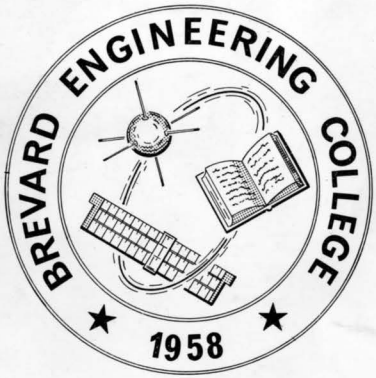
BREVARD ENGINEERING COLLEGE

MELBOURNE, FLORIDA



ANNOUNCEMENT

1963

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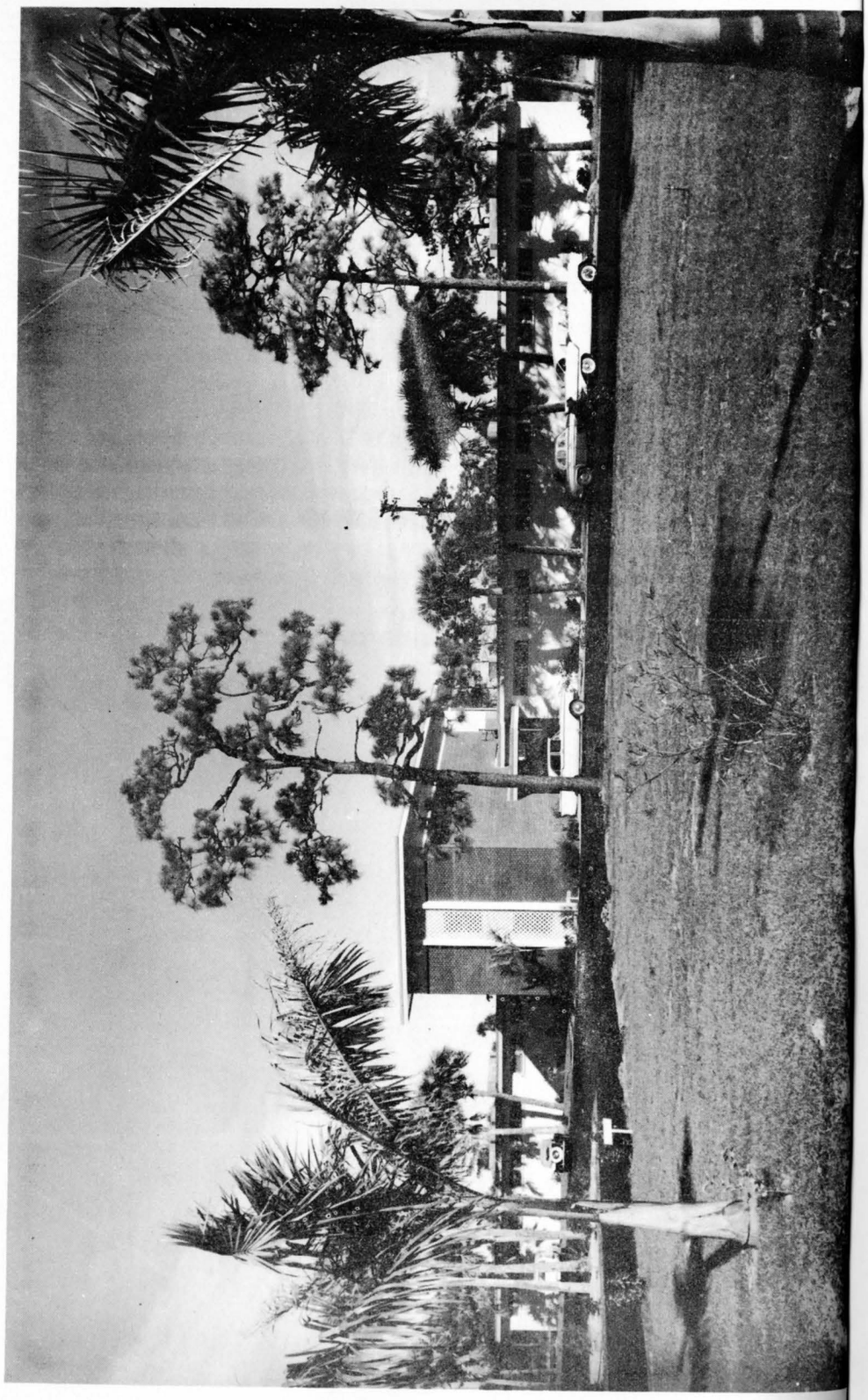
BREVARD ENGINEERING COLLEGE

An Institution of High Learning in Engineering, Liberal Arts and Sciences

ESTABLISHED IN 1958



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FOREWORD

HISTORY AND AIMS

The Brevard Engineering College was founded in 1958, by engineers and scientists working in the nation's space industry at Cape Canaveral. The campus is located in Melbourne, Florida, a few miles south of Patrick Air Force Base, the center of engineering and scientific activities for the Atlantic Missile Range.

It is the objective of the college to provide opportunities for higher education in engineering, science, liberal arts, and the new field of space technology. Although the college has been primarily an evening school for those working at the Cape Canaveral Complex, full daytime classes were established in 1962 to fit the needs of others seeking quality education at the college.

The Brevard Engineering College since 1962, formed a non-profit corporation, The Florida Institute of Space Technology, and the engineering and technical programs are conducted under this name.

Many of those associated with the college are regularly employed in the missile test industry as scientists, engineers, or technical managers. Each is expert in his own particular field and it is this expertness that is brought into the classrooms. There are few colleges that can boast of such depth of technical experience in their teaching staff.

In spite of skyrocketing educational expenses, Brevard Engineering College demonstrates that a private school . . . voluntarily supported by the community and by industry . . . can become a successful, growing organization. At present, 700 students are enrolled, a third of them in the graduate school. Like the faculty, most of the students are employed in the aerospace industry.

Undoubtedly the most important achievement of the college is the contribution now being made to America's growth in space technology. Education in space technology for scientists and engineers can best be secured where problems occur and where they are being solved at the nation's major missile development center.

Brevard Engineering College was planned and organized with foresight to meet a present need and to match its growth with the challenge of the future.

CAMPUS

The Brevard Engineering College campus is situated on approximately 35 acres of partially wooded land in the City of Melbourne,

Brevard County, Florida. The present college buildings are located along Country Club Road upon which the campus fronts. A stream, abounding with a natural growth of palm trees, circles around the campus forming a tropical "backdrop" to the campus proper. An administration building with two modern, completely air-conditioned classroom wings was completed in 1961.

An additional modern structure containing five class rooms and two offices was recently completed and a science building which will house chemistry, physics and engineering laboratories is under construction. A student center is scheduled for completion in 1963.

A separate modern air conditioned library building, complete with offices and other facilities is located adjacent to one of the classroom wings.

ACCREDITATION

The Brevard Engineering College is a relatively new institution and, therefore, not yet regionally accredited. The college is nevertheless dedicated to following the principles and standards of The Southern Association of Colleges and Schools. Also, it is the policy and practice of the college to carry out engineering curricula in conformity to criteria established by the Engineers' Council for Professional Development. Regional Accreditation is not a requirement for transferring credits, and other engineering schools and universities will accept credits from the Brevard Engineering College for courses paralleling their own.

All of the missile contracting corporations at the Air Force Missile Test Center have approved the college for their employees' educational benefits. In fact, the college was singled out by a number of these corporations to be the only non-regionally accredited college for which such approval had ever been granted. This "accreditation by industry" attests to the academic standards of the college.

The Brevard Engineering College is an academic member of The Society for Industrial and Applied Mathematics and in 1962 was elected to associate membership in the Florida Association of Colleges and Universities.

OPERATION AND CONTROL

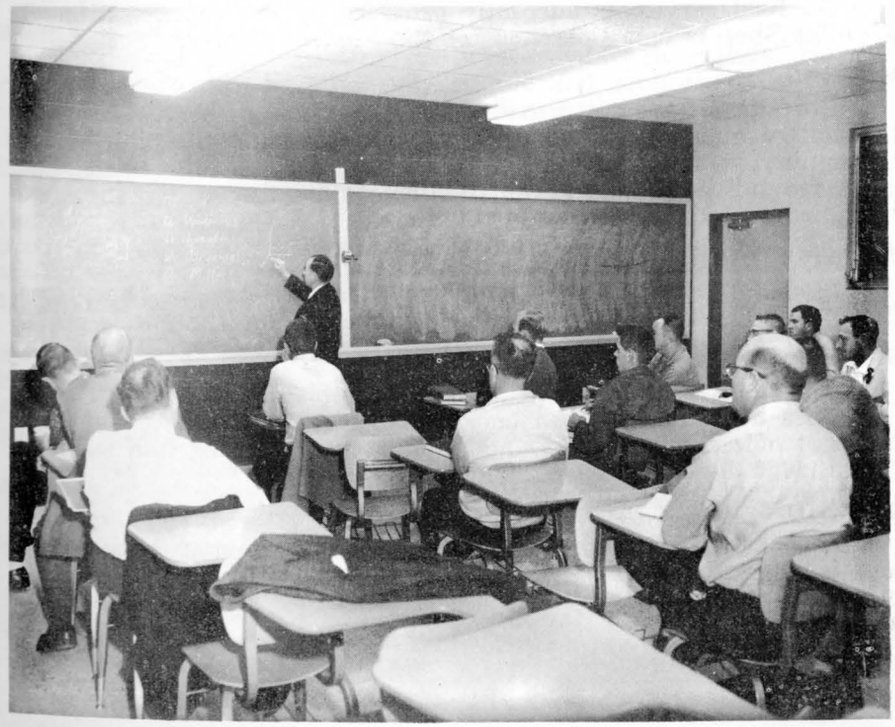
The Brevard Engineering College is incorporated as a non-profit educational institution and chartered to confer undergraduate and graduate degrees. Under the provisions of the corporate charter, control of the college is vested in a self-perpetuating Board of Trustees. The Trustees, elected to the Board, are outstanding civic and industrial leaders in the community and serve without pay. The charter provides that the college operate as a co-educational, nonsectarian, private institution of higher learning.

FINANCIAL SUPPORT

The college is primarily supported by the tuition and fees of students. As a private school it is not supported by taxation and receives no financial appropriations from any governmental unit. Careful attention to sound business policies, help from dedicated friends of the college and insistance on a balanced budget has placed the institution on a sound financial basis.

The U. S. Bureau of Internal Revenue has declared the Brevard Engineering College to be tax-exempt thereby allowing donations to the college to be tax deductible.

A $250,000.00 building fund drive is currently underway and local financial institutions, industry and friends have pledged their financial support to the college. One industry, Radiation Inc., has in addition, pledged a part of their corporate earnings as an endowment fund. Grants are received from time to time from individuals and corporations. The Radio Corporation of America has each year supported the college with unrestricted grants.



FACILITIES AND SERVICES

LIBRARY

The Brevard Engineering College Library is planned as the focal point of academic activity for both students and faculty on the campus and the Cape Canaveral Complex. Its development is aimed at providing the intellectual resources of books, periodicals and reports to support and enrich the academic curricula and graduate research programs.

The college library currently contains more than 5,000 technical volumes and subscribes to approximately 100 technical journals and periodicals. In addition to the standard technical books, a great many volumes are devoted to the humanities and the fine arts.

A professionally trained librarian is in charge of the library. Student assistants form an important part of its staff and receive practical experience in library service.

The library is housed in a separate air-conditioned building on the campus. In addition to the stacks and reading area, it contains the librarian's office, a book store, storage room and other auxiliary facilities. Further plans for the growth of the college include the construction of a separate and larger library building to house the ever increasing book collection and to meet the accelerating demands for library service.

Since the library is unique in the area, it is open to the general public.

FOOD SERVICE

No food service is currently provided by the college, although a Coffee Shop is being planned for the Student Center.

HOUSING

Dormitories are not provided for students at present. However, the college maintains a list of approved off-campus housing in the community, within easy walking distance. All housing accommodations for full-time undergraduate students not living at home must be approved by the Director of Students.

TRANSPORTATION

Students must provide their own transportation. Downtown Melbourne is within easy bicycling distance of the campus.

STUDENT CENTER

A student center is scheduled for completion in 1963. It will contain a new and enlarged book store, a coffee shop, student government offices, a student lounge, and a large meeting hall suitable for student dance activities.

BOOKSTORE

A bookstore is maintained for the accommodation of the students and is presently located in the library. New and used books and other accessories required in the college courses are sold at reasonable price.

Artists' sketch of the Planned Student Center Building.

MEDICAL SERVICE

No medical facilities are presently provided by the college. However, a new modern hospital fully staffed and equipped is a three minute drive from the campus. The student's parents will be notified in the event of injury or illness.

COUNSELING SERVICES

The guidance services of the college are designed to assist the students with educational, vocational, financial, social and personal problems as they arise, and to help them take full advantage of the academic and social opportunities offered to them by the college.

STUDENT GOVERNMENT

All full time day students of Brevard Engineering College automatically become members of student government when they register. They elect officers who serve as a direct liaison between the administration and students.

STUDENT REGULATIONS

All regulations pertaining to student behavior, dress, smoking, drinking of intoxicating beverages, and operation of automobiles on the campus are covered fully in the Students' Handbook.

PLACEMENT SERVICE

The Placement Bureau will assist students in obtaining part-time and summer employment as well as permanent employment toward a career.

ACADEMIC REGULATIONS

CREDIT HOURS

The credit hours of each course are normally represented by the number of class meeting hours per week for one term. Since there may be exceptions to this general rule, particularly for laboratory periods, the Course Description should be consulted for the credit hours of specific courses.

THE GRADING SYSTEM

The system of grading is as follows:

A	(excellent)	— 90 - 100	4	credit points
B	(good)	— 80 - 89	3	credit points
C	(average)	— 70 - 79	2	credit points
D	(poor)	— 60 - 69	1	credit point
F	(failed)	— 0 - 59	0	credit points
I	(incomplete)		0	credit points
N	(no grade)			
WP	(withdrawal—passing)			
WF	(withdrawal—failing)			

INCOMPLETE WORK

A grade of "I" is given for incomplete work and indicates that the work of the student in the course is qualitatively satisfactory and that there is reasonable expectancy that completion of the remaining work may result in a passing grade. The instructor shall furnish the Chairman of the Department or the Dean with a statement of the work required to be completed. The student must complete the work, and the instructor must report the final grade at the earliest possible time, but not later than six weeks following the quarter in which the "I" was received except with special permission of the Dean. If there is no possibility of the student's receiving a passing grade, even if he should complete the remaining work, the grade entered shall automatically be an "F". As soon as the incomplete work has been made up, the instructor, or in the case of his absence from the college, the Department Chairman or Dean, shall file the proper mark in the Registrar's Office. Until such time as the final mark is recorded, the credit hours in the uncompleted course shall not be counted or considered for any purpose.

AUDIT

A student may audit a course with the permission of the Dean and payment of the regular tuition and fees for the course. An auditor does not receive a grade, but an "N" is entered in the grade space of the final grade report. This shall indicate that the auditor has in general maintained a satisfactory course attendance.

WITHDRAWAL

In order to withdraw officially from any registered course, the student *shall make written application to the Dean* for permission to withdraw. Application shall be made on a form provided for this purpose by the Office of the Registrar.

Students who withdraw with permission from a course at any time prior to the first day of the sixth week of classes will have a "W" entered on their grade card.

Students who drop out of a course without permission of the Dean will be automatically credited with a failure.

The policy on tuition refund is described under the section, Financial Information.

Students who are granted permission to withdraw on or following the first day of the sixth week of classes, and whose work to date has been "passing", will have "WP" (Withdrawal—Passing) entered on their grade card.

Students who are granted permission to withdraw on or following the first day of the sixth week of classes, and whose work to date has been "failing", will have "WF" (Withdrawal—Failure) entered on their grade card.

The college will not entertain requests for withdrawal after the start of the ninth week of classes.

THE GRADE POINT AVERAGE

A student's academic standing for a term is expressed by his grade point average. This is determined by dividing the total number of points earned by the total number of credit hours scheduled or undertaken. The number of points is obtained by multiplying the number of credit points by the number of credit hours for each course. The following is an example:

	Credit Hours	Grade	Credit Points
Course No. 1	5	A	20
Course No. 2	3	C	6
Course No. 3	(3)	I	0
Course No. 4	3	B	9
	11		35

Grade point average 3.18

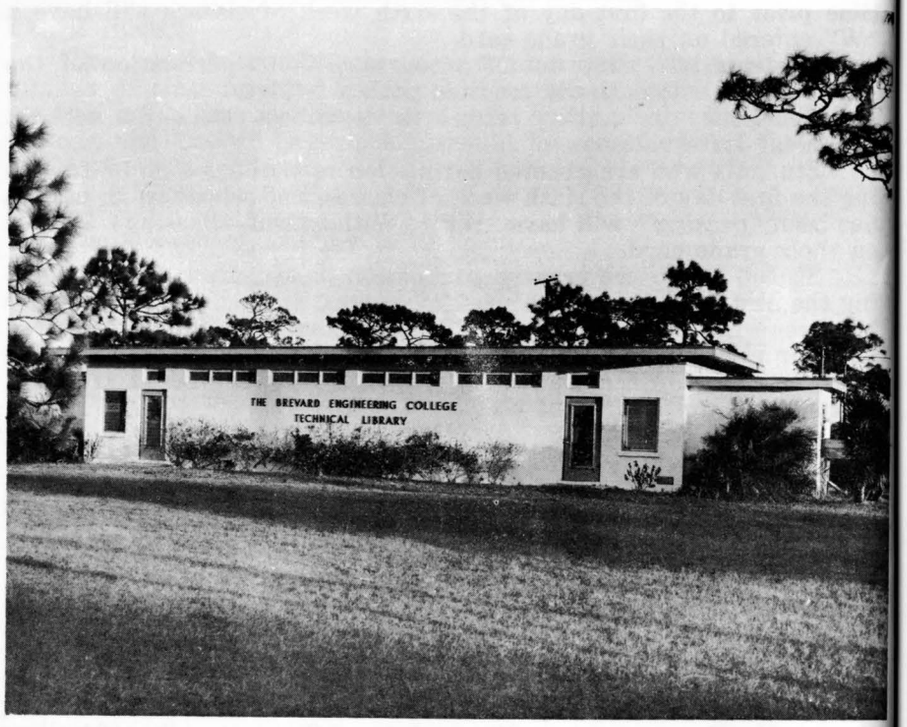
When the final grade on Course No. 3 is recorded, the points and hours will be included in computing the student's grade point average. When a student has a record for two or more terms, he will have a cumulative grade point average determined by dividing the total points earned by the total hours undertaken. The grade point average of transfer students will be computed only on the work done at Brevard Engineering College.

REMOVAL OF FAILURE IN REQUIRED COURSE

The student is responsible for repeating in class, at his first opportunity, a required course in which he has failed.

NOTIFICATION OF GRADES

At the close of each term, the Registrar notifies each student by mail of the grades earned during the term. These grades become a part of the official record of the student and are not subject to change



except upon official authorization of the Chairman of the Department and the Dean.

The College Office is not authorized to release grades prior to the mailing of the grade card to the student.

HONORS

Honor students at the college receive recognition in various ways. At the end of each term, a Dean's List is published, listing the names of students who carry two or more subjects and attain a grade point average of 3.5 or better. Frequently, cash awards and prizes are made available to outstanding students.

ATTENDANCE

The intensive nature of the courses imposes heavy demands upon the student's time and effort. Regular class attendance and punctuality is therefore essential and is expected of every student. Students are expected to make up all work missed through absence. No student may receive credit for a course in which he has missed as much as 25% of the class hours.

FINANCIAL INFORMATION

TUITION AND FEES

Tuition for full time students (15 hours or more) is charged at the rate of $540 a year or $180 a term. Tuition for part time students for lecture courses is charged at the rate of $12 per credit hour for 100 and 200 series courses; $14 per credit hour for 300 and 400 series courses; and $16 per credit hour for 500 and 600 series courses.

Tuition for laboratory courses is charged as follows: P103, P203 at $42 per course; P303, EE304, EE407, M405, M406 and M407 at $48 per course.

An entrance fee of $5 is charged. This fee is not refundable.

A fee of $2 is charged for late payment of a term bill.

A fee of $5 is charged for special examinations.

Graduation fees are charged as follows: Associate degrees, $10; Bachelors degrees, $15; and Graduate degrees, $20.
Financial payment plans are available to all students.

Full time students should budget approximately $100 a year for books and supplies.

TUITION REFUND POLICY

Since the college bases its budget for the term upon the full collection of tuition from all students who are accepted, tuition refunds can be made only in accordance with the following schedule and upon written application:

First week of classes	100%
Second week of classes	70%
Third week of classes	40%
Fourth week of classes	10%

No tuition refund will be made after the end of the fourth week of classes.

Refunds to veterans enrolled for PL550 and 889 are strictly in accordance with the requirements of the Veterans Administration.

SCHOLARSHIP AND LOANS

Various scholarships are available to the students. The Indialantic Rotary Club has established a Student Loan Fund.

THE BACCALAUREATE DEGREE PROGRAMS

DEGREES

Both the Bachelor of Arts degree and the Bachelor of Science degree are offered in the undergraduate programs. Bachelor of Science degrees are offered in Electrical Engineering, Physics, Business Administration, Mathematics, and Aerospace Engineering. Bachelor of Arts degrees are offered in English, History and Psychology. Students are awarded the Associate degree upon successful completion of the lower division programs in these areas.

THE COLLEGE YEAR

The college operates on the quarter or term basis. Each of these terms comprises approximately 11 weeks. They are designated the summer term, fall term, winter term, and spring term. Students may enter at the beginning of any term. A calendar of events will be found on the last page of the catalogue.

ARRANGEMENT OF CLASSES

Students may pursue courses of study on either a part time or full time basis. The baccalaureate degrees may be earned on either basis or on a combination depending on the students' needs.

The day time classes parallel the evening classes so that employed students may attend throughout the year in either class with no conflict with their regular employment schedule.

Undergraduate evening classes meet on Monday, Wednesday, and Friday evenings, from 7:00 to 10:00 P.M. Recitation sessions are divided into two periods of 90 minutes each, giving a total of six periods per week. Each subject occupies two periods per week, on different evenings, allowing for a maximum load of three subjects per term.

Undergraduate day time classes are scheduled throughout the day from Monday through Saturday.

REQUIREMENTS FOR ADMISSION

To be admitted to the College, an applicant must be at least 17 years of age and a graduate of an accredited high school, or must have been granted a high school equivalency diploma. The applicant must have attained a scholastic average which indicates a reasonable probability of success in college.

APPLICATION FOR ADMISSION

All correspondence concerning admission to Brevard Engineering College should be addressed to the Registrar, Brevard Engineering College, Melbourne, Florida. An application blank should be requested, filled out, and returned to the Office of the Registrar. The applicant should also request his High School to send his transcript to the college.

APTITUDE TESTING

An aptitude examination (ACE) is given to all entering undergraduate students. The object of the examination is to guide the faculty in assisting individual students.

ADVANCED STANDING

Credit for work successfully completed at another institution may be granted, if an official transcript is presented, and if it is determined that the work is equivalent to that given at the Brevard Engineering College in course content and hours. In doubtful cases, credit may be granted by written examination. A minimum of 45 quarter hours, however, must be taken at the Brevard Engineering College in the appropriate program to satisfy any of the undergraduate degree requirements.

SPLIT SCHEDULE

Students may split their work among different years of the curriculum as best fits their entrance qualifications, subject to conflict in classroom hours.

SPECIAL STUDENTS

Students who are not candidates for a degree may take any of the courses they desire, provided they are able to satisfy the course prerequisites. Such students are classified as Special Students.

SPECIAL COURSES

Nearly every term, the college offers one or more special courses which are outside the regular degree programs. These courses are offered on demand and some carry college credits.

Special courses which have recently been offered are Surveying; Review for the Professional Engineer's Examination; Investments; Quality Control Administration; Reliability and Calculus Review.

CLASS SCHEDULES

A specific class schedule is available approximately one month before the beginning of each term. The class schedule states the

The president of the college, Dr. Jerome P. Keuper, is flanked by two recipients of the honorary doctorate degree recently awarded by the Brevard Engineering College. On the left is Florida's Secretary of State, the Honorable Tom Adams, and on the right is Astronaut Major "Gus" Grissom.

courses to be offered, the days of the week, and the hours of the day. Copies will be mailed upon request.

CORRESPONDENCE WORK

The college offers no correspondence courses.

RESIDENCE

No less than forty-five quarter hours of work must be completed at Brevard Engineering College. The final fifteen (15) quarter hours before graduation must be earned in residence. The college reserves the right to change requirements for graduation when it is decided that such changes are necessary. A student is generally graduated according to degree requirements at the time of admission unless attendance has not been continuous. In case of re-admission, degree requirements at the time of re-admission must be met.

DIVISION OF LIBERAL ARTS

BACHELOR OF ARTS DEGREE

The Brevard Engineering College confers the degree of Bachelor of Arts upon students of high moral character who meet the academic requirements for the degree. The requirements are based on the general principle of a broad distribution of studies among the representative fields of human culture and a concentration of studies within a major field. The object of distribution is to broaden the student's outlook through a general view of our cultural heritage as we move into the age of space. The object of concentration is to aid the students in acquiring comprehensive knowledge in a particular field of scholarly achievement.

ACADEMIC REQUIREMENTS

Candidates for the Bachelor of Arts degree are required to complete a minimum of one hundred and eighty-six (186) quarter hours of college work with a minimum grade point average of 2.0.

DISTRIBUTION

The following courses are required in the program of every candidate for the Bachelor of Arts degree. These course requirements should be met by the end of the sophomore year.

	Hours
Arts A211, 212	6
English E111, 112, 112, 202, 203 304	18
Foreign Language (electives)	9
History H111, 112, 112, 101, 102	15
Mathematics and Logic M111, PH131, PH331	9
Physical Sciences (electives)	6
Psychology	9
Social Studies (6 hours elected from Political Science or 6 hours elected from Sociology)	6
Total	78

CONCENTRATION

Areas of concentration at the Brevard Engineering College in liberal arts are English, History, and Psychology.

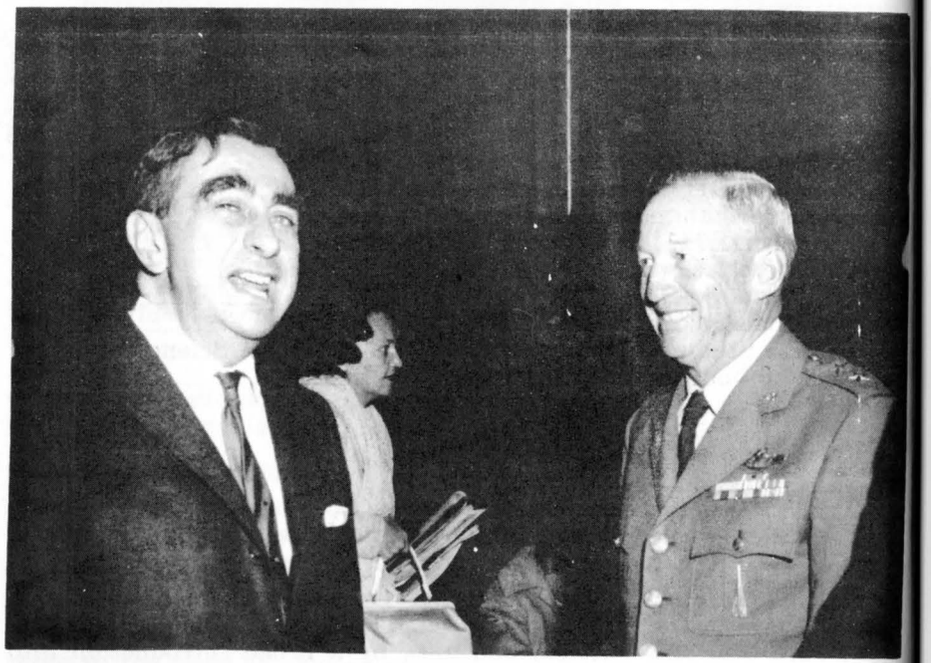
ENGLISH. The Department of English has the objective in the first two years to lay a firm foundation for correct self-expression, both oral and written, and also, by a broad introduction into literature, to lead the student into the higher levels of creative writing and a more intensive study of the great tradition of literature. Requirements for a major in english are a total of 5 quarter hours in english including E301, 302, 311, 312, 323, 401 and 402 in addition to the basic English courses required for the degree.

HISTORY. The Department of History has the objectives to provide students the necessary historical background for an understanding of the world today, to equip students for enlightened citizenship, and to assist students in acquiring knowledge of the ideas and practices of political society.

Requirements for a major in history are a total of 45 quarter hours in History including H103, 201, 220, 221, 223; PO311, 312, 312, in addition to the basic History courses required for the degree.

PSYCHOLOGY. The Department of Psychology has the objectives to provide students with an understanding of human relationships and an insight into the domains of human behavior.

Requirements for a major in psychology are a total of 45 quarter hours in Psychology including PS141 142, 151, 153, 201, 220, 230 and 310. Also, in order that the student have a reasonable understanding of human behavior and its development, complementary courses in Sociology S261, 262 and 263 must be included in the above 45 hours.



Dr. Edward Teller, guest Seminar speaker, chats with Major General Leighton I. Davis, Commander of the Air Force Missile Test Center.

THE INSTITUTE OF SPACE TECHNOLOGY

BACHELOR OF SCIENCE DEGREES

Brevard Engineering College confers the degree of Bachelor of Science upon students of high moral character who meet the requirements for the degree. Baccalaureate degrees are awarded in Aerospace Engineering, Electrical Engineering, Mathematics, Physics, and Business Administration.

ASSOCIATE DEGREE

The Associate Degree is awarded to students who successfully complete a planned program of 96 quarter hours in the basic courses with a minimum grade point average of 2.0. The Associate Degree program forms the foundation for all the technical curricula at Brevard Engineering College and is identical in content in the curricula in Aerospace Engineering, Electrical Engineering and Physics. The Associate Degree program at Brevard Engineering College is not intended to be a terminal program, but rather a milestone of academic achievement in a baccalaureate pursuit.

ACADEMIC REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE

Candidates for the Bachelor of Science degree are required to complete a minimum of one hundred and ninety eight (198) quarter hours of college work with a minimum grade point average of 2.0. Recommended programs of study are outlined below. Deviation from the program may be made only with the approval of the Dean. Each baccalaureate program must include at least 40 quarter hours, devoted to the humanities and, except for Business Administration, of the courses outlined in the Associate degree program.

AEROSPACE ENGINEERING

This curriculum leads to the degree of Bachelor of Science in Aerospace Engineering. In the three years of study in the upper division, the student receives training in courses unique to the profession of aerospace engineering. The program is designed to yield a broad training in both aerospace engineering and humanities, with an emphasis on the scientific aspects of space technology. The curriculum is geared to meet the needs of the aerospace industry for scientifically trained personnel and of the individual to enter the exciting profession devoted to the conquest of space.

ELECTRICAL ENGINEERING

The electrical engineering curriculum is primarily devoted to the principles which underlie modern electronic engineering. In the early years emphasis is placed on mathematical and physical principles.

The later years emphasize the basic analysis techniques of the engineer . . . the ways in which the engineer views physical situations and utilizes mathematical techniques in order to design a useful system or product. Finally, emphasis is placed on design of physical systems including electronic communications systems such as radar and telemetry. Communications, one of man's impelling desires, is the basic theme of the curriculum. Radar, radio, and wire telephony, measurement, electronic, computation are the fields of study designed to prepare the student for a career in engineering profession in the age of space.

MATHEMATICS

The curriculum in mathematics embraces required and elective courses in mathematics, allied scientific and technical areas, and the humanities, all of which provide the proper background for a career as a professional mathematician.

PHYSICS

The curriculum in physics trains students in both experimental and theoretical physics. The preparation is such that the student is well equipped, either to build a successful career in a field of applied physics in industry or enter a graduate program in preparatory for more advanced work. Although a central core of physics is required for the degree, the curriculum allows each student to select a considerable variety of subjects best suited to his individual desires and capabilities.

BUSINESS ADMINISTRATION

The Business Administration program is designed to fill a need for professionally trained management personnel in the aerospace industry specifically . . . as well as in business generally. The College recognizes the fact that management is an inter-disciplinary art. Thus, the curriculum is designed to acquaint the student with the fundamental principles of these several disciplines. Studied therefore, are such courses as Communications, Mathematics and Statistics, Foreign Language, and several other courses in the Social Sciences. Courses dealing with management and management theory will be accented. However, it is the intent of the department to provide the broad base of management studies upon which the individual can build and develop his personal philosophy, method, and approach to the management art. It is intended not to develop management technicians but rather managers in every sense of the profession.

Program for the Associate Degree Aerospace Engineering

First Year

Fall Term	M101 — Algebra C101 — Chemistry D101 — Graphic Science
Winter Term	M102 — Algebra C102 — Chemistry D102 — Graphic Science
Spring Term	M103 — Algebra C103 — Chemistry D103 — Graphic Science
Summer Term	M104 — Trigonometry EC101 — Economics E101 — English

Second Year

Fall Term	M105 — Calculus P101 — Physics E102 — English
Winter Term	M106 — Calculus P102 — Physics P103 — Physics Laboratory
Spring Term	M107 — Calculus P201 — Physics E103 — Technical Report Writing
Summer Term	M201 — Differential Equations P202 — Physics P203 — Physics Laboratory

Third Year

Fall Term	M202 — Differential Equations EE201 — A.C. Circuit Theory H101 — American History
Winter Term	M203 — Intermediate Calculus EE202 — A.C. Circuit Theory P301 — Physics
Spring Term	P302 — Physics EE203 — A.C. Circuit Theory P303 — Physics Laboratory Completion of Requirements for Associate Degree in Engineering

Note: Mathematics majors may substitute electives for D101, 102, 103 and EE201, 202, 203.

Bachelor of Science Degree Curriculum in Aerospace Engineering

(See the Associate Degree program for the first three years)

Fourth Year

Summer Term	ME201 — Applied Mechanics I E201 — Public Speaking P450 — Physics of the Atmosphere & Space
Fall Term	ST400 — Introduction to Aerospace Engineering I ME202 — Applied Mechanics II L — Foreign Language
Winter Term	ST401 — Introduction to Aerospace Engineering II ME203 — Applied Mechanics III L — Foreign Lauguage
Spring Term	ST410 — Mechanics of Flight I M455 — Vector Analysis L — Foreign Lauguage

Fifth Year

Summer Term	P403 — Thermodynamics L — Scientific Foreign Language EE451 — Electronics Laboratory
Fall Term	P350 — Optics P304 — Astronomy I EE461 — Electrical Engineering Laboratory
Winter Term	P401 — Electromagnetic Theory P305 — Astronomy II ST420 — Dynamics I
Spring Term	ST411 — Mechanics of Flight II P402 — Hydrodynamics Humanities Elective

Sixth Year

Summer Term	ST421 — Dynamics II ME301 — Strength of Materials Humanities Elective
Fall Term	ST431 — Propulsion I ST422 — Dynamics III Humanities Elective
Winter Term	ST432 — Propulsion II ST450 — Principles of Guidance & Control I M545 — Statistics
Spring Term	EE406 — Servomechanisms ST412 — Mechanics of Flight III M546 — Statistics

Bachelor of Science Degree Curriculum in Electrical Engineering

(See the Associate Degree program for the first three years)

Fourth Year

Summer Term	E201 — Public Speaking EE204 — Advanced A.C. Circuit Theory ME201 — Applied Mechanics
Fall Term	EE301 — Circuit Theory of Electron Devices EE305 — D.C. Machinery ME202 — Applied Mechanics
Winter Term	EE302 — Circuit Theory of Electron Devices EE306 — A.C. Machinery ME203 — Applied Mechanics
Spring Term	EE303 — Circuit Theory of Electron Devices H102 — American History M455 — Vector Analysis

Fifth Year

Summer Term	EE304 — Electron Devices Laboratory H201 — History of Science ME301 — Strength of Materials
Fall Term	EE401 — Transistor Circuit Theory P401 — Electromagnetic Theory ME302 — Machine Design
Winter Term	EE402 — Transistor Circuit Theory ME401 — Engineering Materials Humanity Elective
Spring Term	EE403 — Communication Theory M301 — Engineering Analysis ME402 — Fluid Mechanics

Sixth Year

Summer Term	EE404 — Industrial Electronics E202 — English Literature ME403 — Engineering Thermodynamics
Fall Term	G361 — Principles of Management E203 — English Literature ME404 — Engineering Thermodynamics
Winter Term	EE405 — Theory of Electron Devics EE406 — Servomechanisms EE407 — Servomechanisms Laboratory
Spring Term	EE — Elective Humanity Elective EE471 — Transistor Electronics Laboratory

Bachelor of Science Degree Curriculum in Mathematics

(See the Associate Degree program for the first three years)

Fourth Year

Summer Term	E201 — Public Speaking G221 — Foreign Language Elective
Fall Term	M302 — Mathematical Analysis G222 — Foreign Language P304 — Astronomy
Winter Term	M303 — Mathematical Analysis G223 — Foreign Language P305 — Astronomy
Spring Term	M304 — Mathematical Analysis EC201 — Economics H102 — American History

Fifth Year

Summer Term	M405 — Digital Computers H201 — History of Science Elective
Fall Term	G361 — Principles of Management M406 — Digital Computers Elective
Winter Term	M401 — Introduction to Modern Mathematics M407 — Advanced Programming Elective
Spring Term	M402 — Introduction to Modern Mathematics M455 — Vector Analysis Elective

Sixth Year

Summer Term	M403 — Introduction to Modern Mathematics M556 — Vector Analysis E202 — English Literature
Fall Term	M404 — Introduction to Statistical Methods G331 — Logic E203 — English Literature
Winter Term	M545 — Statistics G332 — Logic Elective
Spring Term	M — Elective M — Elective Humanity Elective

Bachelor of Science Degree Curriculum in Physics

(See the Associate Degree program for the first three years)

Fourth Year

Summer Term	P330 — Physical Electronics ME201 — Applied Mechanics E201 — Public Speaking
Fall Term	P350 — Optics EE461 — Electrical Engineering Laboratory L — Foreign Language
Winter Term	P360 — X-rays and Crystal Physics P401 — Electromagnetic Theory L — Foreign Language
Spring Term	M455 — Vector Analysis H102 — American History L — Foreign Language

Fifth Year

Summer Term	EE451 — Electronics Laboratory P403 — Thermodynamics L — Scientific Foreign Language
Fall Term	P431 — Atomic and Nuclear Physics G221 — Principles of Management EE — Elective
Winter Term	P412 — Atomic and Nuclear Physics P443 — Experimental Atomic Physics Humanity Elective

Sixth Year

Summer Term	P450 — Physics of the Atmosphere and Space P434 — Introduction to Solid State Physics Humanity Elective
Fall Term	P443 — Experimental Research — Thesis P — Elective P435 — Introduction to Nuclear Physics
Winter Term	P444 — Experimental Research — Thesis A211 — Introduction to Music P — Elective
Spring Term	P — Elective A212 — Introduction to Art and Architecture P510 — Electrical Discharges in Gases

Bachelor of Science Degree Curriculum in Business Administration

First Year

Fall Term	M101 — Algebra C101 — Chemistry E101 — English
Winter Term	M102 — Algebra C102 — Chemistry E102 — English
Spring Term	M103 — Algebra C103 — Chemistry E202 — English Literature

Second Year

Fall Term	L — Language H110 — Western Civilization BA131 — Business Statistics
Winter Term	L — Language H111 — Western Civilization PH331 — Logic
Spring Term	L — Language H112 — Western Civilization PH331 — Logic
Summer Term	E103 — Technical Report Writing H101 — American History EC101 — Economics

Third Year

Fall Term	L — Language H102 — American History EC201 — Economics
Winter Term	L — Language BA211 — Principles of Accounting EC202 — Labor
Spring Term	L — Language BA212 — Principles of Accounting EC221 — Public Policy and Business
Summer Term	BA213 — Principles of Accounting BA261 — Business Law

Fourth Year

Fall Term	G221 — Principles of Management H301 — Latin American History S261 — Principles of Sociology
Winter Term	G222 — Principles of Management PS141 — General Psychology S262 — Principles of Sociology
Spring Term	G223 — Principles of Management PS142 — General Psychology S263 — Principles of Sociology
Summer Term	BA311 — Income Tax Accounting BA361 — Investments BA364 — Social Insurance

Fifth Year

Fall Term	G321 — Management Processes PO311 — Political Science PS330 — Industrial Psychology
Winter Term	G322 — Management Processes PO312 — Political Science G341 — Personnel Management
Spring Term	G323 — Management Processes PO313 — Political Science G342 — Personnel Management
Summer Term	E301 — Sales Writing E201 — Public Speaking BA343 — Personnel Management

Sixth Year

Fall Term	BA411 — Management Accounting BA461 — Contract Administration BA365 — Marketing
Winter Term	EC301 — Labor Economics BA462 — Contract Administration II BA366 — Principles of Salesmanship
Spring Term	EC302 — Labor Relations BA463 — Contract Administration III BA464 — Business Ethics Completion of Requirement for Associate Degree

THE GRADUATE SCHOOL

PURPOSE AND OBJECTIVES

It is the purpose of the Graduate School degree program, within the framework of the general objectives of the College, to achieve in the student mastery of an area of technical learning and the development of independent scholarship. Graduate degrees are awarded only to individuals who have demonstrated a breadth of knowledge and a maturity of scholarship. They are not awarded for routine completion of course requirements.

DEGREES OFFERED

Four Master of Science programs are offered in the Graduate School. Degrees may be earned in the fields of Electrical Engineering, Applied Mathematics, Physics and Aeorspace Engineering.

CLASS SCHEDULE

Graduate classes normally meet on Tuesday and Thursday evenings. However, the College reserves the right to schedule classes on other evenings when necessary. Each class period is normally of 1½ hours duration.

COURSE ANNOUNCEMENTS

The term in which a course is to be given will be found in the Graduate School Bulletin.

CLASSIFICATION OF STUDENTS

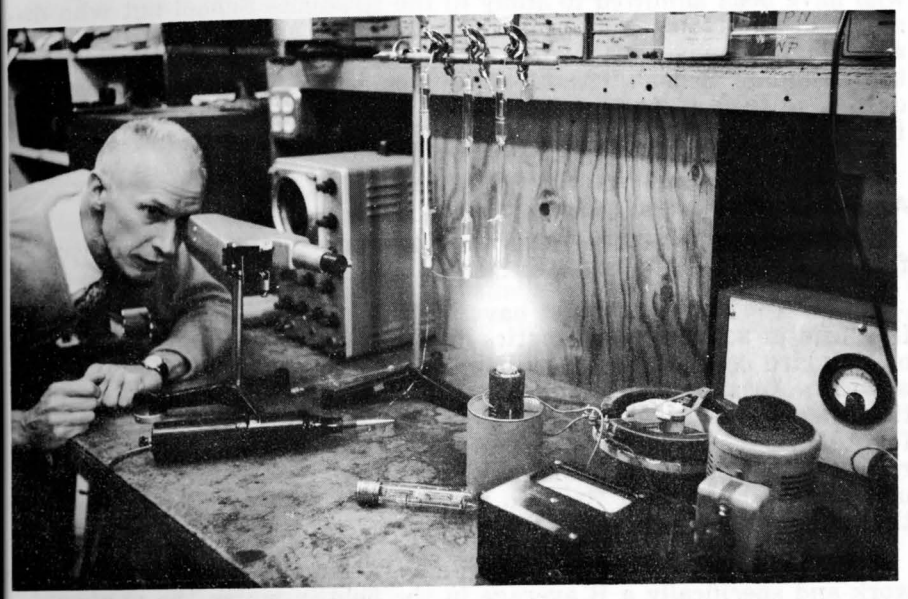
REGULAR STUDENTS are those who intend to meet requirements for a degree and who have been unconditionally approved to work toward a graduate degree by the Chairman of the Department in which the student expects to major and by the Dean of the Graduate School. Such approval does not imply acceptance of the student as a candidate for a degree. Approval of candidacy is subject to the considerations indicated in the Requirements for the Master of Science Degree. A program of study will be outlined for a Regular Student. The program must be approved by the Dean of the Graduate School and may be modified from time to time as circumstances may require.

PROVISIONAL STUDENTS are those admitted to graduate study who intend to meet requirements for a degree but

(a) Who are deficient in previous academic grade average or

(b) who are deficient in course or subject prerequisites or

(c) whose applications, transcripts or other required information are received after application deadlines.



Victor B. Kovac, Physics Laboratory instructor calibrating a spectro scope with an OSRAM spectral lamp.

Upon removal of all deficiencies a Provisional Student may be reclassified as a Regular Student.

SPECIAL STUDENTS are those holding baccalaureate degrees who have been admitted to study in the Graduate School and who wish to have such study become a matter of record, but who do not seek a graduate degree. Such students must comply with all regular requirements for admission to the course or courses desired, but waivers of admission requirements may in certain cases be granted by the Dean of the Graduate School. Should a Special Student subsequently desire to become a Regular Student, credit earned is subject to evaluation by the department in which he expects to specialize and may or may not be accepted to apply toward minimum degree requirements in the College.

DEGREE STUDENTS are those students who have fulfilled all requirements for the grade of Regular Student and have in addition fulfilled the requirements for admission to candidacy (see Requirements for Master of Science Degree).

AUDITORS are those students holding baccalaureate degrees who have been admitted to study in the Graduate School but who do not wish to have such study become a matter of record. Admission as an auditor must be approved by the instructor and by the Dean of the Graduate School. Auditors will be permitted, but are not required, to take course examinations. They will not receive a grade in the course. They must pay the full tuition and fee requirements.

ADMISSION REQUIREMENTS

The following general requirements must be met by all applicants for admission to the Graduate School:

(1) The applicant must have been granted a Bachelor's Degree in a field of science, mathematics or engineering from an institution of standard collegiate rank recognized by an appropriate accrediting agency. An applicant who is a graduate of a non-accredited institution is evaluated upon an individual basis to determine his eligibility for admission. A graduate of a non-accredited institution may be required to raise his standing by taking additional courses at the undergraduate level in Brevard Engineering College as required by the Dean of the Graduate School.

(2) The applicant must have had a B average in undergraduate work and specifically a B average in the field in which the applicant expects to major in the Graduate School.

(3) The applicant must submit to the Dean of the Graduate School one copy of an official transcript of his undergraduate record. This transcript must be sent directly from the applicant's college or university to the Brevard Engineering College.

(4) His application must be approved by the Dean of the Graduate School.

ADMISSION PROCEDURE

Application for admission to the Graduate school shall be made by new students on a form that may be obtained from the College Office. Upon completion of the application form the applicant shall present himself at the Office of the Dean of the Graduate School for assignment to an adviser who will then check the applicant's qualifications for admission and, if satisfactory, work out with the applicant an acceptable course of study based on the applicant's objectives and qualifications. The adviser will then approve the application for admission and the agreed upon course of study.

Students previously enrolled in the college who wish to take new, but previously approved, courses or who wish to take the second or third term of a previously approved course just completed with a passing grade shall make application on a form provided by the Office of the Registrar. A term bill will then be prepared and mailed to the student.

Students previously enrolled in the college who wish to take a new, but not previously approved, course shall make application on the form provided by the Office of the Registrar. Approval of the application must be given by the Dean of the Graduate School before a term bill is prepared and mailed to the student.

REQUIREMENTS FOR MASTER OF SCIENCE DEGREE

ADMISSION TO CANDIDACY — Admission to the Graduate School does not imply that the work taken by the student must be credited toward a degree. No commitment in this matter has been made until the student is admitted to candidacy for a degree. The following are the requirements for admission to candidacy:

(1) Completion of a minimum of two terms in residence and the completion of a minimum of nine term hours of study.

(2) Certification by the Chairman of the Department that the Graduate Record Examination has been taken and all other requisite preliminary examinations have been passed.

(3) Foreign language requirements, if specified, have been met.

(4) A general course average of no lower than B with no individual course grade lower than C. A student may have a "D" in a course which is not counted for credit towards the degree.

(5) The presentation of an outline of the student's program of study, and a plan of work proposed as a basis for his thesis, if required, which have the approval of the Chairman of the Department and the Dean of the Graduate School.

Application for admission to candidacy for a Master's Degree must be made by the student on a form to be obtained from the Office of the Dean of the Graduate School and must be filed with the Dean of the Graduate School upon completion.

LANGUAGE REQUIREMENTS — At the option of the Department a reading knowldge of one foreign language must be demonstrated prior to admission to candidacy. This requirement may be met by one of the following methods: (1) by examination, or (2) presentation of two years of college credit (at least 12 semester hours or 18 quarter hours) in one of the following foreign languages: French, German, Russian. The examination will consist of 1½ hours in which to write an acceptable translation of a technical document, with the aid of a dictionary. No student will be permitted a re-examination in a foreign language during the same quarter in which he failed the examination. Premission for re-examination in subsequent terms can be granted only upon evidence of sufficient work done to justify re-examination.

GRADUATE RECORD EXAMINATION — This examination is required for all students seeking the Master of Science Degree. It should be taken not later than the student's second quarter of resi-

dence, but must be taken before admission to candidacy can be approved. Information as to the dates on which the examination may be taken may be obtained from the Office of the Registrar.

PROGRAM OF STUDY — A candidate for a Master of Science degree is required to complete a program of study consisting of courses carrying a minimum credit value of 15 quarter hours, of which a minimum of 21 must be in his major field. The program of study, and thesis plan if required, must be submitted on the proper forms for approval by the student's Department Chairman, and the Dean of the Graduate School. This should be completed not later than the student's second quarter of residence and must be done before the student is admitted to candidacy. These approved programs must be on file in the Office of the Registrar.

Two courses per term are considered a full load for evening students in the Master of Science programs. Thus the minimum requirement of 45 term hours may be expected to require at least two calendar years. In general, however, it is anticipated that a longer time will be required. Additional departmental requirements are given in the section on Graduate Degree Programs.

REQUIRED STANDING — An average of "B" must be maintained on the program of study used to satisfy degree requirements. No single grade lower than "C" will be accepted.

It should be noted in the section "grading System," that although a passing grade of "D" may be issued, a "D" is not acceptable for course credit toward a Master's degree. A student who intends to apply for admission to candidacy for a Master's Degree should be fully cognizant of the consequences of the effect of a "D" grade on his future program. If a student receives a "D" in a course required for the degree, he may apply to the Dean of the Graduate School for a re-examination. Upon approval of the instructor, Department Chairman and Dean of the Graduate School, and upon payment of the Special Examination fee, the re-examination will be given. If the re-examination grade is not adequate to raise the original course grade above "D", the course must be repeated at the next opportunity. If the grade of "D" is received in an elective course, the student may apply for re-examination, elect to repeat the course, or select another elective. Application for re-examination must be received at the Office of the Dean of the Graduate School not later than two weeks from the date of mailing of the original grade.

EXAMINATIONS — In addition to all examinations required for admission to candidacy and all examinations on the courses taken, the candidate must pass a comprehensive written examination covering his field of specialization, and at the option of the Department, an additional oral examination. An oral examination shall be conducted by a committee appointed by the Dean of the Graduate School, but will be open to any member of the faculty who may desire to attend.

RESIDENCE—The minimum residence requirement for a Master's Degree is six (6) quarters. All work credited toward a Master's Degree must be completed within six (6) years.

TRANSFER OF CREDITS — Transfer of credits for graduate courses is never automatic. In a program of study for a graduate degree the courses taken must constitute a logical whole. In cases in which a course taken at another recognized institution does constitute a logical part of the student's program, transfer of credit may be allowed if recognized by the Chairman of the Department and approved by the Dean of the Graduate School. Such transfer of credit cannot exceed 9 quarter hours. Work done at extension or by correspondence will not be credited toward the Master's Degree. An undergraduate course taken at another institution may be used to satisfy prerequisite requirements for a graduate course even where these prerequisites are normally graduate courses, provided it can be shown to the satisfaction of the Department Chairman and the Dean of the Graduate School that the course content is essentially equivalent to the graduate course for which it is being substituted. Such a course cannot, however, be accepted for transfer of credit.

THESIS — At the option of the student's major department, a thesis may be required for the Master of Science Degree. It must show that the student has used independence of judgment in developing a problem from primary source materials. A thesis adviser will be appointed by the Chairman of the student's major department. The Master's thesis must be approved by the adviser and placed on file with the Dean of the Graduate School for a reading committee at least six (6) weeks before the date of graduation. Three file copies must be deposited with the College Library before the degree is granted. These copies must contain the written approval of the adviser, Chairman of the final reading committee, and the Dean of the Graduate School.

GRADUATE DEGREE PROGRAMS

GENERAL — The degree of Master of Science may be conferred upon satisfactory completion of the requirements for Master of Science degree as described in the previous sections and in addition the departmental requirements described in this section.

DEPARTMENT OF PHYSICS — The Physics option for the Master of Science degree requires a minimum of 48 hours. The following courses are required:

M-505	Advanced Calculus	3 hours
M-506	Advanced Calculus	3 hours
M-507	Advanced Calculus	3 hours
P-515	Mathematical Physics—Analytical Mechanics	3 hours
P-516	Mathematical Physics—Waves and Vibration	3 hours
P-517	Mathematical Physics—Electric and Magnetic Fields	3 hours
P-530	Quantum Mechanics I	3 hours
P-535	Solid State Physics	3 hours
P-540	Nuclear Physics I	3 hours
P-550	Physical Optics	3 hours
P-580	Statistical Mechanics	3 hours
P-605	Thesis	3 hours
		36 hours

The balance of 12 hours may be electives from the folowing list:

P-520	Astrophysics	3 hours
P-531	Quantum Mechanics II	3 hours
P-537	Molecular Vibrations	3 hours
P-541	Nuclear Physics II	3 hours
P-558	Quantum Electronics	3 hours
P-560	Magnetohydrodynamics	3 hours
P-570	Selected Topics in Physics	3 hours
EE557	Transistor Theory	3 hours
ST540	Celestial Mechanics I	3 hours
ST541	Celestial Mechanics II	3 hours

A final comprehensive written examination covering the entire range of the candidate's program of study must be taken along with a final oral examination.

DEPARTMENT OF AEROSPACE ENGINEERING — The Aerospace Engineering option for the degree of Master of Science requires a minimum of 48 hours. The following courses are required:

M-505	Advanced Calculus	3 hours
M-506	Advanced Calculus	3 hours
M-507	Advanced Calculus	3 hours
P-515	Mathematical Physics—Analytical Mechanics	3 hours
P-516	Mathematical Physics—Waves and Vibrations	3 hours

P-517	Mathematical Physics—Electric and Magnetic Fields	3 hours
ST510	Rocket Propulsion I	3 hours
ST511	Rocket Propulsion II	3 hours
ST530	Missile Guidance	3 hours
ST540	Celestial Mechanics I	3 hours
ST541	Celestial Mechanics II	3 hours
ST550	Range Instrumentation, Optical	3 hours
ST551	Range Instrumentation, Electronic	3 hours
		39 hours

The balance of 9 hours may be electives from the following list:

ST542	Geodesy	3 hours
ST570	Communications and Tracking Networks	3 hours
ST580	Space Medicine	3 hours
ST585	Analysis of Manned Space Craft	3 hours
M-535	Matrix Theory I	3 hours
M-538	Matrix Theory II	3 hours
M-545	Statistics I	3 hours
M-546	Statistics II	3 hours
M-547	Error Analysis	3 hours
P-520	Astrophysics	3 hours
P-530	Quantum Mechanics I	3 hours
P-531	Quantum Mechanics II	3 hours
P-540	Nuclear Physics I	3 hours
P-541	Nuclear Physics II	3 hours
EE515	Advanced Theory of Servomechanisms	3 hours
EE517	Analysis of Non-linear Control Systems	3 hours
EE545	Logical Design of Digital Computers I	3 hours
EE546	Logical Design of Digital Computers II	3 hours

A final comprehensive written examination, covering the entire range of the candidate's program of study, must be taken. A final oral examination must also be taken.

DEPARTMENT OF MATHEMATICS — The Applied Mathematics option for the degree of Master of Science requires a minimum of 48 hours. The following courses are required:

M-505	Advanced Calculus	3 hours
M-507	Advanced Calculus	3 hours
M-525	Complex Variables I	3 hours
M-526	Complex Variables II	3 hours
M-527	Real Variables	3 hours
M-535	Theory of Determinants and Matrices I	3 hours
M-538	Theory of Determinants and Matrices II	3 hours
M-545	Statistics I	3 hours
M-546	Statistics II	3 hours
M-605	Thesis	3 hours
M-606	Thesis	
		33 hours

Six hours must be taken from the following list:

P-515	Mathematical Physics	3 hours
P-516	Mathematical Physics	3 hours
P-517	Mathematical Physics	3 hours
P-520	Astrophysics	3 hours
P-530	Quantum Mechanics I	3 hours
P-531	Quantum Mechanics II	3 hours
ST540	Celestial Mechanics I	3 hours
ST541	Celestial Mechanics II	3 hours
EE545	Logical Design of Digital Computers I	3 hours
EE546	Logical Design of Digital Computers II	3 hours

The balance of 9 hours may be elected from the above list or from the following list:

M-508	Operational Calculus	3 hours
M-511	Advanced Differential Equations	3 hours
M-536	Modern Algebra I	3 hours
M-537	Modern Algebra II	3 hours
M-547	Error Analysis	3 hours
M-561	Number Theory	3 hours
M-575	Numerical Analysis I	3 hours
M-576	Numerical Analysis II	3 hours
M-581	Advanced Analytic Geometry	3 hours

A comprehensive written examination must be passed covering the general field of applied mathematics and an oral examination in defense of the thesis. The thesis must be a comprehensive and searching piece of work in applied mathematics suitable for publishing and guided by a member of the faculty, appointed by the Chairman of the Department for this purpose.

DEPARTMENT OF ELECTRICAL ENGINEERING — The Electrical Engineering option for the degree of Master of Science requires a minimum of 48 hours. The following courses are required:

M-505	Advanced Calculus I	3 hours
M-506	Advanced Calculus II	3 hours
M-507	Advanced Calculus III	3 hours
P-515	Mathematical Physics—Analytical Mechanics	3 hours
P-516	Mathematical Physics—Waves and Vibration	3 hours
P-517	Mathematical Physics—Electric and Magnetic Fields	3 hours
EE515	Advanced Theory of Servomechanisms	3 hours
EE517	Analysis of Non-Linear Control Systems I	3 hours
EE518	Analysis of Non-Linear Control Systems II	3 hours
EE525	Synthesis of Passive Networks I	3 hours
EE526	Synthesis of Passive Networks II	3 hours
EE527	Synthesis of Passive Networks III	3 hours

The balance of 12 hours may be electives from the following list:

EE528	Electromagnetics	3 hours
EE535	Radar Systems	3 hours
EE545	Logical Design of Digital Computers I	3 hours
EE546	Logical Design of Digital Computers II	3 hours
EE550	Introduction to Analog Computers	3 hours
EE551	Advanced Analog Computers	3 hours
EE557	Transistor Theory	3 hours
P-530	Quantum Mechanics I	3 hours
P-531	Quantum Mechanics II	3 hours
P-535	Solid State Physics	3 hours
P-558	Quantum Electronics	3 hours
ST530	Missile Guidance	3 hours
ST551	Range Instrumentation—Electronic	3 hours
ST570	Communications and Tracking Networks	3 hours

A final comprehensive written examination covering the entire range of the candidate's program of study must be taken along with a final oral examination.

Flight of America's First Man In Space (Alan B. Shepherd)
Mercury Redstone

COURSE DESCRIPTIONS

AEROSPACE ENGINEERING

ST-400, 401 INTRODUCTION TO AEROSPACE ENGINEERING Cr. 3, 3

Introductory study of space vehicle systems; rocket propulsion; guidance; telemetry; controls, instrumentation and tracking networks; communications; celestial mechanics and cosmology; geophysics and astrophysics; space medicine and geodesy.

ST 410 MECHANICS OF FLIGHT I Cr. 3

Fundamental principles of aerodynamics, air foil theory, lift and drag, control surfaces and stability.

ST 411 MECHANICS OF FLIGHT II Cr. 3

Analysis of forces acting on aircraft and space craft. Determination of vehicle performance and trajectories.

ST 412 MECHANICS OF FLIGHT III Cr. 3

Study of the static and dynamic stability of aircraft and space craft throughout all phases of flight. Stability and control of re-entry vehicles.

ST 420 DYNAMICS I Cr. 3

Study of the motion of particles and rigid bodies. Methods of energy, work, momentum and impulse. Application to aircraft and space craft.

ST 421 DYNAMICS II Cr. 3

Gyroscopic Theory. Introduction to Celestial Mechanics. Vibration Generalized Coordinates and forces and the Lagrangian formulation of dynamics equations.

ST 422 DYNAMICS III Cr. 3

Simple vibration and vibration with two or more degrees of freedom. Stability. Introduction to non linear oscillations and introduction to aeroelasticity.

ST 431 PROPULSION I Cr. 3

Fundamental principles of operation and performance of ramjet, turbojet, turboprop and turbofan, reciprocating engine, and chemical rocket propulsion systems.

ST 432 PROPULSION II Cr. 3

Fundamental principles of operation and performance of nuclear, electrical, plasma and solar sail propulsion systems.

ST 450 PRINCIPLES OF GUIDANCE AND CONTROL I Cr. 3

Basic principles of navigation, electromagnetic and gravity fields, radio, inertial and radio-inertial guidance systems.

ST 510 ROCKET PROPULSION I Cr. 3

Thrust equation and performance parameters; differential equations for one-dimensional fluid flow with heat addition; application of differential equations to rocket propulsion; integration of the differential equations; rocket nozzle design; injection systems; liquid propellant combustion chambers; heat transfer.

ST 511 ROCKET PROPULSION II Cr. 3

(Prerequisite ST510)

Liquid propellant feed systems, rocket engine controls and instrumentation; design of typical liquid propellant rocket power plant; properties, storage and handling of liquid propellants; properties of solid propellants; types, configurations and performance parameters of solid propellants; design of typical solid propellant power plant; nuclear, ion, plasma and photon rocket theories and power plants.

ST 530 MISSILE GUIDANCE Cr. 3

(Prerequisite EE-406, Servomechanisms)

Theory of inertial navigation; principles of operation of inertial sensing elements; testing of inertial components; stable platforms; initial conditions and alignments; rocket vehicle guidance, performance analysis of rocket vehicle guidance systems.

ST 540 CELESTIAL MECHANICS I Cr. 3

(Prerequisite M-202)

Basic principles of applied mechanics applied to the calulation of orbits of planets and satellites. The Solar system; the central force field, orbit determination; perturbation analysis; introduction to celestial navigation.

ST 541 CELESTIAL MECHANICS II Cr. 3

(Prerequisite ST 540)

Three body problem; special and general perturbation; ballistic missile trajectory; ascent into and perturbation of satellite orbit; orbit transfer; libration points in earth-moon system.

ST542 GEODESY Cr. 3

Techniques of measurement of large portions of the earth's surface; form and dimensions of the earth; ellipticity; utilization of observations of the stars; use of ballistic cameras in geodesy.

ST 550 RANGE INSTRUMENTATION — OPTICAL Cr. 3

(Prerequisite P-301)

A study of the role of optical instrumentation in tracking missiles and satellites. Includes Ballastic Cameras, CZR and Theodolites. Operation of the instruments, computation of trajectory from the data and capabilities and limitations.

ST 551 RANGE INSTRUMENTATION — ELECTRONIC Cr. 3

A study of the role of electronic instrumentation in tracking missiles and satellites. It will consist of three parts. (1) Pulse radar principle. Basic operating equations. Range and angle measurements. Precision radar techniques. Performance evaluation. Acquisition. Tracking of missiles and space vehicles. (2) C. W. Tracking systems; system equations; phase-frequency concepts. Range and angle measurement. Data extraction, handling and transmission. (3) Telemetry.

ST 570 COMMUNICATIONS AND TRACKING NETWORKS Cr. 3

Earth to earth links; earth to space vehicle links; earth to artificial satellite to space vehicle links; communication equipment design including transmitters, receivers, antennas, frequency, optics, control and relay stations.

ST 580 SPACE MEDICINE Cr. 3

Role of man in the space program; review of the physiology of the cardio-pulmonary and nervous systems; dynamic forces, acceleration, deceleration and weightlessness; life support systems, oxygen-respiration requirements, waste disposal, closed ecological systems, CO_2 disposal, nutritional requirements, pressure suits; medical monitoring and data acquisition systems; radiation; psychological aspects of isolation and confinement, perception-reaction, stress factors and stress relieving systems, day-night cycle, work-adaptation to environment.

ST 585 ANALYSIS OF A MANNED SPACE CRAFT Cr. 3

The problems associated with designing, establishing and maintaining a manned earth-orbiting space craft will be considered, including the following: space craft configuration; artificial gravity versus gravity-free environment; structural problems; space power requirements; human factors and safety; vehicle and orbital stabilization and control problems; booster requirements for placing the craft in orbit; rendezvous and resupply operations.

ST 590 MAN-MACHINE PROCESSES

Optimum operation and maintenance of large complex systems where man plays a leading role. Psychophysiological operator response, environmental problems.

ARTS

A 211 INTRODUCTION TO MUSIC Cr. 3

Designed to familiarize students with the language of music. A study of harmony and the terminology of music. Appreciation for the masterworks in the history of music.

A 212 INTRODUCTION TO ART AND ARCHITECTURE Cr. 3

A comparative study of the art and architecture of the Ancient, Medieval and Baroque periods leading into the modern.

BIOLOGY

B 111, 112 GENERAL BIOLOGY Cr. 3
General biological principles and problems with consideration of both plant and animal forms.

B 113 GENERAL ZOOLOGY Cr. 3
(Prerequisite B112)
General zoological principles relating to invertebrate and vertebrate animals.

B 211 GENETICS Cr. 3
Principles of Mendelian heredity, mutation sex determination, eugenics.

B 301 BACTERIOLOGY Cr. 3
An introduction to the morphology, physiology, classification and economic importance of yeasts, molds, and bacteria.

B 401 INTRODUCTION TO ANATOMY Cr. 3
Study of nerves, veins, arteries, bones, muscles, lymph organs, histology essentials.

BUSINESS ADMINISTRATION

BA 131 BUSINESS STATISTICS Cr. 3
(Prerequisite M103)
The nature of business and economic statistics, statistical description, time series, varibles, etc.

BA 261 BUSINESS LAW Cr. 3
Fundamental principles of law which govern the daily conduct of business, the understanding of which should enable business and individuals to avoid litigation.

BA 211, 212, 213 PRINCIPLES OF ACCOUNTING Cr. 3
Theory of debit and credit, record making, organization of accounts and various phases of partnership and corporation accounting. Three hours each quarter. Three quarters.

BA 311 INCOME TAX ACCOUNTING Cr. 3
(Prerequisite BA213)
Accounting procedure and problems connected with the Federal Income Tax Law.

BA 361 INVESTMENTS Cr. 3
Fundamental principles underlying sound investment and the various types of investment securities.

BA 364 SOCIAL INSURANCE Cr. 3
Principles and problems of various types of social insurance and legislation dealing with industrial accidents and diseases, unemployment, old age, sickness, and automobile liability.

BA 365 MARKETING Cr. 3
Marketing methods and policies: consideration of various marketing institutions and their functions; social and economic aspects of our marketing system. Three hours.

BA366 PRINCIPLES OF SALESMANSHIP
Principles and practices of salesmanship. Three hours.

BA 411 MANAGERIAL ACCOUNTING Cr. 3
(Prerequisite BA213)
Use of accounting information as an instrument of managerial control with special reference to budgeting cost determination and taxation. Statement analysis is also considered.

BA 461, 462, 463 CONTRACT
ADMINISTRATION I, II, II Cr. 3
A study of the basic law and regulations relating to military and civilian government contracts. Consideration will be given to certain clauses, the interpretation of the clauses and the practical application of these clauses. Three hours each quarter. Three quarters.

BA 464 BUSINESS ETHICS Cr. 3
Moral conduct from the philosophical, social and buisness viewpoints.

CHEMISTRY

C 101, 102, 103 CHEMISTRY Cr. 3, 3, 3
Study of the fundamental principles of chemistry, physical state of matter and the periodic table; molecular bonding and classification of compounds; chemical equations; solutions; oxidation-reduction; chemical equilibria; chemistry of the metals and non-metals; insight into organic and nuclear chemistry.

C 301 GEOLOGY Cr. 3
A survey of structural and historical geology including principal geological formations, rocks and minerals and a history of the earth's crust.

C 404, C 405 ORGANIC CHEMISTRY Cr. 3, 3
An elementary course in the chemistry of carbon compounds. Emphasis on bio-chemical compounds.

C 450 PHYSICAL CHEMISTRY Cr. 3
Properties of solutions, chemical equilibrium, pH, the colloidal state; particular emphasis on biochemical applications.

ECONOMICS

EC 101 ECONOMICS Cr. 3
Basic course dealing with the problems of production and distribution of wealth, pricing, business organization, money, credit, public finance, and the economic organization of society.

EC 201 ECONOMICS Cr. 3
(Prerequisite EC101)

A further study and extension of the principles of economics including cost of production, elements of money and banking and applications of economics to public policy in a democratic society.

EC 202 LABOR ECONOMICS Cr. 3

A survey of the field of labor economics. Major topics covered are: the economic problems of the wage earner in modern society, the structure, policies and problems of labor organizations; employer and governmental policies affecting labor relations.

EC 221 PUBLIC POLICY AND BUSINESS Cr. 3

Historical approach to the regulation and control of American business by government and society and the effects of these controls upon modern-day enterprise. Specifics to include the evolution and present application of anti-trust legislation, Fair Labor Standards Act, etc. Three hours

EC 302 LABOR RELATIONS Cr. 3

A critical appraisal of the labor problems including the history, organization and operation of American trade unionism, collective bargaining and public control of labor relations. Three hours.

ELECTRICAL ENGINEERING

EE-201, 202, 203 A-C CIRCUIT THEORY Cr. 3, 3, 3
(Prerequisite Mathematics M-107;
Concurrent Physics P-201)

Concepts of resistance, inductance, and capacitance as electric circuit elements, series and parallel circuits; resonance phenomena; real and apparent power; Kirchoff's voltage and current laws; network equations on loop and node basis. Bridge circuits; network theorems; coupled circuits; impedance transformation or matching; tuned coupled circuits.

EE-204 ADVANCED A-C CIRCUIT THEORY Cr. 3
(Prerequisites EE-203,
Mathematics M-202)

Transients in Linear Circuits; Transmission Line Theory; Network Theory, Filters, and Equalizers. LaPlace transformation as applied to circuit theory.

EE-301, 302, 303 CIRCUIT THEORY OF ELECTRON DEVICES Cr. 3, 3, 3
(Prerequisite EE-204)

Electronic circuit components (diodes, triodes, tetrodes, pentodes, gas filled tubes, photo tubes) circuit theory of triodes; circuit theory of tetrodes and pentodes; audio and video amplifiers; feedback principles. Gas tube control circuits; single phase rectifiers and power supplies; polyphase rectifier circuits; radio frequency amplifiers and oscillators.

EE-304 ELECTRON DEVICES LABORATORY Cr. 2
(Prerequisite EE-303)

Laboratory experiments to illustrate the principles of EE-301, 302, 303.

EE-305 D-C MACHINERY Cr. 3
(Prerequisite EE-204)

Principles and operating characteristics of D-C Machines; generated electromotive force; saturation curves; voltage regulation and efficiency of shunt, series and compound generators; motor operating equations; speed, regulation and efficiency of shunt, series and compound motors; auxiliary equipments.

EE-306 A-C MACHINERY Cr. 3
(Prerequisite EE-204)

Basic principles of A-C Machinery; transformers; alternators; synchronous motors; induction motors; single-phase motors; selsyn devices.

EE-401, 402 TRANSISTOR CIRCUIT THEORY Cr. 3, 3
(Prerequisite EE-303)

Physical concepts of transistors and other related semiconductor devices; P-N Junction theory; characteristics and parameters of transistors; equivalent circuits; basic amplifier circuits; miscellaneous solid state devices.

EE-403 COMMUNICATION THEORY Cr. 3
(Prerequisite EE-303)

Theory of communication, information content, frequency spectra, noise, radio receivers and transmitters, propagation, and antennas.

EE-404 INDUSTRIAL ELECTRONICS Cr. 3
(Prerequisite EE-303)

Fundamentals of industrial electronic control using photo cells, gas tubes, and ignitrons; timing circuits, and sequence relaying; welder control; radio frequency heating.

EE-405 THEORY OF ELECTRON DEVICES Cr. 3
(Prerequisite EE-303)

Electric fields, potential distribution, space charge flow, and energy relations in electron tubes; electron theory of metals, thermionic emission; kinetic theory of gases.

EE-406 SERVOMECHANISMS Cr. 3
(Prerequisites EE-303, 305,
306, Mathematics M-202)

General background of servomechanisms. LaPlace trans-

formation, equations of physical systems, transient analysis, transfer functions, design, gain adjustment, compensation. Nyquist diagram, Bode plots, Root Locus.

EE-407 SERVOMECHANISMS LABORATORY Cr. 2
Laboratory experiments to illustrate the principles of EE-406.

EE-410 INFORMATION THEORY Cr. 3
Coding, probability constraints, statistical properties of signals, noise, filtering and prediction.

EE-414 ANTENNA THEORY Cr. 3
Theory of antennas

EE-451 ELECTRONICS LABORATORY Cr. 2
Voltage stabilizers, Multivibrator, Secondary emission, G. M. Counter, delay line, microwave techniques, frequency modulation, balanced D.C. amplifiers, quenching and coincidence circuits, Reflex velocity, modulated oscillators.

EE-471 TRANSISTOR ELECTRONICS LABORATORY Cr. 2
Static characteristics of a junction transistory; equivalent circuit analysis and experimental determination of voltage amplifier performance. Power amplifier, pulse circuits.

EE-515 ADVANCED THEORY OF SERVOMECHANISMS Cr. 3
(Prerequisite EE-406 Servomechanisms)
Phase plan analysis of non-linear systems; application of Z-tranforms to sampled systems; statistical approach to systems analysis by way of Fourier Transforms, autocorrelation and cross correlation techniques.

EE-517 ANALYSIS OF NON-LINEAR CONTRAL SYSTEMS I Cr. 3
(Prerequisite EE-515 Advanced Servomechanisms)
General theory of "quasi-linear" systems (for the description of periodic and random input behavoior) and topological phase space techniques (for the description of transient behavior); Analysis of non-linear systems by describing functions, phase plane, Liapounoff's method, Lagrange's method, and extensions of these techniques.
This term covers description and classification on non-linearities; general techniques for solving non-linear control problems; introduction to quasi-linearization and the describing function technique; describing functions of simple non-linearities, frequency invarient non-linearities and frequency varient non-linearities; quasi-linear closed loop systems.

EE-518 ANALYSIS OF NON-LINEAR CONTROL SYSTEMS II Cr. 3
(Prerequisite EE-517)

A continuation of EE-517. This term covers random input describing functions; Gaussian and other type describing functions; the phase plane method; trajectories and stability; Liapounoff's Method; Lagrange stability; relay servos.

EE-525 SYNTHESIS OF PASSIVE NETWORKS I Cr. 3
The first of a three term series concerned with the study of the techniques for the synthesis of passive networks. As most of the practicing engineer's problems are those of designing rather than analyzing circuits, this course is designed to provide the basic tools necessary to perform this task. This term covers the basic introduction to the required mathematics. The basic energy relations that must exist for a network to be realizable are developed and techniques for determining the existence of these conditions established.

EE-526 SYNTHESIS OF PASSIVE NETWORK II Cr. 3
The techniques for deriving functions that satisfy the basic conditions for a physically realizable network are established. Methods for deriving two element parameter networks (RL, RC, and LC) based on input impedance parameters are developed and many examples considered.

EE-527 SYNTHESIS OF PASSIVE NETWORKS III Cr. 3
Three element (RLC) input network synthesis is developed. Techniques for the development of transfer impedance synthesis are derived and example illustrating the most powerful schemes are presented.

EE-528 ELECTROMAGNETICS Cr. 3
Plane waves in dielectric and conducting media, transmission lines, wave guides, antennas, and boundary value problems.

EE-535 RADAR SYSTEMS Cr. 3
Fundamental principles of radar systems; analysis of the engineering principles and the design of circuitry unique to these systems.

EE-545 LOGICAL DESIGN OF DIGITAL COMPUTERS I Cr. 3
Basic principles and circuits in logical design of digital systems. Covers Boolean algebra, computer arithmetic, minimization of combinational logic, basic circuits, design of simple sequential circuits.

EE-546 LOGICAL DESIGN OF DIGITAL COMPUTERS II Cr. 3
(Prerequisite EE-545)
Continuation of EE-545. Simplification of sequential logic by Huffman-Mealy technique. Design of arithmetic units including multipliers. Includes memory and input-output techniques, and design of a small digital computer.

EE-550 INTRODUCTION TO ANALOG COMPUTERS Cr. 3

This course presents the fundamentals necessary for the programming and solving of numerous types of problems on the electronic analog computer. Included are methods of determining scale factors, time scales, non-linear phenomena, multiplying, dividing, coordinate transformation and function generation. Also covered are the repetitive operation and digital differential analyzers.

EE-551 ADVANVED ANALOG COMPUPTERS Cr. 3
(Prerequisite EE-550)

A continuation of EE-550 with particular emphasis on real time computers and hybrid systems.
ductor devices; P-N Junction theory; characteristics and para-

EE-557 TRANSISTOR THEORY Cr. 3

Physical concepts of transistors and other related semi-conductor devices; P-N Junction theory; characteristics and parameters of transistors; equivalent circuits; basic amplifier circuits, miscellaneous solid state devices.

EE-560 INTRODUCTION TO SYSTEM ANALYSIS

Signal analysis and models for electrical and mechanical systems. Response of simple electrical and mechanical systems. Error analysis.

ENGLISH

E 101, 102 ENGLISH Cr. 3, 3

The basic mechanics of written communications; sentence and paragraph structure; vocabulary; punctunation; clarity of expression.

E 103 TECHNICAL REPORT WRITING Cr. 3
(Prerequisite E 102)

The evaluation of data, their sources and uses in preparing reports; practice in the organization of material and preparation of concise and accurate reports; training in practical writing for industry, business and research, with emphasis on the special requirements and techniques of the professional report.

E 111, 112, 113 FRESHMAN ENGLISH Cr. 3, 3, 3

Thorough training in English Grammer and Composition with selected readings in essays, fiction, poetry, plays.

E 201 PUBLIC SPEAKING Cr. 3
(Prerequisite E 102)

The course is designed specifically to develop the student's ability to deal effectively with speaking situations arising in his job. It covers the presentation of concepts and ideas to technical and non-technical audiences; instruction and practice in platform speaking, group or conference participation, use of visual aids, preparation, planning and presentation.

E 202, 203, 204 SURVEY OF ENGLISH LITERATURE Cr. 3, 3, 3

A study and evaluation of English Literature from Beowulf to modern times. Reading and discussion of selected English classics.

E 301 SURVEY OF AMERICAN LITERATURE Cr. 3

A study of American Literature from Colonial times to Whitman.

E 303 SURVEY OF AMERICAN LITERATURE Cr. 3

A study of American Literature from Whitman to modern times.

E-311 SHAKESPEARE Cr. 3

Romantic comedies and historic plays of Shakespeare.

E 312 SHAKESPEARE Cr. 3

A study of the great tragedies, in Hamlet, Macbeth, Anthony and Cleopatra, Othello.

E 323 18th CENTURY ENGLISH LITERATURE Cr. 3

English Literature from Swift to Burns

E 401 THE ROMANTIC POETS Cr. 3

A thorough reading course in Scott, Coleridge, Byran, Shelley, Keats, and Wordsworth.

E 402 THE VICTORIAN NOVEL Cr. 3

The development of the English novel with special consideration to the novels of the Victorian period.

E 403 HISTORY OF THE ENGLISH LANGUAGE Cr. 3

The nature, origin and development of the English language.

E 404 MILTON Cr. 3

An intensive study of Milton's poetry. This study is made with the life and times of Milton as a background and with consideration of various elements and influences entering into his poetry.

E 451 CHAUCER Cr. 3

An introduction to his poetry and the England of his day.

E 461 APPROACHES TO POETRY Cr. 3

Modern and Classical Poetry; Mechanics of poetry. The ballads, spics, lyrics, sonnets, odes.

E 471 BOOK REVIEWS Cr. 3
Modern Day book reviews.

E 481 SALES WRITING Cr. 3
Detailed examination of sales and marketing correspondence and reports, their make-up and requirements. Three hours.

E 501, 502, 503 THE DEVELOPMENT OF THE DRAMA Cr. 3
A study of the development of the drama from the Greeks to the present time.

E 511, 512, 513 20th CENTURY BRITISH AND AMERICAN LITERATURE Cr. 3, 3, 3
The drama, poetry, and novel.

GRAPHICS

D 101, 102, 103 GRAPHIC SCIENCE Cr. 3, 3, 3
Engineering Drawing. Instruments and their use; applied geometry; lettering; theory and practice of projection drawing; auxiliary and oblique views; sections and conventions; pictorial views; drawings and the shop; dimensions, notes, limits and precision; working drawings. Descriptive Geometry and Graphical Solutions. Point, edge and normal views; points and straight lines and planes; curved lines; curved and warped surfaces; intersections, developments; vector geometry; charts, graphs and diagrams; functional scales, nomography.

HISTORY

H 101 AMERICAN HISTORY Cr. 3
A survey of: the backgrounds of American History; the Colonial Period; the War for American Independence; the Confederation of the Constitution; and the National Period.

H 102 AMERICAN HISTORY Cr. 3
From 1840. Political history forms the framework, with economic, social, cultural, and intellectual history interwoven. An introduction to historical literature, source material and criticism in included.

H 103 AMERICAN HISTORY Cr. 3
A continuation of H 102

H 111, 112, 113 HISTORY OF WESTERN CIVILIZATION Cr. 3, 3, 3
A study of the growth and spread of Western civilization from its beginning in the Near East to the present.

H 201 HISTORY OF SCIENCE Cr. 3
A study of the great events and personalities in the fields of science and engineering from the time of the ancient Greeks to the present day. To develop an appreciation for the heritage of modern science.

H 211 AMERICAN DIPLOMATIC HISTORY Cr. 3
Topics covered include the foundations of American diplomacy from the Colonial period to 1823; and the diplomacy of American Continental expansion to 1865.

H 212 AMERICAN DIPLOMATIC HISTORY Cr. 3
American Diplomatic History from the Civil War period to present day, including discussion of the United States as a world power; U. S. involvement in Far Eastern affairs after 1898; the diplomacy of World Wars I and II; and developments to the present day.

H 215 LATIN AMERICAN HISTORY Cr. 3
Survey of the history and institutional development of Spanish and Portuguese America.

H 220, 221, 223 THE WORLD IN THE TWENTIETH CENTURY Cr. 3
A study of the world in the present century. Designed to give the student a better understanding of the world in which we live.

H 311, 312, 313 HISTORY OF ENGLAND Cr. 3
Topics from the history of Great Britain with emphases on the development of democratic government.

H 401, 402 HISTORY OF FLORIDA
Spain in Florida, the British period, the second Spanish period, the U. S. acquisition of Florida, the Civil War, the development of Florida culture and industry since the civil war.

LANGUAGES

L 211, 212, 213	FRENCH	Cr. 3
L 215	SCIENTIFIC FRENCH	Cr. 3
L 221, 222, 223	GERMAN	Cr. 3
L 225	SCIENTIFIC GERMAN	Cr. 3
L 261, 262, 263	RUSSIAN	Cr. 3
L 265	SCIENTIFIC RUSSIAN	Cr. 3
L 271, 272, 273	SPANISH	Cr. 3

MANAGEMENT

G 221, G 222, G 223 PRINCIPLES OF MANAGEMENT Cr. 3, 3, 3

Principles of management and the problems incident to their application. Included are such areas as Production Control, Quality Control, Finance, Industrial Relations, Plant Location, etc. Three thours each quarter. Three quarters.

G 321, G 322, G 323 MANAGEMENT PROCESSES Cr. 3, 3, 3
(Prerequisite G 221)

Analysis of the management processes including organizing, planning, controlling and leadership. Three hours each quarter. Three quarters.

G 341, G 342, G 343 PERSONNEL MANAGEMENT Cr. 3, 3, 3
(Prerequisite G 221)

Principles and policies governing present day employer-employee relationships, and problems and practices in the fields of industrial relations. Three hours each quarter. Three quarters.

G 363 ADVANCED MANAGEMENT Cr. 3
(Prerequisite G 221)

A critical analysis and study of advanced management theory. Particular emphasis will be placed on the six major approaches to the management discipline.

MATHEMATICS

M 101, 102, 103 ALGEBRA Cr. 3, 3, 3

The fundamental operations of algebra. Factoring and fractions; exponents and radicals; functions and their graphs; equations and their solutions; systems of linear equations; quadratic equations; ratio, proportion, and variation. Progressions; mathematical induction; binomial theorem; inequalities, complex numbers; theory of equations, logarithms; permutations, combinations, and probability; determinants; partial fractions.

M 104 TRIGONOMETRY Cr. 3
(Prerequisite M 101)

Ordinary topics of trigonometry. Trigonometric functions; functions of acute angle; related angles, identities; radian measure; graphs; functions of two angles; trigonometric equations, logarithms; solving right and oblique triangles; inverse trigonometric functions.

M 105, 106, 107 CALCULUS Cr. 3, 3, 3
(Prerequisite M 103, 104 or M 103, 104 concurrently)

Fundamental ideas of differential and integral calculus. Differentiation and graphical representation of algebraic functions and of the sine and cosine. Integration of simple algebraic and trigonometric functions. Applications of problems in geometry and mechanics; maxima and minima; velocity and acceleration; plane areas; volumes; arc length; area of surfaces of revolution center of gravity; moment of inertia; analytic geometry; analytic geometry of the conic sections. Trigonometric, inverse trigonometric, exponential, logarithmic and hyperbolic functions. Polar coordinates and parametric representation. Elementary vector analysis in the plane.

M 111 COLLEGE MATH FOR ARTS STUDENTS Cr. 3

A survey of algebra and trigonometry for liberal arts students. A non-credit course for science and engineering students.

M 151, 152, 153 ENGINEERING MATHEMATICS Cr. 5, 5, 5

A thorough treatment of fundamental mathematics for engineering and science students. Studies include algebra, trigonometry, and fundamentals of analytic geometry and calculus.

M 201, 202 DIFFERENTIAL EQUATIONS Cr. 3, 3
(Prerequisite M107)

Infinite series, and complex number, solutions of ordinary differential equations, including first order equations, linear differential equations with constant coefficients, simultaneous systems, methods of numerical solution, series solutions and application to physics and engineering problems.

M 203 INTERMEDIATE CALCULUS Cr. 3
(Prerequisite M107)

Brief review of elementary calculus. Further topics include vector velocity and acceleration in plane curvilinear motion; three dimensional analytic geometry; partial differentiation, multiple integration.

M 301 ENGINEERING ANALYSIS Cr. 3
(Prerequisite M202, 203, EE203, ME 301)

Introduction to the mathematical treatment of advanced problems arising in various branches of engineering and science. Emphasis is placed on the application of calculus, differential equations, matrices, Fourier methods, vector analysis, etc., to engineering problems.

M 302, 303, 304 MATHEMATICAL ANALYSIS Cr. 3, 3, 3
(Prerequisite M203, M303)

A systematic discussion of the fundamental properties of real numbers and a careful development of the concepts of functions, limits, continuity, derivatives, integrals series etc. A general study of integration line and surface integrals theorems of Gauss Stokes and Green; selected topics in the theory of functions of a real variable.

M 401, 402, 403 INTRODUCTION TO MODERN MATHEMATICS Cr. 3, 3, 3
(Prereuisite M304)

Supplements the usual elementary courses. Emphasizes recently developed mathematical ideas and proofs which underlie mechanical and manipulative techniques. Without the former, the student is liable to commit fundamental errors in his application of mathematics. Topics discussed include: sets, relation, measure and probability, metric and vector spaces, linear functionals, modern generalization of the concept of function.

Introduces numerical methods. Finite differentiation and integration, interpolation methods, polynomial approximations, Chevyshev polynomials, smoothing techniques.

M 404 INTRODUCTION TO STATISTICAL METHODS Cr. 3
(Prerequisite M107)

A first course in statistics. The normal distribution, statistical inference, curve fittings, estimate of the variance, analysis of variance, regression and correlation.

M 405 DIGITAL COMPUTERS Cr. 3
(Prerequisite M103, M104)

An introduction to the operation of general purpose electronic digital computers. Number systems, arithmetic operations in digital machines; coding, digital computer programming.

M 406 DIGITAL COMPUTERS Cr. 3
(Prerequisite M106 & M405)

A continuation of M405. Numerical techniques. Actual practice on medium size digital computer.

M 407 ADVANCED PROGRAMMING Cr. 3
(Prerequisite M406)

Advanced programming of digital computers.

M 455 VECTOR ANALYSIS Cr. 3*
(Prerequisite M202)

A study of the algebra and geometry of vectors and linear vector spaces and matrices. The following topics will be included: vector algebra; dot, cross and continued products; equations of lines, planes and surfaces; application to mechanics and dynamics; vector calculus; vector motion; scalar and vector fields; gradient; divergence and curl.

M 501 INFINITE SERIES Cr. 3

Advanced course in Infinite Series, Summability of Divergent Series, Power expansions, Solution of non linear equations by series, applications.

M 502 GROUP THEORY Cr. 3

Theory of Groups, Applications.

M 505 ADVANCED CALCULUS Cr. 3

Properties and uses of infinite series; convergence and divergence of infinite series; tests for convergence; conditional and absolute convergence; power series; uniform convergence; differentiation and integration of power series; Taylor's series; power series solutions of differential equation; Legendre polynomials; Bessel functions; infinite series with complex terms; Fourier series and Fourier type series or orthogonal functions; definition and uses of the Laplace Transform.

M 506 ADVANCED CALCULUS Cr. 3*

Analytic and geometric aspects of complex variables; applications; complex numbers and the deMoivre formula; functions of complex variables; analytic functions; Cauchy-Riemann equations; Cauchy's Integral Theorem; the fundamental theorem of integral calculus; Cauchy's Integral Formula; harmonic functions; Taylor's series; Laurent's expansion; residue theorem; evaluation of real integrals by the residue theorem; fundamentals of probability theory and relative frequency; total and compound probability; random variables and expectation; discrete and continuous distributions; Laplace-deMoivre limit theorem; Poisson Law; theory of errors, variance, covariance and correlation; estimates of variance.

M 507 ADVANCED CALCULUS Cr. 3

A. *Functions of Several Variabless* Review of basic techniques; change of variables; Jacobians; directional derivatives; maxima and minima; Lagrange Multipliers; Taylor's formula; differentiation under the integral sign; Leibniz's formula; calculus and variations.

B. *Partial Differential Equations.* The vibrating string. Derivation of differential equation; initial conditions; characteristics; boundary conditions; damped oscillations; forced oscillations and resonance; solution by series; separation of variables; the Dirichlet problem; Legendre and Bessel functions; solutions by integrals; Fourier transform; convolution theorem; elliptic, parabolic and hyperbolic equations.

M 508 OPERATIONAL CALCULUS Cr. 3
(Prerequisite M 507)

Detailed development of the theory of the Laplace transform. Application to the solution of ordinary and partial differential equations. Solution of engineering problems by operational techniques.

M 511 ADVANCED DIFFERENTIAL EQUATIONS Cr. 3

Method of successive approximations, including Lipschitz condition; systems of ordinary equations, including the equation of the M-th order; systems of equations of higher order and total differential equations; interpolation and numerical inte-

gration; symbolic methods; the numerical solution of differential equations; linear equations, including reduction of the order of the equation and the Euler equation; certain classical equations, including solutions in series; regular singular points; the hypergeometric differential equation; the Legendre differential equation; Bessel's differential equation.

M 525 COMPLEX VARIABLES I Cr. 3
(Prerequisite M 507)

Complex numbers, analytic functions, continuity. Cauchy-Riemann conditions, harmonic functions, exponential function, logarithmic function, geometry of elementary functions, mapping; the point at infinity, the linear fractional transformation, successive transformations; line integrals, Cauchy-Goursat theorem, multiply connected regions; derivatives of analytic functions, Morera's theorem; the fundamental theorem of algebra.

*Not accepted for credit towards requirements for Master of Science degree in Applied Mathematics.

M 526 COMPLEX VARIABLES II Cr. 3
(Prerequisite M 525)

Power series, Taylor's series, Laurent's series, uniform convergence, uniqueness of representations by power series; residues and poles, the residue theorem, computation of residues at poles, evaluation of real infinite integrals, integration around a branch point; conformal mapping, the Schwarz-Christoffel transformation, analytic continuation, Riemann surfaces.

M 527 REAL VARIABLES Cr. 3
(Prerequisite M 526)

Set theory, real number system, measure theory, sequence of functions, implicit functions and integration theory.

M 535 THEORY OF DETERMINANTS AND MATRICES I Cr. 3
(Prerequisite M 202)

Algebra of matrices; submatrices; transposition; elementary transformation; determinants; special matrices; rational equivalence of rectangular matrices; multiplication of matrices; the associative law; elementary transformation matrices; determinant of a product; non-singular matrices; inverse of a matrix; equivalence of rectangular matrices; bilinear forms; congruence of square matrices; skew matrices and skew bilinear forms; symmetric matrices and quadratic forms; non-modular fields; addition of matrices; real quadratic forms, linear spaces; linear sub-spaces; linear independence, linear mappings and linear transformations.

M 538 THEORY OF DETERMINANTS AND MATRICES II Cr. 3
(Prerequisite M 535)

Matrices with polynomial elements; elementary divisors; matrix polynomials; the characteristic matrix, function and equation; eigen-values; invariant factors; characteristic matrices with prescribed invariant factors; reduction to canonical forms; applications of matrices.

M 536 MODERN ALGEBRA I Cr. 3

The general plan of work in this course consists of the following: an introduction to abstract algebra and an account of most of the important algebraic concepts. The course goes beyond the foundations and basic properties of algebraic systems and presents comprehensive accounts of selected topics. Included in the first term are semi-groups and groups including transformation groups and the fundamental theorem of homomorphisms for groups; rings; integral domains and fields.

M 537 MODERN ALGEBRA II Cr. 3
(Prerequisite M 536)

A continuation of M 536. Includes extension rings and fields; groups with operators, including Schreier's theorem and the Jordan-Holder theorem.

M 545 STATISTICS I Cr. 3

An introduction to mathematical statistics to include probability concepts, theoretical and empirical frequency distributions, linear correlation and regression and introduction into the theory and applications of least squares and statistical inference.

M 546 STATISTICS II Cr. 3
(Prerequisite M 545)

Methods of statistical estimation and hypothesis testing. Sampling distributions. Introduction to multivariate analysis, design of experiments and distribution free methods.

M 547 ERROR ANALYSIS Cr. 3
(Prerequisites M 546, M 538)

Basic principles of error analysis; error models; statistical treatment of errors; generalized least squares; error propagation; geometric dilution of precision; application to complex systems.

M 556 VECTOR ANALYSIS II Cr. 3*
(Prerequisite M 455)

This term will constitute a study of spaces of higher dimensions. Divergence Theorem and Stokes Theorem. Frenet's formulas. Green's Theorem. Orthogonal transformations. Application of vector analysis theory to problems in physics, mechanics and thermodynamics.

M 561 NUMBER THEORY Cr. 3

A general introduction to the theory of numbers. Properties

of numbers. Number systems. Euclid's Algorithm. Prime numbers. Mersenne and Fermat Primes. The distribution of primes. The Aliquot Parts. Perfect numbers. Amicable numbers. Indeterminate problems. Problems and puzzles. Theory of linear indeterminate problems. Diophantine problems. Fermat's last theorem.

M 575 NUMERICAL ANALYSIS I Cr. 3

Numerical solutions of equations including Gauss, Crout and matrix inversion methods, Gauss-Sidel and other iterative methods. Other methods applicable to automated calculation procedures and error analysis will be discussed. The general area of least squares polynomial approximation will be covered and include the principle of least squares, various approximate forms (orthogonal, Hermite, Legendre, etc.) curve fitting and smoothing.

*Not accepted for credit towards requirements for Master of Science degree in Applied Mathematics.

M 576 NUMERICAL ANALYSIS II Cr. 3

Special emphasis will be on solution of problems with the aid of digital computers. Subjects covered include interpolation methods such as Newton's divided differences, Lagrangian and finite differences. Also studies will be operations with finite differences and the numerical solution of differential equations. Various schemes in current use for computer solution of sets of differential equations will be discussed.

M 581 ADVANCED ANALYTIC GEOMETRY Cr. 3

A thorough review of the analytic geometry of Euclidean space, beginning with elementary propositions on real vectors; coordinates; planes and lines; transformation of coordinates; types of surfaces and some properties of quadric surfaces; including study of invariants under rotations and translations and of conformal quadrics; tetrahedral coordinates and duality in such coordinates, quadric surfaces in tetrahedral coordinates; linear systems of quadrics; hyperbolic coordinates; pencils of quadrics; bundle of quadrics; webs of quadrics; apolarity; transformations of space; curves and surfaces.

M 605 THESIS IN MATHEMATICS Cr. 3

Individual work under the direction of a member or members of the graduate faculty on a selected topic in the field of of mathematics.

SP 7 MATHEMATICS REVIEW Non-credit

Brief review of important concepts of algebra and trigonometry; basic concepts of differential equations; definitions of derivatives and integrals; applications of derivatives and integrals; properties of limits; mean value theorem; L'Hospital's Rule; natural logarithms; determinants; hyperbolic functions; polar coordinates; vectors and parametric equations; partial differentiation; multiple integrals; infinite series; complex numbers and functions; first and second order differential equations, homogeneous, linear and exact, higher order equations.

This course is specially designed for those students who completed their undergraduate calculus and differential equations a number of years ago and who require renewed experience in working problems in these fields or who may wish to pursue a graduate program but who may not have achieved a sufficiently high standing in undergraduate mathematics to allow them to enroll immediately in courses in calculus and differential equations at the graduate level.

MECHANICS

ME 201, 202, 203 APPLIED MECHANICS Cr. 3, 3, 3
(Prerequisite P 101)

Introduction to engineering applications of static behavior of rigid and deformable systems. Stress and strain. Force systems, application to stress distributions and stability. Dynamic behavior of rigid and deformable systems. Kinetics and Kinematics of particles and rigid bodies. Impulse-momentum and work-energy theorems and applications.

ME 301 STRENGTH OF MATERIALS Cr. 3
(Prerequisite ME 203)

Analysis of stress and strain in two dimension torsion of circular bars. Theory of bendings; deflection of beams. Shear and bending stress. Column theory.

ME 302 MACHINE DESIGN Cr. 3
(Prerequisite ME 301)

Applications of the principles of applied mechanics strength of materials and kinematics to the design of machine parts. Creative design problems involving fits, endurance limits, fastenings, shafting, gears, springs, couplings, brakes, clutches, flexible connectors etc.

ME 401 ENGINEERING MATERIALS Cr. 3
(Prerequisite ME 303)

Solid State physics presented from the point of view of engineers. Thermal, electrical and physical properties of common engineering materials.

ME 402 FLUID MECHANICS Cr. 3
(Prerequisite ME 203, M 202)

A study of the properties of fluids, gas laws, viscosity, static pressure, bouyant force and equilibrium of floating and immerced bodies, dynamics of fluids, Bernoulli's theorem, flow in pipes, Reynolds number.

ME 403, 404 ENGINEERING THERMODYNAMICS Cr. 3, 3
(Prerequisite M 202, P 102)

Fundamental laws governing flow of gases, vapors. Basic concepts of thermodynamics of chemical reactions and combustion. Emphasis is placed on applications to internal combusion engines, turbines, compressors and refrigeration.

PHYSICS

P 100 INTRODUCTION TO MODERN PHYSICS Cr. 3

An introductory course in physics for liberal arts students only. Emphasis on understanding atomic nature of matter.

P 101, 102 PHYSICS Cr. 3, 3
(Prerequisite M 105 or M 105 concurrently)

A study of mechanics including statistics, Newton's laws, work and energy, circular motion, elasticity, hydrostatics, harmonic motion and viscosity. Temperature. Heat and laws of thermodynamics. Thermal properties of matter. Sound-wave motion, vibrating bodies and acoustical phenomena.

P 103 PHYSICS LABORATORY Cr. 2

Physics laboratory to accompany P 101, 102.

P 104 INTRODUCTION TO ASTRONOMY Cr. 3

An introduction to astronomy for Liberal Arts students. A qualitative understanding of the solar system and an appreciation for the content and expanse of the universe.

P 201, 202 PHYSICS Cr. 3, 3
(Prerequisite P 102)

Coulomb's law, the electric field, potential. Dielectrics. D.C. Circuits, motors, and generators. The magnetic field; meters. Induction and capacitance. Alternating currents and electromagnetic waves. Electronics.

P 203 PHYSICS LABORATORY Cr. 2

Physics laboratory to accompany P 201, 202.

P 301 PHYSICS Cr. 3
(Prerequisite P 202)

The nature and propagation of light. The principles of optics, lenses and optical instruments. Illumination, color interference, diffraction and polarization.

P 302 PHYSICS Cr. 3
(Prerequisite P 301)

Introduction to atomic and nuclear physics. Quantum theory of radiation, atomic models and spectra, relatively, X-rays, waves and corpuscles, radioactivity, nuclear reactions, radiation, hazards, nuclear energy, cosmic rays and fundamental particles.

P 303 PHYSICS LABORATORY Cr. 2

Physics laboratory to accompany P 301, P 302.

P 304, 305 ASTRONOMY Cr. 3, 3
(Prerequisite P 301, or P 301 concurrent)

The solar system and stellar astronomy. Distribution, structure and evolution of stars and galaxies. Introduction to astrophysics.

P 330 PHYSICAL ELECTRONICS Cr. 3
(Prerequisite P 302)

Electron Ballistics, mass spectroscopy, introduction to accelerators, space charge theory, Fermi-Dirac statistics, thermionic emission. Scholtky effect, high field and secondary emission.

P 350 OPTICS Cr. 3
(Prerequisite P 302)

Fundamental principles of geometrical and physical optics. Refraction at spherical surfaces, thick lenses, limitation of rays by apertures, diffraction, interference polarization, radiation.

P 360 X-RAYS AND CRYSTAL PHYSICS Cr. 3
(Prerequisite P 302)

Production of X-rays, absorption, scattering, X-ray spectra, refraction. Theory and application of the diffraction of X-rays in matter to the determination of the structure of crystals. Introduction to crystallography.

P 401 ELECTROMAGNETIC THEORY Cr. 3
(Prerequisite M 202)

A study of Maxwell's equations; plane waves; radiation; theory of antennas and wave guides.

P 402 HYDRODYNAMICS Cr. 3
(Prerequisite P 302)

Theory of ideal, incompressible flow. Basic flow equations for two and three dimensional flow, stream function, velocity potential, conformal mapping, one and two dimensional compressible flow theory.

P 403 THERMODYNAMICS Cr. 3
(Prerequisite P 302)

Relationships for P-V-T data on pure substances. Examination of the Thermodynamic energy relationships for pure substances. First and Second Laws. Phase and chemical equilibria.

P 412 ATOMIC AND NUCLEAR PHYSICS Cr. 3
(Prerequisite P 401)

Experimental foundation of quantum physics. Limitations of classical physics, photons, de Broghe waves. Internal structure of atoms and quantization.

P 413 ATOMIC AND NUCLEAR PHYSICS Cr. 3
(Prerequisite P 412)

The vector model of the atom, Pauli exclusion principle and the periodic table of the elements.

P 442 EXPERIMENTAL ATOMIC PHYSICS Cr. 2
(Prerequisite P 412)

Laboratory experiments in modern physics. Millikan oil drop method, charge to mass ratio of electrons, Rutherford scattering.

P 443 EXPERIMENTAL ATOMIC PHYSICS Cr. 2
(Prerequisite P 442)

Continuation of P 441. Discreteness of atomic and molecular structure, and wave-corpuscle dualism. Experiments on absorption spectra, X-ray emission spectra, photoelectric effect, Zeeman effect, Faraday effect.

P 434 INTRODUCTION TO SOLID STATE PHYSICS Cr. 3
(Prerequisite P 433)

Free electron theory of metals and semiconductors. The band approximation; zone structure; the Hall effect and properties of semiconducting materials.

P 435 INTRODUCTION TO NUCLEAR PHYSICS Cr. 3
(Prerequisite P 433)

An introduction to the study of the nucleus. Correlation of experimental evidence with theory; alpha and beta decay; gamma radiation; meson theory and the fundamental particles. Cosmic rays.

P 450 PHYSICS OF THE ATMOSPHERE AND SPACE
(Prerequisite M 455)

Study of the model of the atmosphere, and space, from the ground level to Intergolates Space. Atmosphere of the sun, planets and moons will be investigated and the effect of solar storms on their behavior.

P 443 EXPERIMENTAL RESEARCH — THESIS Cr. 3
(Prerequisite — Permission of the instructor)

Introduction to experimental research techniques by participation in active research program. Familiarization with research laboratory equipment and techniques. Selection of thesis research project and presentation by each student to the group. Designed to bridge the gap between elementary laboratory and research in modern physics.

P 444 EXPERIMENTAL RESEARCH — THESIS Cr. 3
Continuation of P 443.

P 510 ELECTRICAL DISCHARGES IN GASES Cr. 3
(Prerequisite P 302)

Fundamental processes of electron emission from cathodes and interaction with gas. High frequency discharges. Townsend discharge, Geiger Mueller tubes, cathode fall, plasma, glow discharges and arcs.

P 515 MATHEMATICAL PHYSICS Cr. 3

Dynamics, Newton's Laws, inertial and non-inertial reference frames; displacement and motion of a particle and of a rigid body; potential function, Green's identities and Poisson's equation; central forces, Newton's law of universal gravitation, Kepler's laws; dynamics of a system of particles and of rigid bodies; Euler's equation and equations of motion of a free rigid body.

P 516 MATHEMATICAL PHYSICS Cr. 3

Generalized coordinates and the method of Lagrange, Hamilton's principle and least action, canonical equations of Hamilton; waves and vibrations, wave equation and related characteristics, eigenvalues, vibrating string, membrane and sphere; Theory of Relativity, basic postulates, generalization of the Galileo transformations, Lorentz transformations, determination of distances and synchronization of clocks, time sequence of events.

P 517 MATHEMATICAL PHYSICS Cr. 3

Electrostatics, conductors and dielectrics, electrostatic boundary value problems, magnetostatics, double dipole layers, potentials; electromagnetism, Ampere's theorem, circuital theorem, vector and scalar potentials, Maxwell's equations; electromagnetic radiation, Poynting Vector, electromagnetic wave propagation, refraction and reflection; Coulomb field, atomic structure.

P 520 ASTROPHYSICS Cr. 3

Analysis of light, solar spectrum, the sun's light and energy; properties and structure of interstellar and interplanetary space; diameters of the stars; constitution and evolution of the stars; physics of the nebulae and galaxies; relativity and cosmology.

P 530 QUANTUM MECHANICS I Cr. 3

The new concepts necessary to explain the experimental observations of modern physics lead to quantum mechanics which will be treated primarily using the Schroedinger equation; energy levels and wave functions, wave packets, motion of a free particle, electron spin, spin-orbit forces, spectroscopic term classification, radiation and radiative transistions, the Pauli principle, atomic shell structure and quantum statistics.

P 531 QUANTUM MECHANICS II Cr. 3
(Prerequisite P 530)

This term is concerned with the application of quantum mechanics to the solution of practical engineering and scientific problems.

P 535 SOLID STATE PHYSICS Cr. 3
(Prerequisite P 530)

Classification of solids and crystal structures; Lattice Energy of Ionic Crystals; Elastic Constants of Crystals; Lattice Vibrations; Thermal Properties of Solids; Dielectric Properties; Ferroelectric Crystals; Diamagnetism, Paramagnetism, Superconductivity; Free Electron Theory of Metals; Band Theory of Metals; Semiconductors.

P 537 MOLECULAR VIBRATION Cr. 3
(Prerequisite P 530)

Vibration of Molecules; Wave Mechanics and Molecular Vibration; More Advanced Methods of Studying Vibrations; Symmetry Considerations; Application of Group Theory to the Analysis of Molecular Vibration; Vibration Selection Rules and Intensities; Potential Functions; Methods of Solving the Secular Determinant.

P 540 NUCLEAR PHYSICS I Cr. 3
(Prerequisite P 435)

Experiments and theoretical principles underlying our understanding of the fundamental properties of nuclei; nuclear masses and binding energies; alpha, beta and gamma ray spectra; Nuclear models.

P 541 NUCLEAR PHYSICS II Cr. 3
(Prerequisite P 540)

Elementary particles; scattering of protons and neutrons; nuclear reactions; energy release; cross section; resonance effects; nuclear levels; fusion and fission; origin of the elements.

P 550 PHYSICAL OPTICS Cr. 3
(Prerequisite P 350)

Study of Wave Motion; reflection and refraction on Huygen's Principle; Lenses, Dispersion; Spectrum; Interference; Diffraction; Fraunhofer Diffraction; Double Refraction; Plane Polarized Light; Rotary Polarization, Electromagnetic Theory of Light.

P 558 QUANTUM ELECTRONICS Cr. 3
(Prerequisite P 530)

Molecular Beam Masers; Atomic Beam Oscillator; Parallel Plate Resonators; Atomic Frequency Standards and Clocks; Optical Pumping; Parametric Amplifiers.

P 560 MAGNETOHYDRODYNAMICS Cr. 3
(Prerequisite P 517)

Study of the interaction of moving and conducting fluids with magnetic fields and their application to energy device development; plasma acceleration studies; application to space propulsion; magnetogasdynamic shock layer flow; space-charge waves and plasma diagnostics; microwave reflection and absorption by a non-uniform plasma sheath; thermonuclear power.

P 570 SPECIAL TOPIC IN PHYSICS Cr. 3

The student may sign up for a special topic if he has the sponsorship of an instructor, and has the consent of the Chairman. Four (4) copies of a report on the topic must be made, one each for the school library, Chairman, sponsoring instructor, and a personal copy.

P 580 STATISTICAL MECHANICS Cr. 3
(Prerequisite P 403)

Classical statistical mechanics; system phase space; representative ensembles; the ergodic surmise; Liouville theorem; point-mass perfect gas; molecular distribution; the most probable distribution; temperature; entropy; Boltzmann's distribution; equipartition of energy; second law of thermodynamics; entropy and probability; relativity and statistical theory.

P 605 THESIS Cr. 3

Individual work under the direction of a member or members of the graduate faculty on a selected topic in the field of physics.

PHILOSOPHY

PH 131 INTRODUCTION TO PHILOSOPHY Cr. 3

A survey of classical philosophy with selected reading and discussion of the works of the great philosophers of history.

PH 331, 332 LOGIC Cr. 3, 3

A study of the principles of reasoning involved in normal human thought processes. The inter-relationship of logic, philosophy, and mathematics.

POLITICAL SCIENCE

PO 311 POLITICAL SCIENCE Cr. 3
American Government

The bascic principles of the American system of government; its structures, functions, and operation.

PO 312 POLITICAL SCIENCE Cr. 3
State and Local Government

The structure, organization and function of state and local governments with emphasis on their importance in the American political system.

PO 313 POLITICAL SCIENCE Cr. 3
American Political Parties
The history, organization and function of American political parties, with particular emphasis on their role in the American political system.

PSYCHOLOGY

PS 141, 142 GENERAY PSYCHOLOGY Cr. 3, 3
Study of the principles of psychology of normal behavior. Prerequisite to all courses.

PS 151 DEVELOPMENT PSYCHOLOGY Cr. 3
A study of psychological factors underlying the evolution of behavior of the infant and child.

PS 152 EDUCATIONAL PSYCHOLOGY Cr. 3
A study of experimental investigations related to ways in which learning takes place and theories of development derived therefrom.

PS 153 SOCIAL PSYCHOLOGY Cr. 3
A study of the problems of social behavior such as prejudices, rumor, propaganda. Analysis in terms of basic principles of perception, learning and motivation.

PS 201 STATISTICS Cr. 3, 3
A study of statistical techniques and their application to problems in the field of psychology.

PS 210 EXPERIMENTAL PSYCHOLOGY Cr. 3
Aims and procedures of the scientific techniques used in the field.

PS 220 TESTS AND MEASUREMENTS Cr. 3
A critical study is made of the principles and techniques involved in measurement in Education and Psychology. Prerequisite Statistics.

PS 230 PSYCHOLOGY OF PERSONALITY AND ADJUSTMENT Cr. 3
An elemental study of the methods of evaluation and principles of fostering adjustment.

PS 310 ADVANCED GENERAL PSYCHOLOGY Cr. 3
An advanced study of the topics of perception, motivation, emotion and personality with source material from current literature.

PS 320 FUNDAMENTALS OF PSYCHOLOGICAL MEASUREMENTS Cr. 3
A study of the rationale underlying test construction with special emphasis upon test validity and test reliability. Prerequisite Statistics.

PS 330 INDUSTRIAL PSYCHOLOGY Cr. 3
A survey of the uses of psychology in industry. Topics include: selection, placement and training of workers; familiarization with tests commonly used in industry; significance of individual differences; factors influencing attitude and morale; causes of job dissatisfaction; analysis of individual problems. Prerequisite Psychology of ersonality and Adjustment.

PS 410 PRINCIPLES OF HUMAN ENGINEERING Cr. 3
A study of the principles of the dynamics involved in interpersonal relationships.
Prerequisite of Psychology of Personality and Adjustment.

PS 420 INTRODUCTION TO COUNSELING Cr. 3
Basic principles and methods used in educational, vocational and personal counseling.

SOCIOLOGY

S 261 PRINCIPLES OF SOCIOLOGY Cr. 3
A systematic explanation of man's social nature, types of groups and institutions, social processes and social change.

S 262 PRINCIPLES OF SOCIOLOGY Cr. 3
Social Problems.
An analysis and suggestions for dealing with contemporary problems in modern society: i.e., crime, poverty, alcoholism, juvenile delinquency and social welfare.

S 263 PRINCIPLES OF SOCIOLOGY Cr. 3
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A social psychological analysis of social controls such as folkways, customs, fashions, attitudes, etc.

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CALENDAR OF EVENTS

WINTER 1963

Jan 2, Wed.	Classes begin
Jan. 8, Tues.	Last day for registration and for full tuition refund.
Jan. 28-31	First 80 minute test
Feb. 5, Tues.	Last day for withdrawal
Feb. 22, Fri.	Holiday (Washington's Birthday)
Feb. 25-28	Second 80 minute test
Mar. 13, Thurs.	Last day of classes
Mar. 14-19	Final exams

SPRING 1963

Mar. 27, Wed.	Classes begin
Apr. 2, Tues.	Last day for registration and for full tuition refund.
Apr. 22-25	First 80 minute test
Apr. 30, Tues.	Last day for withdrawal
May 20-23	Second 80 minute test
May 30, Thurs.	Holiday (Memorial Day)
June 6, Thurs.	Last day of classes
June 7-12	Final Exams

SUMMER 1963

July 8, Mon.	Classes begin
July 13, Sat.	Last day for registration and for full tuition refund.
Aug. 5-8	First 80 minute test
Aug. 10, Sat.	Last day for withdrawal
Sept. 2, Mon.	Holiday (Labor Day)
Sept. 3-5	Second 80 minute test
Sept. 16, Mon.	Last day of classes
Sept. 17-21	Final exams

FALL 1963

Sept. 27, Fri.	Psychological test for all new students.
Sept. 30, Mon.	Classes begin
Oct. 5, Sat.	Last day for registration and for full refund.
Oct. 28-31	First 80 minute test
Nov. 2, Sat.	Last day for withdrawal
Nov. 11, Mon.	Holiday (Veterans' Day)
Nov. 22-27	Second 80 minute test
Nov. 28-Dec. 1	Thanksgiving Recess
Dec. 11	Last day of classes
Dec. 12-17	Final Exams

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