

Fall 1983

# Center for Science and Engineering Schedule of Classes Fall 1983

Nova Southeastern University

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# Schedule of Classes

Fall Schedule

## Bachelor Degree Programs

Electrical Engineering  
Computer Engineering  
Computer Science  
Computer Systems  
Computer Information Systems  
Mathematics  
Computer Systems/Technical Communications

## Master's Degree Programs

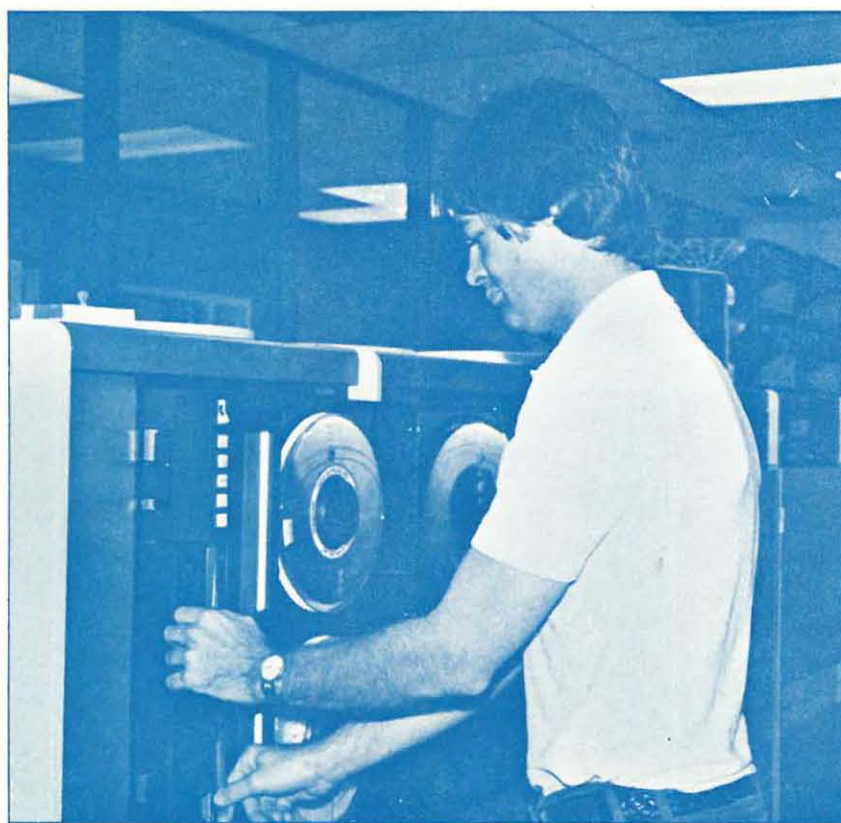
Computer Science  
Engineering Management  
Computer Management

## Special Programs

 **Nova University**  
CENTER FOR SCIENCE AND ENGINEERING

NON-PROFIT ORGANIZATION  
U.S. POSTAGE  
PAID  
PERMIT NO. 886  
FT. LAUDERDALE, FLORIDA

**Nova University**  
3301 College Avenue  
Fort Lauderdale, Florida 33314





# Registration Policies

## Registration

Register in person by submitting your completed registration form and tuition and fees IN FULL to the Office of the Registrar, Parker Building, Room 104. The hours are Monday through Thursday, 8:30 a.m.-6:30 p.m., and Friday, 8:30 a.m.-5:00 p.m.

OR  
mail your completed registration form, tuition and fees IN FULL to the Office of the Registrar, 3301 College Avenue, Fort Lauderdale, Florida 33314. Call 475-7400 to request registration materials if you have not received them.

The regular registration fee is in effect until one week before the term begins. After that, a late fee will be charge.

## Drop/Add Procedures

The first week of classes is the Drop/Add Period. After a class

has met once you must receive written permission from the program office to add the class. The normal refund policy applies to a course dropped during the drop and add period unless another course of equal credit, with the same term beginning date, is added in its place.

The Registrar's Office must be notified in writing of the course to be dropped. This may be done by completing a change of Registration form available in the Registrar's Office or by mailing a simple written note to the Registrar's Office.

## Tuition Refund Policy

The following refund policy will be computed based upon the date written notification of the drop is received by the Registrar's Office:  
100% refund prior to the first

class meeting.

75% refund prior to the second class meeting, regardless of class attendance.

50% refund prior to the third class meeting, regardless of class attendance.

Fees are non-refundable.

## Policy Regarding Incomplete Grades

With the written approval of the course instructor, you may have up to one additional term to complete the course and receive a letter grade. An incomplete form must be completed and signed by the instructor in order to receive a grade of "I".

## Withdrawal Policy

After the third class meeting, a student may withdraw from a course by completing a

"Withdrawal Form" available in the Registrar's Office. This form should be approved by the instructor and academic office. It is the student's responsibility to return the completed form to the Registrar's Office.

## Financial Aid

Nova University participates in various governmental financial aid programs for the benefit of its students.

For information call: 475-7410.

For information call:

Broward County 475-7650  
Dade County 940-6447 x 7650  
Palm Beach County 732-6600 x 7650

# Undergraduate Courses

## Beginning August 29, 1983 (9 Weeks)

Course	Sec	Title	Day	Dates	Time	Loc
CS-340	A	Data Structures	M	8/29-10/24	6-10:30 pm	P208
CS-450	A	Data Base Management Systems Design	M	8/29-10/24	6-10:30 pm	P129
MAT-135	A	Technical Mathematics	M	8/29-10/24	6-10:30 pm	P209
MAT-150	A	Precalculus	M	8/29-10/24	6-10:30 pm	P207
MAT-440	A	Numerical Analysis	M	8/29-10/24	6-10:30 pm	P107
CS-170	A	Computer Programming I	T	8/30-10/25	6-10:30 pm	P208
CS-240	A	Digital Design	T	8/30-10/25	6-10:30 pm	P209
CS-405	A	Computer Architecture	T	8/30-10/25	6-10:30 pm	P107
EE-340	A	Electronics II	T	8/30-10/25	6-10:30 pm	P129
PHY-160	A	Physics III	T	8/30-10/25	6-10:30 pm	P207
CS-150	A	Introduction to Computer Organization	W	8/31-10/26	6-10:30 pm	P208
CS-200	A	Computer Programming II	W	8/31-10/26	6-10:30 pm	P209
CS-335	A	Assembler & Assembly Language Programming	W	8/31-10/26	6-10:30 pm	P207
EE-430	A	Fundamentals of Communication Systems	W	8/31-10/26	6-10:30 pm	P107
CS-210	A	Fortran	Th	9/1-10/27	6-10:30 pm	P208
CS-460	A	Systems Programming	Th	9/1-10/27	6-10:30 pm	P209
EE-450	A	Control Systems	Th	9/1-10/27	6-10:30 pm	P207

Last Date to Withdraw October 14, 1983

## Beginning October 31, 1983 (9 Weeks)

Course	Sec	Title	Day	Dates	Time	Loc
CS-200	A	Computer Programming II	M	10/31-1/9	6-10:30 pm	P207
CS-330	A	Structured Programming (Pascal)	M	10/31-1/9	6-10:30 pm	P208
CS-350	A	Computer Circuit Design	M	10/31-1/9	6-10:30 pm	P209
MAT-450	A	Probability & Statistics	M	10/31-1/9	6-10:30 pm	P107
CS-170	A	Computer Programming I	T	11/1-1/10	6-10:30 pm	P207
CS-320	A	Organization of Programming Languages	T	11/1-1/10	6-10:30 pm	P208
EE-210	A	Networks I	T	11/1-1/10	6-10:30 pm	P107
EE-460	A	Microprocessor Applications	T	11/1-1/10	6-10:30 pm	P142
MAT-210	A	Calculus I	T	11/1-1/10	6-10:30 pm	P209
PHY-140	A	Physics I	T	11/1-1/10	6-10:30 pm	P143
PHY-212	A	Science of Matter	T	11/1-1/10	6-10:30 pm	P213
CS-160	A	Fundamentals of Logic Design	W	11/2-1/11	6-10:30 pm	P207
CS-365	A	Methods of Systems Analysis	W	11/2-1/11	6-10:30 pm	P208
CS-370	A	Software Design	W	11/2-1/11	6-10:30 pm	P209
ES-310	A	Engineering Applications	W	11/2-1/11	6-10:30 pm	P142
MAT-135	A	Technical Mathematics	W	11/2-1/11	6-10:30 pm	P107
CS-220	A	Business Oriented Language (COBOL)	Th	11/3-1/12	6-10:30 pm	P207
CS-470	A	Information Systems Analysis and Design	Th	11/3-1/12	6-10:30 pm	P209
EE-440	A	Energy Systems	Th	11/3-1/12	6-10:30 pm	P208

Last Date to Withdraw December 16, 1983

**Avoid Closed Classes  
Register Early**

# Graduate Courses

## Beginning August 29, 1983 (9 Weeks)

Course	Sec	Title	Day	Dates	Time	Loc
CS-550	A	Data Base Management Systems Design	M	8/29-10/24	6-10:00 pm	P129
CS-505	A	Computer Architecture	T	8/30-10/25	6-10:00 pm	P107
EGR-530	A	Fundamentals of Communication Systems	W	8/31-10/26	6-10:00 pm	P107
CS-560	A	Systems Programming	Th	9/1-10/27	6-10:00 pm	P209
EGR-550	A	Control Systems	Th	9/1-10/27	6-10:00 pm	P207

Last Date to Withdraw October 14, 1983

## Beginning Oct. 3, 1983 (12 Weeks)

Course	Sec	Title	Day	Dates	Time	Loc
CS-631	A	Programming Languages	M	10/3-1/02	6-10:00 pm	P147
CS-665	A	Management of Software Projects	T	10/4-1/03	6-10:00 pm	P147
EGR-630	A	Systems Engineering	W	10/5-1/04	6-10:00 pm	P147
CS-651	A	Operating Systems Theory & Design	Th	10/6-1/05	6-10:00 pm	P147

Last Date to Withdraw November 25, 1983

## Beginning Oct. 31, 1983 (9 Weeks)

Course	Sec	Title	Day	Dates	Time	Loc
EGR/CS-565	A	Microprocessor Applications	T	11/1-1/10	6-10:00 pm	P142
CS-570	A	Information Systems Analysis and Design	Th	11/3-1/12	6-10:00 pm	P209
EGR-540	A	Energy Systems	Th	11/3-1/12	6-10:00 pm	P208

Last Date to Withdraw December 16, 1983

# Courses for Non-Technical Majors

## Beginning August 29, 1983 (8 Weeks)

Course	Sec	Title	Day	Dates	Time	Loc
CS-111	M	Computer Literacy	W	8/31-10/26	6-10:00 pm	P146
CS-112	M	Intro. to Data Processing	T	8/30-10/18	6-10:00 pm	P146
MAT-102	M	Introductory Algebra	M	8/29-10/24	6-10:00 pm	P146
PHY-103	M	Introduction to Geology	Th	9/1-10/27	6-10:00 pm	P239

## Beginning Oct. 31, 1983 (8 Weeks)

Course	Sec	Title	Day	Dates	Time	Loc
CS-111	M	Computer Literacy	M	10/31-12/19	6-10:00 pm	P146
CS-113	M	Business Applications of Microcomputers	W	11/2-12/21	6-10:00 pm	P131
CS-114	M	Computer Applications for Health Care Administrators	M	10/31-12/19	6-10:00 pm	P131
MAT-102	M	Introductory Algebra	T	11/1-12/20	6-10:00 pm	P129
MAT-105	M	College Algebra	T	11/1-12/20	6-10:00 pm	P214
PHY-105	M	Intro. to Chemistry	W	11/2-12/21	6-10:00 pm	P239



# Summary of Program Requirements

EE	CE	CS	MATH	SYS	CIS	SYS/TC	
x	x	x	x	x	x	x	Communications (3 cr.) (LAN-111)
x	x	x	x	x	x	x	Communications (3 cr.) (LAN-112 or TEC-330)
x	x	x	x	x	x	x	Social Science/Behavioral Science (12 cr.)
x	x	x	x	x	x	x	Humanities (6 cr.)
		x		x			Precalculus
x	x	x	x	c		c	MAT-210 Calculus I
x	x	x	x				MAT-220 Calculus II
x	x		x				MAT-305 Calculus III
x	x		x				MAT-310 Differential Equations
				c	x	c	MAT-315 Introduction to Statistics
			x				MAT-320 Advanced Calculus
a	a	a					MAT-360 Matrices & Statistics
a	a	a	x				MAT-420 Linear Algebra
			x				MAT-430 Functions of a Complex Variable
x	x	x	x				MAT-440 Numerical Analysis
a	a	a	x				MAT-450 Probability & Statistics
x	x	x	x				PHY-140 Physics I
x	x	x	x				PHY-150 Physics II
x	x	x	x				PHY-160 Physics III
x	x	x	x				PHY-212 Science of Matter/or a chemistry course
			x				PHY-310 Modern Physics
				x	x	x	Physical/or Life Science (9 cr.)
					x		CS-112 Introduction to Data Processing
					x	x	CS-150 Introduction to Computer Organization
x	x	x	x				CS-160 Fundamentals of Logic Design
x	x	x	x	x	x	x	CS-170 Computer Programming I
x	x	x	x	x	x	x	CS-200 Computer Programming II
c	x	x	x	x		x	CS-210 Fortran
		x	x	x	x	x	CS-220 Business Oriented Language (Cobol)
x	x	x	x				CS-240 Digital Design
					x		CS-315 Advanced Cobol
		x	x	x		x	CS-320 Organization of Programming Languages
c	x	x	x	x	x	x	CS-330 Structured Programming (Pascal)
x	x	x	x	x		x	CS-335 Assemblers & Assembly Language Programming
		x	x	x	x	x	CS-340 Data Structures
					x		CS-345 Distributed Data Processing
x	x	x					CS-350 Computer Circuit Design
					x		CS-365 Methods of Systems Analysis
		x	x	x	x		CS-370 Software Design
					x		CS-401 Organization of the Computer Environment
x	x	x					CS-405 Computer Architecture
x	x	x					CS-410 System Design & Analysis
		b		a			CS-420 Operating System Concepts
							CS-430 Simulation & Modeling
							CS-440 Microcomputers
		b		x	x		CS-450 Data Base Management Systems Design
		x		x		x	CS-460 System Programming
				a	x		CS-470 Information Systems Analysis and Design
					x		CS-475 EDP Audit and Control
		b		a			CS-480 Introduction to Compilers & Interpreters
							CS-485 Theory of Computation
					x		CS-490 Directed Project in Computer Science
x	x	x					EE-210 Networks I
x	x						EE-255 Electricity Laboratory (1 cr.)
x	x						EE-310 Networks II
x	x	x					EE-330 Electronics I
x	x						EE-335 Electronics Lab I (1 cr.)
x	x						EE-340 Electronics II
x	x						EE-345 Electronics Lab II (1 cr.)
x	c						EE-400 Electronics III
x	c						EE-405 Networks III
x	c						EE-410 Electromagnetic Theory
x	c						EE-420 Field Transmission Lines
x	c						EE-430 Fundamentals of Communication Systems
x	c						EE-440 Energy Systems
x	c						EE-450 Control Systems
x	x						EE-460 Micro Processor Applications
x	x						EE-470 Electrical Engineering Design
x						x	ES-220 Engineering Drawing
x							ES-310 Engineering Applications of Materials
							ES-320 Industrial Planning
							ES-330 Statics
							ES-340 Dynamics
							ES-390 Thermodynamics
						x	TEC-320 Technical Communication
						x	TEC-330 Technical Writing
						x	TEC-350 Production of Technical Communication Material
						x	TEC-370 Technical Documentation I
						x	TEC-380 Technical Documentation II
						x	TEC-450 Legal Aspects of Technical Communication
						x	TEC-460 Technical Communication Project Management
						x	TEC-470 Seminar in Technical Communication
9	9	12	15	12	21	12	Electives (in credits)
				30	12		Credits in Business (or approved discipline)
			6		6	9	Electives in CS or EE

Program Requirements		Degree Code
B.S. Electrical Engineering (EE)	138 credits	460
B.S. Computer Engineering (CE)	120 credits	465
B.S. Computer Science (CS)	120 credits	463
B.S. Mathematics (MATH)	120 credits	462
B.S. Computer Systems (SYS)	120 credits	464
B.S. Computer Information Systems (CIS)	120 credits	466
B.S. Computer Systems/Technical Communications (SYS/TC)	120 credits	464
a = Choose 1 "a" course.                      b = Choose 2 "b" courses.                      c = Choose 1 "c" course.		



Deferred Payments

In certain circumstances students may satisfy the registration FULL PAYMENT policy by signing an official NOTE which will obligate them to complete full payment within a period of time prescribed by the University. The circumstances when deferred payment is possible are as follows:

- Students who have APPROVED bank or government LOANS, or other forms of financial aid may obtain a promissory note allowing them to defer full payment until the loan or aid is actually disbursed.
- Students who are eligible for TUITION REIMBURSEMENT from their EMPLOYER may obtain a promissory note allowing them to defer full payment until they are actually reimbursed. Students must document that they are eligible under an approved company reimbursement policy.

Fee Schedule

Graduate application fee (non-refundable)	\$ 15
Graduate registration fee (non-refundable)	\$ 15
Graduate late registration fee	\$ 15
Graduate tuition fee (per credit)	\$150
Undergraduate application fee (non-refundable)	\$ 20
Undergraduate registration fee (non-refundable)	\$ 10
Undergraduate late registration fee	\$ 10
Undergraduate tuition fee (per credit)	\$125

Bulletin Board

Placement Test Dates

Sept. 15	6pm-9pm	P213
Sept. 24	10am-1pm	P238
Oct. 1	10am-1pm	P213
Oct. 17	6pm-9pm	P213
Nov. 15	10am-1pm	P238
Nov. 17	6pm-9pm	P213
Dec. 3	10am-1pm	P209
Dec. 13	6pm-9pm	P131
Dec. 19	6pm-9pm	P213

Computer Programs for Young People

A series of three-week computer programming courses for young people grades 9 through 12 will be offered in the late afternoons and on Saturdays. For information, call 475-7650.

Computer Applications for Health Care Administrators

A new course covering theory and applications of programs for computers which are useful in the health care environment. This course will include discussion of computerized monitoring and testing in addition to hands-on experience with microcomputers. (CS-114)

Course Descriptions

All courses are 3 semester credits unless noted.

**CS-111 Computer Literacy** Introduction for the non-technical person. Computer literacy, principles of computer operation, uses of computer in small businesses, schools, social service agencies, hospitals. Hands-on experience with micro-computers and specialized software. This course is for non-computer science majors.

**CS-112 Introduction to Data Processing (BUS 3801, CS-101)** Topics include basic computer theory, file storage media, input devices, number systems and programming techniques. This course is for non-computer science majors. PREREQUISITE: CS-111.

**CS-113 Business Applications of Microcomputers** Theory and applications of programs for microcomputers which are useful in the business environment. Accounting, data base management, and information system management programs will be included. Computer laboratory-oriented course. PREREQUISITE: CS-111 or familiarity with microcomputers.

**CS-114 Computer Applications for Health Care Administrators** Theory and applications of programs for computers which are useful in the health care environment. Will include discussion of computerized monitoring and testing in addition to hands-on experience with microcomputers.

**CS-150 Introduction to Computer Organization** An introduction to principles of digital computer operation and organization, data representation, the central processing unit, memory, input/output devices, number systems, logic systems. PREREQUISITE: Demonstrated competency equivalent to MAT-102.

**CS-160 Fundamentals of Logic Design** An introduction to elementary digital logic circuits, Boolean algebra, Karnaugh maps, digital counters, other basic circuit elements. Number set modules, binary, octal and hexadecimal number systems are investigated and related to digital computing structures. PREREQUISITE: demonstrated competency equivalent to MAT 135

**CS-170 Computer Programming I** An introduction to good programming techniques including flowcharting, code design, debugging techniques and documentation, problem-solving methods and algorithm development to be used in the design of computer programs. The language, BASIC, will be taught as part of this course. An introduction to the use of microcomputers and computer terminals. PREREQUISITE: demonstrated competency equivalent to MAT 102.

**CS-200 Computer Programming II** Continuation of Computer Programming I including introduction to random and sequential files, program design, modular design, structured programming, large programming design, documentation. PREREQUISITE: CS-170.

**CS-210 Fortran** Introduction to the language FORTRAN with reference to the latest standards, special techniques for programming in FORTRAN. PREREQUISITE: CS-200

**CS-220 Business Oriented Language (COBOL)** A study of the COBOL programming language with emphasis on business applications. Topics covered will include program structure and breakdown, report generation and file handling. PREREQUISITE: CS-200.

**CS-240 Digital Design** Application of the principles of logic design in digital systems. Arithmetic logic units, parallel and serial interfaces, information transfer in a digital system, major hardware components and peripheral devices, digital computers. PREREQUISITE: CS-160.

**CS-320 Organization of Programming Languages** Development of an understanding of the organization of programming languages, introduction to formal study of programming language specification and analysis, comparison of two or more high level modern programming languages. PREREQUISITE: CS-210, CS-330, CS-340.

**CS-330 Structured Programming (PASCAL)** Basic principles of structured programming and language foundation. PASCAL will be taught as an example of a structured programming language. PREREQUISITE: CS-200, and CS-210 or CS-220.

**CS-335 Assemblers and Assembly Language Programming** A detailed analysis of the operation of assemblers. Assembler features, assembly language programming, macro facilities. Assembly language programs will be written as part of this course. PREREQUISITE: CS-210 or CS-330.

**CS-340 Data Structures** An introduction to the concepts and techniques of structuring data on bulk storage devices, introduction to data structures and file processing including arrays, records, strings, lists, trees, stacks, queues, manipulation and limitations of files. PREREQUISITE: CS-330.

**CS-350 Computer Circuit Design** Design of combinational and sequential digital circuits, programmable logic design, and firmware design. PREREQUISITE: CS-240.

**CS-365 Methods of Systems Analysis** An overview of systems development with emphasis on techniques and tools of system documentation and logical system specification. PREREQUISITE: CS-220.

**CS-370 Software Design** Algorithm analysis, software design, management of large software projects, functional specification, design and testing phase of large scale projects, quality control. PREREQUISITE: CS-330.

**CS-401/501 Organization of the Computer Environment** Management of the computer environment, personnel, customer interface, budgeting, coordination, policy development, staffing, department interface, hardware and software selection, planning, maintenance, and management.

**PREREQUISITE:** Requires senior standing.

**CS-405/505 Computer Architecture** The analysis and design of computer systems; the interrelation of software and hardware design in the final computer system, interrelation between the operating system and the architecture of computer systems, concurrent processes and resource allocation. PREREQUISITE: CS-350. Suggested prerequisite: CS-335.

**CS-450/550 Data Base Management Systems Design** Concepts and structures necessary to design and implement a data base management system, including physical file organization and data organization techniques, data models, networks, data integrity, and file security. PREREQUISITE: CS-220, CS-340.

**CS-460/560 Systems Programming** A study of various system programming techniques, hardware-software interface, software controlled hardware. A comparison of several existing computer systems will be made. PREREQUISITE: CS-335, CS-340.

**CS-470/570 Information Systems Analysis and Design** Information processing systems, project planning, software packages. PREREQUISITE: CS-450.

**CS-631 Programming Languages** Introduction to data structures and data types, and understanding of the modern approach to structured programming will be developed. A comparative study of several high-level programming languages. Emphasis will be placed on how concepts are expressed in each of the major languages, such as FORTRAN, COBOL, PL/I, C, PASCAL, and ALGOL. PREREQUISITE: Consent of Center.

**CS-651 OPERATING SYSTEMS THEORY AND DESIGN** Analysis of computer operation systems with emphasis on structured design. Multi-programming and multi-processing, real-time, time-sharing, networks, job control. Scheduling, synchronization and other forms of resource management: I/O programming, memory and file system management. PREREQUISITE: CS-520 Operating Systems Concepts.

**CS-665 Management of Software Projects** Management techniques applied to the development of software. Planning, evaluation, testing and validation of software products. Budgeting, scheduling and quality control techniques for software projects. PREREQUISITE: Consent of the Center.

**EE-210 Networks I** Definitions of charge, current, voltage, resistance, capacitance and inductance. Ohm's law, Kirchhoff's laws, nodal analysis and mesh analysis. Principles of superposition, maximum power theorem, Thevenin's theorem and Norton's theorem. PREREQUISITE: PHY 150, MAT-210.

**PREREQUISITE:** PHY 150, MAT-210.

**EE-340 Electronics II** Analysis and design of single-stage and multi-stage amplifiers, difference amplifiers and operational amplifiers. Frequency response and other performance criteria with feedback. Oscillators. PREREQUISITE: EE-210, EE-310

**EE-430 Fundamentals of Communication Systems** Fourier series and transforms, modulation systems, sampling, digital data transmission, noise, channel capacity, design and analysis of communication systems. PREREQUISITE: EE-405, EE-340 (Same as EGR-530).

**EE-440 Energy Systems** Electromechanical, electrochemical, photoelectric, thermoelectric and other energy conversion. Transmission and distribution of electric power, electrical power system analysis. PREREQUISITE: PHY-140, PHY-150, PHY-160, EE-310, EE-330 (Same as EGR-540).

**EE-450 Control Systems** Differential equations, Laplace transforms, systems with feedback, transfer functions, stability, frequency response, and other performance characteristics, compensation. Analysis and design of control systems. PREREQUISITE: EE-405, EE-440 (Same as EGR-550).

**EE-460 Microprocessor Applications** Applications in the design of microprocessor-based circuits. PREREQUISITE: CS-350. Suggested prerequisite: Assemblers and Assembly Language Programming (Same as EGR-565).

**EGR-530 Fundamentals of Communication Systems** Fourier series and transforms, modulation systems, sampling, digital data transmission, noise, channel capacity, design and analysis of communication systems. PREREQUISITE: Networks III, Electronics II (same as EE-430)

**EGR-540 Energy Systems** Electromagnetical, electrochemical, photoelectric, thermoelectric and other energy conversion. Transmission and distribution of electric power, electrical power system analysis. PREREQUISITE: Physics I, Physics II, Physics III, Networks II, Electronics I (same as EE-440)

**EGR-550 Control Systems** Differential equations, Laplace transforms, systems with feedback, transfer functions, stability, frequency response, and other performance characteristics, compensation. Analysis and design of control systems. PREREQUISITE: Networks III and Energy Systems (same as EE-450)

**EGR-565 Microprocessor Applications** Applications in the design of microprocessor-based circuits. PREREQUISITES: Computer Circuit Design, SUGGESTED PREREQUISITE: Assembler and Assembly Language Programming (same as CS-565, EE-460)

**EGR-630 SYSTEMS ENGINEERING** The development of engineering subsystems, that is, systems to do specific tasks, and their integration into major projects; the analysis of human factors in the relationship of humans and systems.

**ES-310 Engineering Applications of Materials** Basic concepts of material structure and their relation to mechanical, thermal, electrical, magnetic and optical properties with engineering applications. Simple stress and strains, thermal stresses, pure torsion, shearing force, bending moment, combined stresses. PREREQUISITE: PHY-140, PHY-150, PHY-160, MAT-220.

**MAT-101 General Mathematics** Application of basic mathematical operations. Problem solving techniques. Introduction to basic algebraic concepts and graphs. Appropriate for non-math and non-science majors. PREREQUISITE: Placement examination requirement satisfied or MAT-101

**MAT-102 Introductory Algebra A** basic review of algebra including algebraic terminology, polynomials and applications. Appropriate for non-math and non-science majors. PREREQUISITE: Placement examination requirement satisfied or MAT-101

**MAT-105 College Algebra (MAT-3002)** Includes topics such as fundamental operations, functions and graphs, linear and quadratic equations, and conic sections. PREREQUISITE: Placement examination requirement satisfied or MAT-102

**MAT-135 Technical Mathematics** Prepares the technical major for Pre-calculus. Including a basic review of algebraic terminology, polynomials, fundamental operations, functions and graphs, linear and quadratic equations, and conic sections. PREREQUISITE: Placement examination requirement satisfied or MAT-102. Credit not given for those students who have taken MAT-105.

**MAT-150 Precalculus** Review of algebra, trigonometric functions, graphs of functions, logarithms, exponents, functions of the natural number. Introduction to calculus, concept of limits, integrals. PREREQUISITE: Placement examination requirement satisfied or MAT-135 OR MAT-105.

**MAT-210 Calculus I** Functions, limits, derivatives of algebraic functions. Introduction to derivatives of trigonometric functions, logarithmic functions, application of derivatives to physics problems, related rates and maximum/minimum problems, definite and indefinite integrals with applications. PREREQUISITE: MAT-150

**MAT-440 Numerical Analysis** Solution of algebraic and transcendental equations by a number of iterative methods, discussion of convergence considerations, probability and statistical theory, numerical integrator of a number of types of problems will be

discussed both in theory and in practice through the use of computer problem-solving. PREREQUISITE: MAT-220 and PHY-140, PHY-150 and PHY-160, CS-210 or CS-330.

**MAT-450 Probability and Statistics** Probability function, random events, expectation, conditional probability distribution functions, foundations of statistics. PREREQUISITE: MAT-210.

**PHY-103 Introduction to Geology** An introductory course that will provide an understanding of the earth's composition and structure, an explanation of the processes that affect the earth and the resulting features, a description of the physical evolution of the major mountains and oceans, a description of biological evolution in relation to ancient geologic environments, an analysis of earth's resources and implications for the future.

**PHY-105 Introduction to Chemistry** Non-laboratory course. Presents an introduction to the elementary principles of chemistry. A study of the structure of matter and the transformation it undergoes. Does not satisfy chemistry requirement for engineering majors.

**PHY-140 Physics I** Basic principles of mechanics including vectors, force, equilibrium, displacement, velocity, acceleration, mass. Newton's Laws, work energy, gravitation, momentum, rotational motion, mechanics of systems of particles and rigid bodies. PREREQUISITE: MAT-210.

**PHY-160 Physics III** Thermodynamics, entropy, wave motion and optics, temperature, heat and kinetic theory, reflection and refraction of light, interference and diffraction, polarization, radiation. PREREQUISITE: MAT-210.

**PHY-212 Science of Matter** Introductory course in the science of materials. review of atomic theory, atomic bonding and periodic table, chemical equations, states of matter, structure of crystals, nature of crystal imperfections and atom movements, metallic and ceramic materials and their properties, multiphase materials, equilibrium relationships. PREREQUISITE: PHY-140, PHY-150, PHY-160.