in recent years.

The basic problem in the development of radomes is, of course, coming up with a material which will stand the extreme heat of re-entry and yet remain transparent to radar signals, thus avoiding the re-entry radar blackout which is now a problem in locating space capsules. Mr. Walton’s group of engineers has obtained favorable results in this area using fused silica. This material, when coated with very refractory oxides and metals is also used in the production of rocket nozzles.

Materials testing becomes an important part of this experimental work and to this end the station is equipped with an oxygen-hydrogen rocket engine capable of producing flame temperatures up to 3800° F and various other exotic devices.

Ceramics, then, is not the art of brick-making, but a vital engineering science well-deserving of the name.

Fused silica is able to undergo mechanical shock, thermal shock, and erosive and corrosive abuse and still hold up.
As a result of extensive experimentation rounded radomes have come into wide use.

Extreme conditions of flight are created in the testing laboratory for experimenting with new materials and designs.

An aluminum mandrel is used to form the mold for slip-casting of the radome.
Sanitary Engineering Research to Improve Community Water Filtration

Over the past several years, the U.S. Public Health Service has been investigating improved methods of public water purification and filtration. One of the most important steps in public water distribution is the final filtration process. Dr. Charles O'Melia, of Georgia Tech's Civil Engineering Department, has been working on a $30,000 study grant from the USPHS on a project to obtain better design criteria for sand filters.

Sand filtration is the most commonly used system in the Southeast. This final step must improve an iron floc which is added to the water to promote the accumulation of fine particles of impurities into larger, filterable particles.

Previously, the sand filters have been designed primarily on the basis of individual experience and intuition. Dr. O'Melia’s research will aid in the design of these systems to take into account the various factors of the water system, such as the chemical composition of the water supply. He began the project in 1963 and hopes to complete it by summer of 1965.
Unique stirring apparatus prepares the floc solution for the final sand filtration.

Rotating pump "squeezes" the test solution through the apparatus.
Lasers are a family of electronic devices that generate highly directional light beams of a single frequency. They are believed to have potential importance in communication, because coherent light can be looked upon as radio waves of extraordinarily high frequency with a theoretical information—carrying capacity thousands of times greater than that of radio waves. It also has been suggested that lasers will have possible future applications in computers, data processing, display systems, eye surgery, drilling and machining refractory metals, and in tracking interplanetary space probes.

The most familiar laser, of the type first announced about three years ago, employs a ruby or similar crystal. Chromium ions in the crystal are "pumped up to a high energy level which is metastable by ordinary light. When they return to a more stable energy level they emit a photon of light whose frequency corresponds precisely to the energy difference of the two levels. These "emitted" photons result in monochromatic light.

Subsequently developed gas lasers, such as the helium-neon laser pictured here, which was built by Dr. Jones of the Electrical Engineering Department, work on basically the same principle with gas molecules being pumped to a metastable level by an electrical discharge. Dr. Jones hopes to discover what factors affect the bandwidth of his laser, which emits a pencil-thin, deep-red beam in the milliwatt power range, and also what causes the laser beam to take the curious geometrical shape that it does.

Quantum Theory Brings on the Lasers
Deep-red light is emitted from both ends of the laser and continues outward in a pencil-thin beam.

Angular adjustment of the reflecting end-plates has proven to be a very critical operation.

Laser technology is based on quantum mechanics and the Maxwellian energy equations.
Packaging is an important part of any system, and one where operations can most often be improved.

The class presentation of the report is the final part of the project.
I. F. 415 is a five hour systems analysis course designed to teach students the basic implements of traditional industrial engineering analysis and design. The main project in this course is the complete analysis of one of Atlanta's business firms. Groups of four students usually handle one project, which must include the study of the firm's processing, sales, finance, labor, materials, and overall management.

Recently, one of the local dairies was studied. The group noticed, for example, that the storeroom operation was very inefficient, as labor costs were high and insufficient space was available. Now, however, the dairy has enlarged the storeroom and built an overhead handling system for the cases.

Upon completion of the report, the group gives an oral presentation to the class, and later to the manager of the company.

Other companies that have been studied recently are a winery, a radio station, and a hospital ward.
Experimentation with the open conference discussion as a teaching method is one of the goals of I.M. 499.

**IM’s Discuss Soviet Economy**

In the spring of 1962 the Standards Committee of the Industrial Management Department laid the plans for a new course designed to give a selected group of outstanding I. M. seniors an opportunity to discuss current management problems with specialists in the area under question.

The proposed course materialized fall quarter of this year as I. M. 499, a discussion seminar of the department’s top sixteen senior students. The group meets for three hours once a week to discuss a chosen topic of current interest to management, and the course carries three credit hours. Usually guests who are well-informed on the particular topic are present to lend an authoritative word to the discussion.

The success of the course in its limited experimental stage will determine whether it will be opened to more of the department in the future. Dr. Carney, who is chairman of the Standards Committee and also conducting the course, is optimistic about the future of I. M. 499.
"Our two systems are drifting toward some sort of synthesis .... maybe this is what Marx was talking about."

"... farmers deliberately underworking the land because of the quota system."

"... they would not be classified as good communists."
The face of mathematics is not, as is often thought, unchanging with time and progress. In a way not unlike the world of physics when it was startled by Einstein's revelation, so the world of mathematics is subject to changes in basic ideas and methods.

Dr. Kasriel of the Mathematics Department here is doing research work with one such innovation, which was first suggested back in the middle of the nineteenth century, called topology. The field is finding many practical uses due to the adaptability which is inherent in its concepts.

Throughout the ages mathematicians have considered their objects, such as numbers, points, etc., as substantial things in themselves. Since these entities had always defied attempts at an adequate description, it slowly dawned on the mathematicians of the nineteenth century that the question of the meaning of these objects as substantial things does not make sense within mathematics, if at all. The only relevant assertions concerning them do not refer to substantial reality; they state only the interrelations between mathematically undefined ob-
The work that ends without an answer is the hardest of all.

jects and the rules governing operations with them. With this in mind it is not hard to understand the idea of topology. Analysis situs, as it is also called, has as its object the study of the properties of geometrical figures that persist even when the figures are subjected to deformations so drastic that all their metric and projective properties are lost. In other words, a topologist may look at a circle as a triangle which has been stretched into a circular shape and the two figures can be topologically congruent. A given point in the circle must however correspond to a given point in the triangle, etc. Using topological methods problems dealing with the real world of objects, whose solutions are not available to conventional mathematics, can be readily solved.

Other branches of mathematics are also very much open to research techniques. Besides Dr. Kasriel's work, investigation is underway at Tech in probability, abstract algebra, numerical analysis, applied functional analysis, and theory of orthogonal polynomials.
Air Force Seeks Assistance from Tech M.E.'s

In the early 1950's, an investigation of mechanical failure of afterburners in certain jets used by the Air Force revealed a natural phenomenon which is now being studied at Brown University, the University of Michigan, and Georgia Tech. It was found that intense sound from the jet engines was affecting the rate of heat transfer in the afterburner section, a development which had not been foreseen by the engine designers, and one which proved to be critical to engine operation. An immediate solution to the problem was the redesign of acoustical absorbers in the engine, but the Air Force was still interested in the unaccounted for effect.

In 1958, research contracts were awarded to three universities by the Air Force to study this effect. Dr. Kenneth R. Purdy of the Mechanical Engineering Department at Tech has had considerable results in this research. He has discovered that the effect is most intense when the frequency of the sound is resonant with the engine and standing waves are set up. He has also suggested the possibility of an application of this principle to certain industrial processes.

The flow of gases through jet engines can be shown graphically by streamlines.
Occasional breakthroughs in knowledge are the scientist's compensation for the loneliness of research.

Precision measurement is necessary for valid results.
The pincer arms permit working in detail on radioactive test elements.

The reactor's location adjacent to the lobby allows waiting visitors to observe the delicate work.
New School of Nuclear Engineering Obtains Industrial Teaching Aids

The recently formed graduate school of Nuclear Engineering has set an educational precedent by employing a long distance telephone hook-up for regularly scheduled instruction. During the winter quarter, 1964, a scientist at Oak Ridge National Laboratories in Tennessee taught a graduate course in reactor technology to ten students.

Although teaching over long distances is not in itself unique, this system has two features which set it apart. First, a microphone in the classroom permits the students to question the professor during his lecture. Also, a television screen in the classroom is used to project any notes of schematics which the instructor, using a special machine a Oak Ridge writes on his paper.

Dr. William B. Harrison views the specialized staffs at the Oak Ridge and Savannah River projects as potential sources of the best possible instruction to supplement his small staff of three professors. The directors of both of the government-supported research areas have given their interest and approval to the Georgia Tech teaching experiment.

Putting the fuel into Tech's new reactor.
Quantum Theory Used to Study Molecular Structure

The study of physics began as an explanation and description of various phenomenon which men of reason observed about them. As the science progressed, the methods these men used to observe the physical world became more and more sophisticated until today, the physicist is dwarfed by his research equipment. His senses are far too crude and his mind too slow to follow the processes which must be analysed in his work, and thus, his job, for the most part, is designing mechanisms to probe these minute subleties of nature.

Here at Tech, physical research is exemplary of this pattern. For instance, Dr. Thomas Weatherly and Dr. Quitman Williams are studying the molecular structure of certain compounds. Direct observation being out of the question, the researchers must put other methods to use. The quantum theory suggests one such method in stating that a given molecule can only absorb certain discrete frequencies of energy. Dr. Weatherly, with a complicated device which he has built, determines what particular frequencies a given molecule will absorb and from this, theorizes what the molecular structure should be.

The clamps get one last check before the test solution can be run through.
Adjusting the sensitivity of the energy brings out a more meaningful wave.

Lab assistant prepares the apparatus for a demonstration of the theory to an advanced class.
Fabrics, Fibers
Are the TE’s Toys

A tour of the A. French Textile School could be arranged that would permit the visitor to trace the development of a synthetic fabric from the research lab where it is first produced on a test-tube scale to the weaving lab where it is made into finished cloth. Along the way, the visitor would pass through spinning departments, quality control labs, and the other sections that make up this textile mill-in-miniature.

All fibers begin here: the manifestation of chemical formulae and hours of laboratory research.

The tearing strength of a fabric may be measured with great accuracy.
These loose and useless strands of cotton fiber will soon be twisted into thread for weaving.

There is no substitute for practical experience gained by the student in using actual mill machinery.

Seemingly unimportant data, such as the breaking strength of thread measured by this machine, is of great value to the textile researcher.
Humanities: Attempted Answers to Basic Questions

Engineering, science, and management students today are aware of an increasing emphasis in their respective curricula on the humanities: philosophy, languages, literature, the social sciences. For some, this is a nuisance; for others it is a welcome relief from statistics, steam tables, test tubes, and the differential calculus. To get an “insider’s” opinions on the reasons for this apparent shift in emphasis, the Blue Print called on Professor Glenn W. Rainey of Tech’s English Department.

According to Professor Rainey, man today “lives better, works less, and goes to school more,” than did his father or grandfather. Due to the work of engineers and scientists, more people today than ever before have the wealth and leisure to lead a “good life”; fewer people than before must spend their waking hours grubbing for enough food to survive. All Tech graduates will be able to earn the resources to lead a “good life.” As successors to the men of technology and business who made the world what it now is, they owe it to mankind and, most important, to themselves to have at least a rudimentary answer to these questions: What is a good life? What are the things that men hold dear? What are the things that destroy men? What relationships exist between men and their gods?
"You're not just going to be an engineer; you're going to be a father, a husband, a citizen."
Thursday Warriors, Tomorrow’s Leaders

At eleven o’clock on Thursdays, strains of martial music can be heard emanating from that bastion of our national security, the Army ROTC building on Third Street. Said building’s courtyard is a blur of activity as rifles are shouldered, guidons unfurled, and a legion of gallant student-warriors sallies forth for its weekly maneuvers on Rose Bowl Field. The land-locked sailors and ground-bound aviators of the Naval and Air Force contingents are making similar preparations in their headquarters.

During a moment of inactivity, one may see clean shaven young basic cadets listening in wide-eyed amazement to grizzled old senior veterans’ tales of that bloody campaign, “summer camp.”
Laquer on brass or unpolished shoes may indicate that the wearer has been affected by subversive propaganda.

"I think I see the enemy on the horizon..."

"I wonder if I'll be able to give all this up just to teach Drawing 115?..."
The main principle of the drownproofing system is the natural flotation of the body.

Lanoue’s Drownproofing Course Gains National Recognition

Professor Fred Lanoue of the Georgia Tech Physical Training Department has for the past several years been receiving national recognition for the freshman course, P.T. 101, known as “drownproofing.” The course is designed to teach the non-swimmer to stay alive for an indeterminate time in the water.

The drownproofing course has been accepted in a variety of places across the country. Both Emory University and the University of Georgia have incorporated it into their required physical education courses. The Peace Corps employed Coach Lanoue for the year to teach the course to their roving disciples, and the Red Cross has accepted the system as satisfactory for their own swimming and life-saving requirements.

“Why, 75 percent of the three classes ahead of you have swum 50 yards under water.”
Freddie tries to intimidate another freshman jock.

“What do you mean, you can’t do it? Anyone can!”