Center for Science and Engineering 1983-1984 Bulletin

Nova Southeastern University

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Nova University

Center for Science and Engineering
1983-84 Bulletin

Policies and programs set forth herein are effective from July 1, 1983. The regulations and requirements herein, including fees, are necessarily subject to change without notice at any time at the discretion of the Nova University administration.

Nova University is chartered by the State of Florida and accredited by the Southern Association of Colleges and Schools.
Nova University admits students of any race, color, and national or ethnic origin.
Having entered its second decade, Nova University is beginning to see the impact that its graduates are having upon the institutions within our society. Many of the University's programs are mission-oriented, designed to improve the performance of professionals, and evidence is being collected which indicates that Nova alumni are having a strong, positive effect on the institutions in which they are employed.

Independent education must continue to be responsive and adaptable to the varying needs of potential students if it is to represent a true alternative to the tax-supported sector. Nova University is committed to maintaining quality at the same time it is meeting these needs.

Abraham S. Fischler
President

The growth of Nova University as a dynamic, mission-oriented educational institution has been coupled with an intensive search for strategies designed to make each of its courses of study maximally responsive to individual human needs. Hence, Nova University continues to press forward in seeking solutions to major societal problems while offering to its students many opportunities for intellectual challenge, professional preparedness and personal awareness.

Alexander Schure
Chancellor
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General Information
Founded in 1964, Nova University is an independent university which is non-sectarian, non-profit and racially non-discriminatory.

Unusual among institutions of higher education, Nova is a university for all ages. Nova College provides undergraduate education. Numerous graduate programs in a variety of fields provide master's, doctoral, and post-doctoral education. Also, non-degree, continuing education programs are offered. The University School, a demonstration school, serves children from pre-school through seniors in high school.

Since its beginning, the university has been distinguished by its innovative outlook, its unique programs which provide non-traditional choices in educational programs, and its important research which is aimed at solutions to problems of immediate concern to mankind.

In 1970, Nova University joined in an educational consortium with the New York Institute of Technology, an independent, non-profit institution with campuses in Manhattan and Old Westbury, Suffolk County, Long Island. This mutually beneficial relationship permits each institution to draw on the personal and physical resources of the other, giving maximal benefit to the students of each and to society in general.

With students studying in Florida and in 20 states, Nova University is a university of national scope.

Accreditation Nova University is accredited by the Southern Association of Colleges and Schools.

Campus and Off-campus Locations The Nova University main campus is located on a 200-acre site west of Fort Lauderdale at 3301 College Avenue in the town of Davie, Florida. It is 10 miles inland from the Atlantic Ocean and is easily accessible from major U.S. and state highways, including I-95 and Florida's turnpike.

The Center for the Study of Law is located at 3100 S.W. 9th Avenue in Fort Lauderdale, just north of the Fort Lauderdale-Hollywood International Airport.

Nova University at Coral Springs is located at 3501 University Drive. Degree programs, non-credit courses, and cultural events that serve the residents in north Broward County and in Palm Beach County are held in Coral Springs.

The Oceanographic Center is located on the south side of the marine entrance to Port Everglades at 8000 North Ocean Drive, Dania, Florida.

Many Nova University students attend classes on the main campus, at the Law Center or at Coral Springs. But consistent with its educational mission to provide educational opportunities to adult students wherever they may be, Nova offers degree programs and continuing education experiences at off-campus centers locally, throughout Florida, across the United States, and in foreign countries.

With the New York Institute of Technology, Nova University maintains an office in Washington, D.C. It is located at 1511 K St., N.W. Suite 624.
Center for Science and Engineering
The Center for Science and Engineering (CSE) seeks to prepare students for a career in science, computer science, or engineering; to offer opportunities for the non-major to obtain a foundation in rapidly expanding technological areas; and to assist the professional in continuing to update technical knowledge and skills.

Career opportunities in technical fields are developing rapidly. The programs offered by the Center for Science and Engineering have been developed in response to the demands created by the technical expansion which has occurred in the south Florida area. Degree programs in science, computer science, and engineering must be continually updated in order to provide graduates with current knowledge. Individuals who already hold degrees in these areas are in need of continuing education, whether it be in the form of an advanced degree program or through professional workshops. Individuals with non-technical backgrounds have to be aware of certain aspects of science and technology if they are to function in today's world.

The programs offered by the Center for Science and Engineering to meet these needs have been developed in cooperation with industry and professional associations. Boards of advisors from industry have worked with University faculty to develop curricula. Many adjunct faculty, who are practicing engineers, scientists, and computer scientists with full-time positions in industry, bring real-world, state of the art experience into the classrooms.

The programs have been developed in cooperation with the New York Institute of Technology. The center benefits from the continuing relationship with NYIT faculty and administration and draws on that institution for curriculum resources.

Both graduate and undergraduate programs have been designed so that working people can attain professional credentials while retaining their jobs in industry. In many cases students draw upon their work experiences to reinforce their classroom activities. "Second bachelor" degree programs have been developed for those who now feel the need for a degree in a technological area. Masters Degree programs and professional workshops are designed to provide professionals with the opportunity to continue to develop expertise in a particular field or to develop new areas of knowledge.

Classroom experiences are supplemented by hands-on experiences in the computer center, the microcomputer laboratory, the electronics laboratory, and the microprocessor laboratory.

Career opportunities in technical fields are developing rapidly. South Florida is undergoing tremendous technological expansion. Broward County is now said to be the third "center for computers" in the nation after Boston, Massachusetts and Silicon Valley in California. A number of career opportunities are now available which did not exist even ten years ago. Now is the time for many individuals to consider entering new fields or to expand their knowledge in their present fields. The programs offered by the Center for Science and Engineering will prepare both the young person and the adult returning to school to enter these career areas.
### Academic Calendar
Graduate Programs—1983-84

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**Undergraduate Programs—1983-84**

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<tr>
<td>Spring Term</td>
<td>April 23</td>
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<td>July 6</td>
<td>July 21</td>
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<td>Summer Term</td>
<td>May 14</td>
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<td>July 27</td>
<td>August 11</td>
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<tr>
<td>Fall Term</td>
<td>July 30</td>
<td>August 20</td>
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<td>August 27</td>
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<td>August 27</td>
<td>October 12</td>
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<tr>
<td></td>
<td>October 12</td>
<td>October 27</td>
</tr>
</tbody>
</table>
Accreditation  Nova University is accredited by the Southern Association of Colleges and Schools. Nova is also a member of the College Entrance Examination Board.

Location  The Center for Science and Engineering is located in the Orange Plaza Center, 6195 Orange Drive, Suite 61671, Davie, Florida. All mail should be addressed to: Center for Science and Engineering, Nova University 3301 College Avenue, Fort Lauderdale, FL 33314.

Phone  Nova University main switchboard 475-7300
Center for Science and Engineering
Broward  475-7650,7651
Dade (toll free)  944-1219 ex. 7650, 7651
Palm Beach (toll free)  732-6600 ex. 7650, 7651

Format  Most courses in both the graduate and undergraduate programs offered by the center have one class meeting per week either at night or on Saturday morning. There are a limited number of day classes offered.

Graduate three-semester credit courses meet for 4 hours for twelve weeks. Four terms are offered each year.

Undergraduate three-semester credit courses meet for 4.5 hours for nine weeks. Five terms are offered each year. An additional summer session is offered.

Some courses may have a slight variation from this format but all courses will meet for a minimum of the number of hours listed above.

Faculty  Faculty for the programs offered by the Center for Science and Engineering are drawn from many sources. Full time faculty and administrators carry out traditional roles of teaching, curriculum development, research, and publication. Adjunct faculty who are employed full time in industry bring state-of-the-art knowledge into the classroom. Outstanding faculty from other institutions are involved in the center under the Sabbatical Program. Nationally-known professionals are instructors in both the workshop programs and in some of the graduate courses.

In addition, the Center is able to draw on the expertise of the faculty of New York Institute of Technology who have been involved in the program since its beginning.

A board of advisors composed of professionals from local industry assists the center in curriculum development and identification of industry needs.
Housing Located on the main campus is the Nova Cultural and Living Complex. Ninety one- and two-bedroom, unfurnished apartments, in three buildings, are available for graduate and married students. A five-story building with ninety furnished, one-bedroom/one-bath and two-bedroom/two-bath apartments is for undergraduate and other students. Apartments are leased to full-time students on an annual basis. Interested students are invited to obtain rates and further information from the Housing Office, Nova University, 3301 College Avenue, Fort Lauderdale, Florida 33314. Applications for housing for the fall term should be filed prior to May 31. Housing is limited by program and availability.
LEARNING RESOURCES

Libraries Nova University provides appropriate learning resources at each of its academic Centers. In addition, many resources within the broader community are utilized to enrich the learning environment of the students.

The Albert and Birdie Einstein Library in the Mailman-Hollywood Building contains a collection of books and periodicals in the disciplines of the behavioral sciences, education, public administration, electrical engineering, computer sciences, business administration, public communications, and the humanities. This facility also includes individual study carrels and a media room in addition to microform readers.

The George English Library in the Parker Building includes specialized material in mathematics, life sciences, physical science and general undergraduate holdings.

Nova University has two additional college libraries containing specialized materials in ocean sciences and law. Through computer terminals, the Nova Libraries are connected with the DIALOG Information Retrieval System and other national data bases.

Through special cooperative arrangements, Nova University students have access to other libraries in the South Florida Educational Complex, such as Florida International University and Miami Dade Community College. A unique community-university arrangement exists at Coral Springs, where the local branch of the Broward County Public Library and the Nova University Coral Springs Center have a joint “Communiversity” library facility. Believing in maximum interchange of community educational resources, Nova University also maintains cooperative arrangements with other academic libraries in the area, including the Professional Library of the Broward County Public Schools.

The Library Media Services provides a complete non-print media service, including educational materials and equipment in the following formats; 16mm film, videotape, audiotape, recordings, tape/slide presentations, sound filmstrips, and transparencies.

The Library Media Services also provides the complete range of media production services, enabling students and faculty to prepare video recordings, films, slides, audio cassettes, and transparencies for use in class.

Computing Facilities The University computing facility provides data processing facilities and services for meeting the instructional, research, and administrative needs of the University. The central site is located on the main campus in the Mailman-Hollywood Building. Access to the facility is through terminals and other computer systems located on the main campus and at the Port Everglades site. Time-sharing services are
available through the local telephone system. This facility is available to qualified students and faculty for research and for computer-oriented course work.

A microcomputer laboratory has been developed in the Parker building to provide the student with hands-on experience and immediate feedback regarding software development and computer language learning. The laboratory is available only to students currently enrolled in courses offered by the Center. A schedule of laboratory hours is posted each term.

**Laboratory Facilities** Laboratory experiences are available in the areas of computer science, electricity, electronics, logic design, firmware design, and microprocessor applications. Additional laboratory experiences are currently being developed. The main laboratory facilities for the Center for Science and Engineering are located on the second and third floors of the Parker Building.

**Books** Books should be picked up before the first class because there is usually an assignment to be completed for the first class meeting. Books may be purchased at Corner Book Exchange, 4134 Davie Road Extension, Davie, Florida 33314, Phone: 792-7778.
ADMISSION

Graduate Programs  Graduate work in computer science, computer management, or engineering management is based on a strong undergraduate foundation. For this reason, a student seeking admission to the graduate computer science or computer management program should have an undergraduate major in computer science or meet specific course requirements. These course requirements are listed in the degree requirement section of this bulletin. A student seeking admission to the graduate engineering management program should have an undergraduate major in some area of engineering. Students who do not have the prerequisite courses must take them on the undergraduate level before being admitted to the graduate program. Students who do have one of these majors may still be required to take specific prerequisite courses.

In addition the applicant must possess the following:
1. A baccalaureate degree granted by an accredited institution representing completion of a course of study which fulfills prerequisites for graduate work in the specific area chosen.
2. A 2.5 undergraduate grade point average on a grading scale of 4.0 (A).
3. The intellectual capacity and motivation to pursue graduate work as determined by credentials and an interview. The interview may be waived if the applicant does not reside in the state of Florida. In this case the application must be supported by three letters of recommendation from individuals who would be in a position to judge the fitness of the applicant to pursue graduate study in the major chosen.

Undergraduate Programs  In order to be admitted as a degree-seeking candidate in the undergraduate programs, a student must:
1. Meet with counselor from the Center for Science and Engineering to plan program.
2. Submit a high school diploma, GED or college transcripts.
3. Demonstrate adequate skills on the Nova College Placement Examination.
4. Complete six (6) semester hours in required major courses at Nova University with a Q.P.A. of at least 2.0.
5. Declare a major and have a program outline prepared. An evaluation of transfer credit will be made when the program outline is prepared.

An undergraduate student may be enrolled for one term while the admission process is being completed.
Special Students Individuals will be permitted to take courses as special students after submitting application forms and application fees. Up to six credits may be taken under this classification. Students desiring to take more than six credits as special students are required to apply to the center for permission. Students must have the prerequisite courses and skills for the courses chosen.

Second Bachelor Degree A student with a bachelor’s degree from an accredited institution may earn a second bachelor’s degree by completing a minimum of 30 additional credits at Nova University. All major and program requirements must be met. The student should note that this almost always results in more than 30 credits being required of the second degree student. The specific requirements will be identified in the program outline.

International Students All International students, whether applying to graduate or undergraduate programs must:

1. Demonstrate proof of graduation from an accredited secondary school in their home country.
2. Demonstrate proof that they are able to meet all costs of their education without financial aid from Nova University.
3. Submit a deposit on tuition of $100 prior to issuance of the student visa. This deposit is nonrefundable if the student fails to enroll at the University. Otherwise, the amount will be credited toward initial tuition.
4. Demonstrate proficiency in the English language through testing in the Nova University Intensive English Program. Failure to achieve satisfactory scores on the test of English will require additional study in the Intensive English Program prior to registering for classes.

International students who need intensive English study prior to enrollment in regular courses should apply for admission to the Intensive English Program at Nova University.

All students for whom English is not their native or primary language will have to demonstrate proficiency in English through the Nova University Intensive English Program.
APPLICATION PROCESS

Application forms for admission should be requested from the center office or the Registrar's office which is located in the Parker Building, 3301 College Avenue, Fort Lauderdale, FL 33314. Application forms must be completed and returned to the Registrar's office with the nonrefundable application fee. Checks should be made out to Nova University.

Placement Examination—Undergraduate Majors
The placement examination seeks to determine that the student has the basic skills in communications and in mathematics required to do the work in the program he/she has selected. The tests will primarily assess vocabulary, reading comprehension, writing ability, elementary algebra, and intermediate algebra. Students will be placed in courses on the basis of performance in this examination. Second Degree students are not required to take this examination.

The examination is given in the evenings and on Saturdays several times a month. A schedule may be obtained from the center office. Students who do not do well on some part of the examination may have to complete remedial courses successfully before they are admitted to a specific program.
Advanced Standing  The University recognizes that students may have acquired a substantial level of academic knowledge in a variety of ways. These may include courses completed at other colleges, technical courses, government and industry training courses, on the job experience, and personal reading.

A student may gain advanced standing by transfer of credit or credit by examination. A minimum of thirty credits must be taken at Nova University.

Registration  Registration is accepted at any time prior to the beginning of the term. Any student who completes registration after the close of the official registration period will be assessed a late fee. Students are reminded to register early to avoid encountering closed classes. The registration form and check for total amount due should be mailed to the Registrar's Office, Nova University, 3301 College Avenue, Fort Lauderdale, FL 33314 or delivered in person to the Registrar's office, Room 104, Parker Building. The office is open from 8:30 A.M. to 8:00 P.M., Monday through Thursday, 8:30 to 5 P.M. on Friday. Checks should be made out to Nova University.

Students may obtain counseling by phone or in person through the Center for Science and Engineering Office.

The University requires that all tuition and fees be paid prior to the beginning of the academic term. 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. 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 may choose to pay tuition and fees by cash or check, Master Charge, Visa, or Hollywood Buy-O-Matic.

To pay by charge card when mailing a registration, clearly print the card type (MasterCard or Visa), the account number and expiration date in the upper right hand corner of the registration form. For MasterCard, also include the four digit bank number.

Transcripts  Nova University transcripts are available only to students who have no outstanding financial obligations to the University. Transcript request forms are available at each program office.
TUITION, FEES, FINANCIAL AID

Fee Schedule for 1983-1984

<table>
<thead>
<tr>
<th>Service</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>graduate application fee (nonrefundable)</td>
<td>$15</td>
</tr>
<tr>
<td>graduate registration fee (nonrefundable)</td>
<td>$15</td>
</tr>
<tr>
<td>graduate late registration fee</td>
<td>$15</td>
</tr>
<tr>
<td>graduate tuition fee (per credit)</td>
<td>$150</td>
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<tr>
<td>graduate credit by examination (per credit)</td>
<td>$150</td>
</tr>
<tr>
<td>undergraduate application fee (nonrefundable)</td>
<td>$20</td>
</tr>
<tr>
<td>undergraduate registration fee (nonrefundable)</td>
<td>$10</td>
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<tr>
<td>undergraduate late registration fee</td>
<td>$10</td>
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<td>undergraduate tuition fee (per credit)</td>
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<tr>
<td>credit by examination (undergraduate) (per 3 credits)</td>
<td>$125</td>
</tr>
<tr>
<td>graduation fee</td>
<td>$15</td>
</tr>
<tr>
<td>transcript fee (first copy, no fee)</td>
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<tr>
<td>CLEP (payable to College Level Examination Program)</td>
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<td>laboratory and materials fees</td>
<td>variable where applicable</td>
</tr>
<tr>
<td>placement examination</td>
<td>no fee</td>
</tr>
</tbody>
</table>

Please note that all fees are subject to change. Fees currently in effect are published in the Course Schedule for each term.

Refund Policies Fees other than tuition are not refundable. Students who wish to receive a refund of tuition upon withdrawal from a course must complete an official withdrawal form. Withdrawal in itself is not a reason for an automatic refund. In the event of a refund, the following schedule applies:

For a 75% refund: withdrawal in writing before the second class meeting, regardless of class attendance.

For a 50% refund: withdrawal in writing before the third class meeting, regardless of class attendance.

No refunds after the third class meeting, regardless of class attendance.

Refunds will be based on the postmark date of written notification, not on the last date of attendance.

Students are not permitted to withdraw from a course after a certain date each term. For undergraduate students this date is before the third to the last class meeting. This date is printed in the Course Schedule for each term.
**Financial Aid** The financial aid program at Nova University is designed to assist students who would find it difficult or impossible to attend college without financial assistance.

Nova University participates in various governmental and private financial aid programs for the benefit of its students. The determining of need is based on a careful assessment of each student’s financial situation which takes into account the family’s income, assets, debts, number of children, and the estimated cost of attending the University. Application for all financial aid must be made annually. Financial aid is a time consuming task, both for students and the University. In order to be considered for funds, applications and all documentation must be in the financial aid office by the designated deadlines.

Nova’s policy has always been and will continue to be a personalized approach to serving aid applicants.

Application for all financial aid must be made annually. For further information about these programs, contact the Nova University financial aid office.

**Guaranteed Student Loan Program (GSL)** Loan made through local financial institutions that are insured by the State or Federal Government. Eligible students may borrow up to $2,500 per year to a total of $12,500 for undergraduate study and up to $5,000 per year to a total of $25,000 for graduate study. Income information (IRS from 1040) must be provided to determine if students meet the income requirements. In some cases, parents’ income information may also be required. Contact the financial aid office for further details. If your family’s adjusted gross income is $30,001 or over your loan eligibility must be determined by the financial aid office. This determination is derived from a federally approved method of need analysis. If your adjusted gross income is $30,000 or below no further determination of need is required other than providing the 1040 form.

During the repayment period, the student will be charged 9% interest on the unpaid balance of the loan principal. Repayment begins 6 months after a student is not enrolled at least ½ time. Applications are accepted on a continuous basis.

**V.A. Benefits** Nova University academic programs are approved by the Coordinator for Veterans Approval, State of Florida, Department of Education, for veterans educational benefits. The financial aid office will assist veterans in applying for benefits.
THE FOLLOWING PROGRAMS ARE AVAILABLE TO UNDERGRADUATE STUDENTS ONLY

Pell Grant (formerly Basic Educational Opportunity Grant) The Pell Grant is a federal student financial aid program designed to assist students in the continuation of their education after high school. Awards are made to students based on a uniform determination of need. The application is submitted to the Pell Grant Program. A notice of eligibility estimated award is then returned directly to the student. Upon receipt of this Student Aid Report (SAR), it should be submitted immediately to the financial aid office, before registration, so that the necessary preparation and counseling may be completed. To be eligible to receive Pell Grant a student must be registered for a minimum of 6 semester hours. If a student should drop below half time status, all monies disbursed during that registration period will be returned to the Pell Grant Program. Awards for the 1984-85 year will range between $200 and $1800. Application deadline is March 15, 1984.

SPECIAL FLORIDA PROGRAMS

Florida State Student Assistance Grant Similar to the Pell Grant except funded by the State of Florida. Applicants must be twenty-four consecutive month residents of Florida. Application must be made using the Financial Aid Form (FAF) of the College Scholarship Service (CSS). Awards could range from $600 per semester up to $1,800 per year. Application for 1984-85 must be made by April 1, 1984.

Florida Academic Scholar’s Fund The Florida Academic Scholar’s Fund is a grant fund by the State of Florida. To be eligible a student must

1. be enrolled as a full-time student
2. have two-year residency prior to graduation from high school
3. have a grade point average of 3.5 on a scale of 4
4. have a score of 1200 or better on the SATs
5. have first-time-in-college status

Applications are available in the Financial Aid Office. Deadline date for the 1984-85 award year is August 1, 1984.

In order for a student to remain eligible for the Florida Academic Scholar’s Fund, he or she must maintain a GPA of 3.2.
Florida College Career Work Experience Program
The Florida College Career Work Experience program is funded by the State of Florida. To be eligible a student must
1. be enrolled as a full-time student
2. have graduated from a Florida high school (Florida GED meets this requirement.)
3. have two-year continuous residency in Florida
4. demonstrate financial need as determined by the Financial Aid Office

Florida Tuition Voucher Fund A grant program funded by the State of Florida that provides tuition assistance to resident students attending Nova University. Eligibility requirements include:
1. Full-time undergraduate student enrollment. “Full-time” is defined as carrying a minimum of twelve (12) semester hours per trimester or semester.
2. A Florida high school diploma or transcript (Florida GED’s meet this requirement).
3. Proof of 24 months of continuous residency in the State of Florida preceding the awarding of the voucher.
4. First baccalaureate degree pursuit.
   The voucher will provide $375 per term of eligibility, to a maximum of $750 per academic year.

Seminole/Miccosukee Indian Scholarship Florida Seminole and Miccosukee Indians are eligible to receive up to $2,000 per academic year. Applications are available at your local Bureau of Indian Affairs.

Campus-Based Aid Programs, 1983-84 In order to be considered for the following aid programs, students need to have a Nova University Financial Aid Application and Financial Aid Form (FAF) on file by the designated deadline dates. For returning students, the FAF must be mailed to College Scholarship Service (CSS) no later than March 15th. Nova University Student Aid Application must be returned to the Financial Aid Office on or before April 15. For new financial aid students, the FAF must be mailed by May 1 to College Scholarship Service (CSS). The Nova University Student Aid Application must be returned to the Financial Aid Office on or before June 1.
Supplemental Educational Opportunity Grant (SEOG) The Supplemental Educational Opportunity Grant (SEOG) programs are for students who demonstrate need and would be unable to continue their education without additional assistance. Need is determined by use of the Financial Aid Form (FAF) which all financial aid students must complete. SEOG funds are very limited; only those students who have met the necessary deadline dates and have completed files can be considered. Awards will range between $200 and $800 for the 1983-84 year.

National Direct Student Loan Program (NDSL) The NDSL is a school administered government loan program. Student eligibility and the loan amount are based on need as determined by the financial aid office. The aggregate amount for an undergraduate borrower is $6,000, and a graduate or professional student the aggregate loans for all years must not exceed $12,000. Repayment of the loan(s) will not begin until 6 months after the student ceases full- or half-time study at a rate of not less than $50 a month, at 5% simple interest, for a period of not more than 10 years. Application for a Nova NDSL award is made through the CSS on a Financial Aid Form (FAF) and on a separate 1984-85 Nova University Financial Aid Application.

College Work-Study Program (CWS) The CWS is a school administered government work program. The program provides students with on- or off-campus jobs in nonprofit agencies at an hourly wage. Part-time work is available while classes are in session and full-time work during winter or other vacation periods. Application for a Nova CWS award is made through the College Scholarship Service (CSS) on an FAF and on a separate 1984-85 Nova University Financial Aid Application.

Important Things to Remember
1. Financial Aid applications take time! Please allow a minimum of two months to process your application.
2. Aid applications must be made annually.
3. The Pell Grant alone will not cover all tuition and fees. Please check with the financial aid office, before registering, to determine your exact award.
4. A “Statement of Educational Purpose” must be submitted with your Pell Grant papers.
5. Aid awards cannot be made until all admission requirements have been fulfilled.
6. Students transferring from another institution and requesting aid must submit a Financial Aid Transcript(s) from their former institution(s).
ACADEMIC STANDARDS

Grades

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<th>Grade</th>
<th>Description</th>
<th>Quality Points</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
<td>4</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>Marginal (undergraduate only)</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>Failure</td>
<td>0</td>
</tr>
<tr>
<td>W</td>
<td>Withdrawn Without Penalty</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Incomplete</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>PR</td>
<td>Progress</td>
<td></td>
</tr>
<tr>
<td>NG</td>
<td>No Grade</td>
<td></td>
</tr>
</tbody>
</table>

Certain courses are designated Pass, Progress, and Fail only.

Incomplete The I grade may be obtained only with the approval of the instructor on the Incomplete contract. The student will have up to one additional term to complete the work for the course and receive the letter grade.

For undergraduate students, if the course is not completed within the extension period the I grade changes to the earned letter grade which is based on total course requirements.

For graduate students, if the course is not completed within the extension period the I grade changes to an F which remains permanently on the transcript.

Graduate Withdrawal Policy The last day for withdrawal from a course is published each term in the schedule for classes. Students seeking to withdraw from a course must first get the written approval from the instructor.

Undergraduate Withdrawal Policy A student may withdraw from a course during the first three weeks of the course without the instructor's consent by filing the appropriate form. After the first three weeks of the course, the student seeking to withdraw from a course must get the written approval of the instructor and program advisor. Both are expected to discuss the basis of this request and the wisdom of this course of action. Such a withdrawal will appear on the transcript but will not be included in the Quality Point Average. No withdrawal is permitted during the last three weeks of class.
Quality Point Averages A student's academic standing for a specific term is the Quality Point Average (QPA). The QPA is computed by multiplying the number of semester hours times the number of quality points earned for each course taken that term and dividing the total number of quality points by the total number of credits earned that term.

The student’s overall academic standing is the Cumulative Quality Point Average (CQPA). The CQPA is computed by multiplying the number of semester hours times the number of quality points earned for each course taken at the College and dividing the total number of quality points by the total number of credits earned at the College.

Graduate students are required to maintain a minimum CQPA of 3.0. Undergraduate students are required to maintain a minimum CQPA of 2.0 with a CQPA of 2.25 required for graduation.

Repeated Courses Students may repeat a course to improve their grade but credit toward graduation will be granted only once. Both enrollments will appear on the transcript. The second enrollment will have a notation that it is a repeated course. The higher grade will be counted in the student’s Quality Point Average.

Attendance Nova programming for adult learning makes class attendance essential. If an emergency necessitates an absence, a makeup assignment should be planned in consultation with the instructor.

Skill Development Courses Special courses designed to help students attain the skills necessary for successful college work (090-099) do not count toward graduation. Upon completion of one of these courses a student not yet achieving all required skills will receive a PR (Progress) grade and may re-enroll to continue to work toward the required competencies.

Academic Progress—Graduate Programs To remain in good academic standing a graduate student must maintain a CQPA of 3.0 or higher.

A candidate is expected to complete course work and the thesis or practicum in four years. The University reserves the right to withdraw the matriculation status of a student who does not fulfill this time requirement and it also reserves the right to withdraw the privilege of enrollment from a student whose grade average falls below 3.0.
Academic Progress—Undergraduate Programs

Satisfactory Academic Progress To remain in good academic standing, an undergraduate student must maintain an average of a C or higher on all credits attempted (quality point average of 2.0 on a 4.0 scale). A CQPA of 2.25 is required for graduation in all of the undergraduate majors offered by the Center for Science and Engineering.

Academic Probation A student failing to earn a 2.0 average or higher after his first 12 credits of work or to maintain at least 2.0 thereafter, will be placed on probation. Academic probation is removed when the student earns a cumulative quality point average of 2.0 or higher at Nova University.

After being placed on probation, any student receiving financial aid must remove the probation during the next period of enrollment to be eligible for further financial aid.

Progress Probation Students failing to complete at least 50% of their attempted credits each trimester will be placed on probation by the Academic Progress Committee. Progress probation is removed when the student completes at least 50% of attempted credits in a subsequent trimester.

After being placed on probation, any student receiving financial aid must remove the probation during the next trimester enrolled to be eligible for further financial aid.

Suspension To avoid suspension, a student on probation must maintain a quality point average of 2.0 or better for each term of subsequent enrollment, otherwise he or she will be placed on suspension for one term.

Following this suspension, the student may re-enroll. Failure of the student to maintain a 2.0 grade point in each of the two terms subsequent to re-enrolling will result in final suspension.

Counseling Students are encouraged to seek counseling when their quality point average places them in danger of probation so that a cooperative plan may be devised to assist them to improve.

Appeal Any student placed on suspension may file a petition for review by the Academic Progress Committee.

A student placed on final suspension may, after a two-term absence, request a hearing before the Academic Progress Committee for the purpose of showing cause for readmission.
Requirements for a Degree

Qualifications for an undergraduate or a graduate degree:
1. have been admitted to the degree program
2. complete the courses and number of credits as specified by program requirements
3. pass competency requirements in English and Mathematics (undergraduate only)
4. have a 3.0 quality point average for a graduate program or a 2.25 quality point average for an undergraduate program
5. complete the minimum number of credits at the University as specified elsewhere in this catalog
6. submit a graduation form and payment of graduation fee prior to completing registration for the last term
7. have fulfilled all financial obligations to Nova University including the library, the laboratories and the comptroller's office

STUDENT RIGHTS AND RESPONSIBILITIES

Students of the Center for Science & Engineering will enjoy the same rights and services as all other Nova University students, including use of University study and recreational facilities, all support services, and participation in student affairs.

Students will be expected to maintain University standards of conduct, which prohibit theft, plagiarism, and abuse and misuse of facilities or equipment.

Statement of Academic Rights and Responsibilities

Nova University, as a community of women and men, is committed to furthering scholarship, academic pursuits, and service to our society. As an institution, our purpose is to assure every student an equal opportunity to fulfill her or his potential as a student at the highest standard of excellence.

Certain rights and obligations flow from membership in the academic community.
1. the rights of personal and intellectual freedom which are fundamental to the idea of a university
2. a scrupulous respect for the equal rights of others
3. dedication to the scholarly and educational purposes of the University and participation in promoting and assuring the academic quality and credibility of the institution.
The University expects its students to manifest a commitment to academic integrity, and to that end a definition of original work is presented for each student's information, instruction, and acceptance.

Assignments such as course preparations, exams, tests, projects, term papers, practicums, MARPS, etc., must be the original work of the student. Original work may include the thoughts and words of another, but if this is the case, those ideas or words must be indicated by quotation marks or other accepted reference devices.

Work is not original which has been submitted previously by the author or by anyone else for academic credit. Work is not original which has been copied or partially copied from any other source including another student unless such copying is acknowledged by the person submitting the work for credit at the time the work is being submitted or unless copying, sharing, or joint authorship is an expressed part of the assignment. Exams and tests are original work when no unauthorized aid is given, received, or used prior to or during the course of the examination.

A student who is found guilty of academic misconduct shall be subject to the maximum sanction of dismissal or any lesser sanction. Academic misconduct includes all forms of student academic misconduct wherever committed, illustrated by, but not limited to cases of plagiarism and dishonest practices in connection with examinations. All work submitted by students must be their own work project; where the language of another is set forth, quotation marks must so indicate, and appropriate credit must be given when the language, ideas, expressions, and writings of another are used. In addition to academic standards, the student must maintain behavior appropriate to professional standards.

A student should not interfere with the rights of other students seeking their education at the University. Accordingly, theft, vandalism, and any other disruptive behaviors are unacceptable.

Where circumstances are such as to place a student in a position of power over University personnel, inside or outside the institution, the student should avoid any reasonable suspicion that he/she has used that power for personal benefit or in a capricious manner.
GRIEVANCE PROCEDURES

I. Student Grievances are Defined to Include:
   1. A student complaint against a policy, procedure, or administrative action or interpretation of a policy, procedure, or administrative action. In such a case the student should meet with the program administrator in the first instance in an attempt to reach a satisfactory resolution. (If this does not satisfy the student, the student should follow the formal grievance procedures outlined in the section below entitled: IV. Procedure—Formal Grievance.)
   2. A complaint between an instructor and student concerning an academic activity. (In such case the student would follow procedures outlined in the section entitled: III. Procedure—Informal Grievance.)

II. Grievance Time Limitations: Any grievance procedure, informal or formal, must be initiated within 60 days following the term in which the event or series of events occurred.
III. Procedure—Informal Grievance:

1. The student should discuss the grievance in the first instance with the instructor in case of a grievance involving an academic activity.

2. If the student and instructor do not reach a satisfactory resolution of the problem, the instructor or student should schedule within two weeks following their discussion a conference with the program administrator or center director.

3. If a satisfactory resolution of the problem is not reached between the program administrator and the student, the program administrator should schedule another conference with the student and the instructor within two weeks at which the program administrator shall preside.

4. A memorandum outlining the decision reached at this conference must be sent by the program administrator to the student and the instructor within two weeks. If the issue is not settled to the mutual satisfaction of the student or the instructor, either one may follow the formal grievance procedure.

IV. Procedure—Formal Grievance: Formal grievances must be written (printed or typed) and copies submitted to the program administrator and the director of the Center for Science & Engineering within 60 days following the date of the event or series of events in question or within two weeks following the completion of the informal grievance procedures as outlined in the section entitled: III. Procedure—Informal Grievance. No grievance will be considered if it is filed beyond the time stipulated. It will always be in the interest of the student to file a grievance as early as possible. This formal grievance statement must include, but not be limited to, the name of the program administrator, the name of the program and program division, the date or dates of the event(s) questioned, the name or names of the person(s) involved, a description of the problem and a description of any and all attempts to resolve the question prior to filing a formal grievance. No formal grievance can be filed without first following the informal procedures as state in I and III.

Within ten days after the formal grievance statement is filed (mailed or personally delivered), the director will notify the student or instructor of a hearing to discuss and resolve the issue. This hearing will include the student, the director or his designee, the program (department, major or division) director most closely associated with the issue and any others (instructors, students, etc.) directly involved in the complaint.

The hearing will be chaired by the director or his designee. At his hearing, a Grievance Judgment Committee (see below) consisting of four members, two students and two University employees, appointed by the director will hear the case. The committee will report its findings in writing.
to the director. The director will inform in writing the parties involved of the final decision within one week after the hearing. This judgment will be considered final and any further appeal must be appealed to the president of the University.

V. Grievance Judgment Committee The Director of the Center for Science & Engineering will appointment annually, on or before September 30, a standing Grievance Judgment Committee of four persons, two students of the center, and two employees of Nova University. The director will convene and chair this committee whenever a hearing for student grievance is needed or to review and revise existing student grievance procedures. After a hearing the committee will reconvene to come to a judgment on the grievance issue. This judgment will be determined by majority vote. In the case of a tie vote, the director will be informed and will cast the deciding vote.

Reservation of Power Nova University shall reserve the right to amend, modify, change, add to or delete from rules and regulations which may affect its relations with its students, as may be prescribed by law or deemed necessary by the administration.

Further, Nova University reserves the right to change academic requirements, curriculum, tuition, and/or fees when in the judgment of the administration such changes shall be required.
Programs of Study
MASTER OF SCIENCE PROGRAMS

Major in Computer Science The master of science with a major in computer science offers students advanced preparation in computer science with the option of selecting a specialty in language theory, operating systems, database theory, or processor architecture. Additional specialties will be offered in the future. The program has been designed to give the student an in-depth knowledge of computer systems and their numerous applications. The program emphasizes those areas of specialization which are currently of great importance for the industry. Hands-on computer experience will be available in the microcomputer lab. Students will also have experience with the DEC-20 and the VAX-11/780.

Format The program operates on a twelve-week term. Each three-semester-credit course meets four hours per week for twelve weeks. Students may also take certain courses which follow the undergraduate schedule and meet for nine weeks.

Admission Requirements An undergraduate degree with a major in computer science is required. A student who has a technical background may be admitted provisionally into the program provided the student has met the following requirements:

1. Languages:
   — A working knowledge of Fortran, COBOL or BASIC is required.
   — A working knowledge of Algol or Pascal, is required.
   — A working knowledge of an assembly language is required for the processor architecture option.
2. A course in data structures
3. A course in computer organization
4. Adequate background in mathematics
5. A minimum undergraduate grade point average of 2.5.

Students who need to demonstrate proficiency in one of the areas listed above may do so by examination or by presenting transcripts from previous work. Students who are lacking work in a particular area will be required to complete that course successfully on the undergraduate level for undergraduate credit before being admitted into the master's program.
Degree Requirements  Students must complete 36 semester hours of graduate study in computer science including 12 semester hours in the core and in an area of specialization.

REQUIRED CORE:
CS 631  Programming Languages
CS 637  Compiler Design Theory
CS 651  Operating System Theory and Design
CS 661  Data Base Management Theory

LANGUAGE SPECIALIZATION/REQUIRED COURSES:
CS 633  Language Theory and Automata
CS 639  Compiler Implementation
CS 685  Special Project in Languages and Compiler Theory

DATA BASE SPECIALIZATION:
CS 662  Data Base Management Systems Architecture
CS 686  Special Topics in Data Base Theory

OPERATING SYSTEMS SPECIALIZATION:
CS 652  Operating Systems Implementation
CS 687  Special Topics in Operating Systems

PROCESSOR ARCHITECTURE SPECIALIZATION:
CS 677  Firmware Logic Design
CS 678  Microprocessor Architecture
CS 565  Microprocessor Applications
CS 645  Integrated Computer Systems (VLSI)

ELECTIVES: In addition to courses elected from other specialties, the following electives will be offered:
CS 501  Organization of the Computer Environment
CS 505  Computer Architecture
CS 520  Operating System Concepts
CS 530  Simulation and Modeling
CS 540  Microcomputers
CS 550  Data Base Management Systems Design
CS 560  Systems Programming
CS 570  Information Systems Analysis and Design
CS 580  Introduction to Compilers and Interpreters
CS 585  Theory of Computation I
CS 617  Algorithm Analysis
CS 618  Systems Programming and Project Implementation
CS 623  Complexity Theory
CS 625  Numerical Analysis
CS 627  Operations Research
CS 629  Theory of Computation II
CS 641  Digital Computer Design
<table>
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<tr>
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<tbody>
<tr>
<td>CS 642</td>
<td>Computer-Aided Design</td>
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<tr>
<td>CS 643</td>
<td>Principles of Computer Graphics</td>
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<tr>
<td>CS 647</td>
<td>Concurrent Programming Languages</td>
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<tr>
<td></td>
<td>(Ada, Modula, and Simula-67)</td>
</tr>
<tr>
<td>CS 656</td>
<td>Network Design and Analysis</td>
</tr>
<tr>
<td>CS 658</td>
<td>Data Communications</td>
</tr>
<tr>
<td>CS 665</td>
<td>Management of Software Projects</td>
</tr>
<tr>
<td>CS 671</td>
<td>Management of Technical Projects</td>
</tr>
<tr>
<td>CS 675</td>
<td>Systems Performance Evaluation</td>
</tr>
<tr>
<td>CS 676</td>
<td>Modeling and Simulation</td>
</tr>
<tr>
<td>CS 680</td>
<td>Microprogramming and Microprocessors</td>
</tr>
<tr>
<td>CS 681</td>
<td>Research: Data Base Management</td>
</tr>
<tr>
<td>CS 682</td>
<td>Software Engineering</td>
</tr>
<tr>
<td>CS 683</td>
<td>Software Engineering Implementation</td>
</tr>
<tr>
<td>CS 690</td>
<td>Directed Project in Computer Science</td>
</tr>
<tr>
<td>CS 692</td>
<td>Advanced Topics Seminar</td>
</tr>
</tbody>
</table>
Major in Computer Management This program provides computer science specialties with technical knowledge and assists them in developing technical managerial perspectives. In addition to fulfilling their technical and management course requirements in the Center for Science and Engineering, students select up to one quarter of their program from M.B.A. course offerings.

Format The program operates on a twelve-week term. Each three-semester-credit course meets four hours per week for twelve weeks. Students may also take certain courses which follow the undergraduate schedule and meet for nine weeks. Courses selected from the M.B.A. program follow the M.B.A. format.

Admission Requirements An undergraduate degree, preferably with a major in computer science from a regionally accredited college or university. A student who has a technical background may be admitted provisionally into the program provided the student has the specific prerequisites for the courses selected.
Degree Requirements  Thirty-six graduate credits in computer science and management meeting the following specific requirements:

REQUIRED COURSES:

CS 627  Operations Research
CS 631  Programming Languages
CS 637  Compiler Design Theory
CS 651  Operating System Theory and Design
CS 661  Data Base Management Theory
CS 665  Management of Software Projects
CS 671  Management of Technical Projects

Two technical electives (these must be technical courses offered by the Center for Science and Engineering in Computer Science and Engineering, Management Courses may not be used to meet this requirement.)

Three additional management courses which students may select from the following courses offered by the Center for the Study of Administration M.B.A. program:

GMP 5005  Introduction to Marketing
GMP 5020  Organizational Behavior and Development
GMP 5030  Human Resources Management
GMP 5061  Financial Accounting
GMP 5461  Contracts and Management Administration
GMP 5462  Contract and Procurement Law
Major in Engineering Management This program provides engineers with technical knowledge and assists them in developing technical managerial perspectives. In addition to fulfilling their technical requirements in some management course in the Center for Science and Engineering, students select up to one quarter of their program from M.B.A. course offerings.

Format The program operates on a twelve-week term. Each three-semester-credit course meets four hours per week for twelve weeks. Students may also take certain courses which follow the undergraduate schedule and meet for nine weeks. Courses selected from the M.B.A. program follow the M.B.A. format.

Admission Requirements An undergraduate degree in some area of engineering.

DEGREE REQUIREMENTS

EGR 627 Operations Research
EGR 671 Management of Technical Projects
EGR 688 Industrial System Analysis

Six graduate engineering courses to be selected on the basis of student need and CSE approval.

One or two of these courses may be in the area of computer science but not in management. (Consult course description section for engineering course offerings.)

Three additional management courses which students may select from the following courses offered by the Center for the Study of Administration M.B.A. program:

GMP 5005 Introduction to Marketing
GMP 5020 Organizational Behavior and Development
GMP 5030 Human Resources Management
GMP 5061 Financial Accounting
GMP 5461 Contracts and Management Administration
GMP 5462 Contract and Procurement Law
BACHELOR OF SCIENCE PROGRAM

Skill and Competency Requirements  Students are expected to demonstrate skills appropriate for college work in English (reading, writing, and speech) and in mathematics in all courses at Nova College. During the first term of enrollment, students will complete placement tests and will be advised as to appropriate course selection based on test results. Any who may need to develop further the skills required for Nova College work will be counseled as to opportunities available for assistance. While a student is acquiring these skills, his or her enrollment is limited to courses approved by an advisor, generally at the 100 or 200 level.

All Students are also required to pass competency tests in college composition and mathematics (elementary algebra). Students with high scores on placement tests may take competency tests immediately; others will take them after completing appropriate course work to acquire the competencies.

The mathematics competency requirements may be met through the successful completion of MAT 150 or a higher level mathematics course. Students who elect this option do not have to take the mathematics competency examination.

Major in Electrical Engineering  This is a professional engineering degree with a clearly identified curriculum. The electrical engineer will be hired for such career opportunities as research, conceptual design, system synthesis and development, product innovation, and operations management. The engineer is described by A.B.E.T. as a conceptualizer, an innovator, planner/predictor, designer, developer, systematizer, judge, decision maker, producer of standard, formulator of techniques and methods, synthesizer.

Although the electrical engineer may perform many different functions when hired by different companies, there still exists a generalized concept of the basic training needed for the electrical engineer. This program contains a high level of mathematical computation which is evident both in the level of the mathematics courses required for the major and the use of the mathematics in the engineering and electronics courses. This program is generally a 4.5 to 5 year program on a full-time basis. At Nova this program will require 138 credits for graduation compared to 120 credits for other bachelor degrees.
# Degree Requirements

## GENERAL DISTRIBUTION REQUIREMENTS

- **Communications** (6 credits) (LAN 111, LAN 112, or TEC 330)
- **Humanities** (6 credits)
- **Social and Behavioral Sciences** (12 credits)

## MATHEMATICS REQUIREMENTS

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MAT 210</td>
<td>Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>MAT 220</td>
<td>Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>MAT 305</td>
<td>Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>MAT 310</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>*MAT 360</td>
<td>Matrices and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>*MAT 420</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MAT 440</td>
<td>Numerical Analysis</td>
<td>3</td>
</tr>
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<td>*MAT 450</td>
<td>Probability and Statistics</td>
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</table>

## PHYSICAL SCIENCE REQUIREMENTS

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>PHY 140</td>
<td>Physics I</td>
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</tr>
<tr>
<td>PHY 150</td>
<td>Physics II</td>
<td>3</td>
</tr>
<tr>
<td>PHY 160</td>
<td>Physics III</td>
<td>3</td>
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<tr>
<td>PHY 212</td>
<td>Science of Matter (or general Chemistry course)</td>
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## COMPUTER SCIENCE REQUIREMENTS

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<th>Course</th>
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<tbody>
<tr>
<td>CS 160</td>
<td>Fundamentals of Logic Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 170</td>
<td>Computer Programming I (BASIC)</td>
<td>3</td>
</tr>
<tr>
<td>CS 200</td>
<td>Computer Programming II</td>
<td>3</td>
</tr>
<tr>
<td>CS 240</td>
<td>Digital Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 330</td>
<td>Structured Programming (PASCAL)</td>
<td>3</td>
</tr>
<tr>
<td>CS 335</td>
<td>Assemblers and Assembly Language Programming</td>
<td>3</td>
</tr>
<tr>
<td>CS 350</td>
<td>Computer Circuit Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 405</td>
<td>Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>CS 410</td>
<td>System Design and Analysis</td>
<td>3</td>
</tr>
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</table>

## ELECTRICAL ENGINEERING REQUIREMENTS

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>EE 210</td>
<td>Networks I</td>
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<tr>
<td>EE 255</td>
<td>Electricity Laboratory</td>
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<tr>
<td>EE 310</td>
<td>Networks II</td>
<td>3</td>
</tr>
<tr>
<td>EE 330</td>
<td>Electronics I</td>
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</tr>
<tr>
<td>EE 335</td>
<td>Electronics Lab I</td>
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<td>EE 340</td>
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<tr>
<td>EE 345</td>
<td>Electronics Lab II</td>
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<tr>
<td>EE 400</td>
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<tr>
<td>EE 405</td>
<td>Networks III</td>
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<tr>
<td>EE 410</td>
<td>Electromagnetic Theory</td>
<td>3</td>
</tr>
<tr>
<td>EE 420</td>
<td>Field Transmission Lines</td>
<td>3</td>
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<tr>
<td>EE 430</td>
<td>Fundamentals of Communication Systems</td>
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</tr>
<tr>
<td>EE 440</td>
<td>Energy Systems</td>
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</table>
EE 450  Control Systems ........................................ 3
EE 460  Microprocessor Applications ............................ 3
EE 470  Electrical Engineering Design .......................... 3

ENGINEERING SCIENCE REQUIREMENTS
ES 220  Engineering Drawing ..................................... 3
ES 310  Engineering Applications of Materials ............... 3

ELECTIVES .......................................................... 9

Total 138

* Choose one course
Major in Computer Engineering  This major deals primarily with the development of computer hardware technology. Computer engineers are educated in the design and fabrication of hardware components of computer systems and in the development of circuit logic to carry out the basic logic of the components. This program is designed to prepare students in both computer science and in electrical engineering through an interdisciplinary program. It requires 120 credits in contrast to the electrical engineering program which requires 138 semester credits for graduation.

Degree Requirements

GENERAL DISTRIBUTION REQUIREMENTS
Communications (6 credits) (LAN 111 and LAN 112 or TEC 330)
Humanities (6 credits)
Social and Behavioral Sciences (12 credits)

MATHEMATICS
MAT 210  Calculus I .............................................. 3
MAT 220  Calculus II ............................................. 3
MAT 305  Calculus III ............................................. 3
MAT 310  Differential Equations ............................... 3
*MAT 360  Matrices and Statistics ............................ 3
*MAT 420  Linear Algebra ...................................... 3
MAT 440  Numerical Analysis .................................. 3
*MAT 450  Probability and Statistics ......................... 3

PHYSICAL SCIENCE REQUIREMENTS
PHY 140  Physics I ............................................... 3
PHY 150  Physics II .............................................. 3
PHY 160  Physics III ............................................... 3
PHY 212  Science of Matter ..................................... 3

COMPUTER SCIENCE REQUIREMENTS
CS 160  Fundamentals of Logic Design ......................... 3
CS 170  Computer Programming I (BASIC) ..................... 3
CS 200  Computer Programming II ............................. 3
CS 210  Fortran .................................................. 3
CS 240  Digital Design .......................................... 3
CS 330  Structured Programming (Pascal) ..................... 3
CS 335  Assemblers and Assembly Language Programming .... 3
CS 340  Data Structures ......................................... 3
CS 350  Computer Circuit Design ............................. 3
CS 405  Computer Architecture ................................. 3
CS 410  System Design and Analysis .......................... 3
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</tbody>
</table>

**ELECTIVES** ........................................ 9

* Choose 1 *course
** Choose 1 **courses

Total 120
MAJOR IN COMPUTER SCIENCE

The field of computer science is expanding rapidly. The program as presented here has a strong component in hardware design and development coupled with a strong software component. Many people in the computer industry find they need strengths in both areas. This program will provide a substantial base for the graduate to work in a number of computer career fields in computers and to pursue graduate work in computer science.

Degree Requirements

GENERAL DISTRIBUTION REQUIREMENTS
Communications (6 credits) (LAN 111, LAN 112, or TEC 330)
Humanities (6 credits)
Social and Behavioral Sciences (12 credits)

MATHEMATICS REQUIREMENTS
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<td>Fortran</td>
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<td>CS 220</td>
<td>Cobol</td>
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<td>CS 240</td>
<td>Digital Design</td>
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<td>CS 320</td>
<td>Organization of Programming Languages</td>
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<td>CS 350</td>
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<td>CS 370</td>
<td>Software Design</td>
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<td>CS 405</td>
<td>Computer Architecture</td>
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<td>CS 410</td>
<td>System Design and Analysis</td>
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<td>**CS 420</td>
<td>Operating System Concepts</td>
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<td>**CS 450</td>
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<tr>
<td>CS 460</td>
<td>System Programming</td>
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<tr>
<td>**CS 480</td>
<td>Introduction to Compiler/Interpreter Design</td>
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**ELECTRONICS REQUIREMENTS**

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<td>EE 210</td>
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<td>EE 330</td>
<td>Electronics I</td>
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</table>

**ELECTIVES**

- Choose one *course.
- Choose two **courses.

Total **120**
METHODS OF SYSTEM ANALYSIS

INTRODUCTION TO DATA PROCESSING

GENERAL STUDIES (24 CR.)

ELECTIVES (12 CR.)

COMPUTER PROGRAMMING I

COMPUTER PROGRAMMING II

COBOL

PASCAL

DISTRIBUTED DATA PROCESSING

ADVANCED COBOL

DATA STRUCTURES

DATA BASE MANAGEMENT

EDP AUDIT & CONTROL

INFORMATION SYSTEMS ANALYSIS

COMPUTER ORGANIZATION

STATISTICS

PHYSICAL SCIENCE (9 CR.)

12 CREDITS IN BUSINESS

DIRECTED PROJECT

COMPUTER INFORMATION SYSTEMS

CENTER FOR SCIENCE AND ENGINEERING

ELECTIVES (21 CR.)
MAJOR IN COMPUTER INFORMATION SYSTEMS

Computer Information Systems is an emerging academic discipline which is concerned with the application of system development cycles to computer base systems. The goal of the computer information systems (CIS) course of study is to prepare the business applications programmer/analyst who is well schooled in the technical aspects of computer systems, is knowledgeable of the applications area to which they are applied, and has sufficient background to be able to grow professionally in a rapidly changing field. CIS programs are career oriented, with the expectation that the programmer/analysts will have a sufficiently rigorous background that they can, with additional experience, advance along several career paths leading to positions in systems analysis, systems design, programming and systems project leadership, and systems management. This program follows the guidelines stated in the Data Processing Management Association Model Curriculum for Undergraduate Computer Information Systems Education.

Degree Requirements

GENERAL DISTRIBUTION REQUIREMENTS
Communications (6 credits) (LAN 111 and LAN 112 or TEC 330)
Humanities (6 credits)
Social and Behavioral Sciences (12 credits)

MATHEMATICS
MAT 315 Introduction to Statistics ............................ 3

PHYSICAL SCIENCE or
LIFE SCIENCE REQUIREMENTS ............................... 9
COMPUTER SCIENCE REQUIREMENTS
CS 112 Introduction to Data Processing ........... 3
CS 150 Introduction to Computer Organization .......... 3
CS 170 Computer Programming I ................. 3
CS 200 Computer Programming II ........... 3
CS 220 Business Oriented Language (Cobol) ........... 3
CS 315 Advanced Cobol .. 3
CS 330 Structured Programming (Pascal) ........... 3
CS 340 Data Structures .. 3
CS 345 Distributed Data Processing ........... 3
CS 365 Methods of Systems Analysis ........... 3
CS 401 Organization of the Computer Environment .. 3
CS 450 Data Base Management Systems Design ........... 3
CS 470 Information Systems Analysis and Design ........... 3
CS 475 EDP Audit and Control .. 3
CS 490 Directed Project in Computer Science ........... 3

OTHER REQUIREMENTS
Computer Science (CS) Electives ........... 6
Business Courses ....................... 12
ELECTIVES ......................... 21
Total 120
MAJOR IN MATHEMATICS/COMPUTER PROGRAMMING

While providing the student with basic information about computer hardware, this program combines a full major in mathematics with a strong programming component. Graduates will be well prepared to assume analytical and programmer roles in computer careers as well as follow career paths or graduate training in mathematics.

Degree Requirements

GENERAL DISTRIBUTION REQUIREMENTS
Communications (6 credits) (LAN 111, LAN 112, or TEC 330)
Humanities (6 credits)
Social and Behavioral Sciences (12 credits)

MATHEMATICS REQUIREMENTS
MAT 210 Calculus I ............... 3
MAT 220 Calculus II ................ 3
MAT 305 Calculus III .............. 3
MAT 310 Differential Equations ... 3
MAT 320 Advanced Calculus ....... 3
MAT 420 Linear Algebra ........... 3
MAT 430 Functions of a Complex Variable .... 3
MAT 440 Numerical Analysis ....... 3
MAT 450 Probability and Statistics .. 3

PHYSICAL SCIENCE REQUIREMENTS
PHY 140 Physics I ................. 3
PHY 150 Physics II ................ 3
PHY 160 Physics III ............... 3
PHY 212 Science of Matter (or general Chemistry course) .... 3
PHY 310 Modern Physics .......... 3

COMPUTER SCIENCE REQUIREMENTS
CS 160 Fundamentals of Logic Design .... 3
CS 170 Computer Programming I (BASIC) . . 3
CS 200 Computer Programming II ....... 3
CS 210 Fortran ..................... 3
CS 240 Digital Design ............. 3
CS 320 Organization Programming Languages .... 3
CS 330 Structured Programming (Pascal) .... 3
CS 335 Assemblers and Assembly Language Programming .... 3
CS 345 Data Structures ........... 3
CS 370 Software Design .......... 3
CS 460 System Programming ....... 3

ELECTIVES ............................. 15
CS or EE electives .................. 6

Total 120
MAJOR IN COMPUTER SYSTEMS
The computer systems major has been developed for students who desire to combine computer and business components in their degree program. This program focuses on a computer systems approach and on programming techniques rather than on circuit design or computer hardware development.

Degree Requirements

GENERAL DISTRIBUTION REQUIREMENTS
- Communications (6 credits) (LAN 111 and LAN 112 or TEC 330)
- Humanities (6 credits)
- Social and Behavioral Sciences (12 credits)

MATHEMATICS REQUIREMENTS
- MAT 150 Precalculus ........................................ 3
- MAT 210 Calculus I .......................................... 3

PHYSICAL SCIENCE or LIFE SCIENCE REQUIREMENTS ........................................ 9

COMPUTER SCIENCE REQUIREMENTS
- CS 150 Introduction to Computer Organization ................. 3
- CS 170 Computer Programming I (BASIC) ....................... 3
- CS 200 Computer Programming II .............................. 3
- CS 210 FORTRAN ............................................. 3
- CS 220 COBOL .................................................. 3
- CS 320 Organization of Programming Languages .................. 3
- CS 330 Structured Programming (PASCAL) ...................... 3
- CS 335 Assemblers and Assembly Language Programming .......... 3
- CS 340 Data Structures ....................................... 3
- CS 370 Software Design ...................................... 3
- CS 420 Operating System Concepts ............................. 3
- CS 450 Data Base Management Systems Design .................. 3
- CS 460 System Programming .................................. 3
- CS 470 Information Systems Analysis & Design ................ 3
- CS 480 Intro. to Compiler/Interpreter Design .................... 3

OTHER REQUIREMENTS
Thirty (30) credits must be taken in another description such as Business Psychology, Social Work, Journalism, Health Care, Science.

ELECTIVES ........................................ 12

Total 120

*Choose one *course
MAJOR IN COMPUTER SYSTEMS/TECHNICAL COMMUNICATION

An option in technical communications has been developed for those students who wish to learn how to develop technical materials as well as have a solid foundation in computer science. This program focuses on understanding programming techniques and the operation of computer systems along with courses in technical communications.

Degree Requirements

GENERAL DISTRIBUTION REQUIREMENTS
- Communications (6 credits) (LAN 111, LAN 112, or TEC 330)
- Humanities (6 credits)
- Social and Behavioral Sciences (12 credits)

MATHEMATICS REQUIREMENTS
- MAT 150 Precalculus ........................................... 3
- MAT 210 Calculus I ............................................. 3

PHYSICAL SCIENCE OR LIFE SCIENCE REQUIREMENTS .................................................. 9

COMPUTER SCIENCE REQUIREMENTS
- CS 150 Introduction to Computer Organization .......... 3
- CS 170 Computer Programming I ............................. 3
- CS 200 Computer Programming II ............................ 3
- CS 210 FORTRAN .................................................. 3
- CS 220 COBOL ...................................................... 3
- CS 320 Organization Programming Languages .......... 3
- CS 330 Structured Programming (PASCAL) ............... 3
- CS 335 Assemblers and Assembly Language Programming .................................................. 3
- CS 340 Data Structures ........................................... 3
- CS 370 Software Design ......................................... 3
- CS 460 System Programming ................................... 3

TECHNICAL COMMUNICATION REQUIREMENTS
- ES 220 Engineering Drawing .................................... 3
- TEC 320 Technical Communication .......................... 3
- TEC 330 Technical Writing ..................................... 3
- TEC 350 Production of Technical Communication Materials .................................................. 3
- TEC 370 Technical Documentation I ......................... 3
- TEC 380 Technical Documentation II ....................... 3
- TEC 450 Legal Implications of Technical Communication .................................................. 3
- TEC 460 Technical Communication Project Management .................................................. 3
- TEC 470 Seminar in Technical Communications ........ 3

Elective credits chosen from courses with prefix CS or EE .................................................. 9
Electives ........................................................................ 12

Total 120
## Summary of Program Requirements

### Degree Code

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<tr>
<th>Program Requirements</th>
<th>B.S. Electrical Engineering (EE)</th>
<th>B.S. Computer Engineering (CE)</th>
<th>B.S. Computer Science (CS)</th>
<th>B.S. Mathematics (MATH)</th>
<th>B.S. Computer Systems (SYS)</th>
<th>B.S. Computer Information Systems (CIS)</th>
<th>B.S. Computer Systems/Technical Communications (SYS/TC)</th>
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### Program Requirements

- **Choose 1 "a" course.
- **Choose 2 "b" courses.
- **Choose 1 "c" course.
SPECIAL COURSES FOR NONTECHNICAL PEOPLE

The Center for Science and Engineering offers courses primarily in computer science for those people who do not have a technical background but who realize the role that computers are playing in modern society. These courses are designed specifically for people with little technical background so that they may use computers in a variety of environments. Courses are currently offered in computer literacy, in business applications of microcomputers, and in the use of computers in the health field. Other areas will be added.

PROGRAM FOR YOUNG PEOPLE

The Center for Science and Engineering realizes the need to offer advanced coursework to students in grades 6-12. Because of this, specific programs have been developed. Some of which are in cooperation with the school board.

The Computer Program for Young People

This program offers coursework in introductory computer programming (BASIC), advanced computer programming, Pascal, FORTRAN, assembly language, introduction to electronics, introduction to logic, and graphics to young people in grades 9-12. Advanced students, in grades 7 and 8, may be admitted into the program on the basis of testing and recommendations. These courses are offered during the day and evening in the summer and continue during the school year in the evening and on weekends. Further information on the specifics of the program may be obtained from the center.
COURSE DESCRIPTIONS

All courses are 3 semester hours credit unless otherwise noted.

GRADUATE

CS-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.

CS-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: Computer circuit design. Suggested prerequisite: Assembler and Assembly Language Programming.

CS-520 Operating System Concepts Methods in the analysis and design of large scale systems, including concepts of semaphores, processes, linear address space, resource allocation, protection and basic topics in operating system development. PREREQUISITE: Data Structures

CS-530 Simulation and Modeling Construction and use of complex models on digital computers; structures of simulation language, verification and validation of models, statistical analysis of results. Students will design and run a number of simulations. PREREQUISITE: Pascal

CS-540 Microcomputers Design elements of microcomputers including both hardware and software aspects. PREREQUISITE: Computer Design Courses

CS-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: Data Structures, Cobol

CS-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: Assembler and Assembly Language Programming, Data Structures

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

CS-570 Information Systems Analysis and Design Information processing systems, project planning, software package. PREREQUISITE: Data Base Management

CS-580 Introduction to Compilers and Interpreters An introduction to compiler/interpreter design. Topics include lexical analysis, parsing, intermediate code, final code generation, optimization, and error recovery. PREREQUISITE: Organization of Programming Languages or CS-631, Programming Languages

CS-585 Theory of Computation I Theoretical approach to computer science. Topics include correctness, automata and Turing machines, finite state machines, grammars. PREREQUISITE: Fortran, Calculus I

CS-617 Algorithm Analysis The mathematics of algorithm and programming construction. The art of structured programming. The dynamic environment of a program and its record of execution. The theory of concurrent programming.

CS-618 Systems Programming and Project Implementation Participation in the implementation of an industrial, business or university project requiring the know-how of systems programming. Variable number of credits.


CS-629 Theory of Computation II Basic theory of computation, automata, turing machines, recursion, additional topics. PREREQUISITE: CS-585 Theory of Computation I

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/1, C, PASCAL, and ALGOL. PREREQUISITE: Consent of Center.

CS-633 Language Theory and Automata Introduction to formal grammars, Backus-Naur notation. The formal theory behind the design of a computer language is studied. The corresponding types of automata which may serve as recognizers and generators for a language will be described.

CS-637 Compiler Design Theory Language theory will be applied to the design of a compiler for a high-level language. Parsing, syntax analysis, interpretation phase and code generation. Other areas of the compilation process will be covered, such as storage allocation, symbol table management, searching and sorting, and recursion. PREREQUISITE: CS-580 Introduction to Compilers and Interpreters.

CS-639 Compiler Implementation Design, implementation, and testing of a compiler for a high-level language. PREREQUISITE: CS-637 Compiler Design Theory.

CS-641 Digital Computer Design Principles and techniques of digital computer design. Integrated circuits, logic design, LSI and MSI design, sequential circuit analysis. Processor logic design, arithmetic unit, memory systems, input-output structures, micro-programming. PREREQUISITE: CS-631 Programming Languages, Computer logic courses.

CS-642 Computer-Aided Design An introduction to the principles of computer-aided design. (same as EGR-642)

CS-643 Principles of Computer Graphics Use of computers to illustrate and display civil, electrical, mechanical, and chemical designs in two and three dimensions; modifications of design layouts and the flow of materials. (same as EGR-643)


CS-647 Concurrent Programming Languages (ADA, Modula and Simula-67) An introduction to concurrent programming languages. Modules and class concepts in MODULA and SIMULA-67. Compilation units, subprograms, module structures, packages and concurrent tasks in ADA. Generic procedures. Concurrent programming, mailbox tasks, signals and semaphores. Abstract data types, operations on abstract objects, hiding of the representation of objects of a given type, private data types. PREREQUISITE: CS-631 Programming Languages


CS-652 Operating Systems Implementation Continuation of CS-651 Implementation and testing of operating system design on actual hardware. PREREQUISITE: CS-651 Operating Systems Theory and Design

CS-655 Network Design and Analysis Distributed processing and other forms of network systems.

CS-658 Data Communications An introduction to basic data communication concepts, coding modes and types of transmissions, multiplexing, line protocols, switching techniques and communication satellite technology. PREREQUISITE: CS-656 Network Design and Analysis

CS-661 Data Base Management Computer-oriented techniques for information storage and retrieval with emphasis on on-line capability. File structures, including data definition and manipulation languages. PREREQUISITE: CS-550 Data Base Management Systems Design.
Micro-assembler, and Register Transfer language. Advanced topics in special-purpose processor design and architecture redefinition (dynamic) will be presented. PREREQUISITE: Consent of the Center

CS-681 Research: Data Base Management Research project in the area of data base management. PREREQUISITE: CS-662 Data Base Management System Architecture

CS-682 Software Engineering This course offers a thorough analysis of the problems related to the design, development and implementation of software projects. First, the fundamentals of Software project management are presented, followed by a discussion of the techniques of Software development. A comprehensive, modern approach to structured programming, program modularization and program correctness is offered. Software Verification and Validation, Software security and Software protection will also be analyzed in detail. PREREQUISITE: Consent of the Center

CS-683 Software Engineering Implementation The techniques of software engineering will be applied to practical projects. PREREQUISITE: CS-682 Software Engineering

CS-685 Special Project in Languages and Compiler Theory Special directed project will be carried out in the area of languages or compiler theory. PREREQUISITE: CS-639 Compiler Implementation

CS-686 Special Topics in Data Base Theory Special topics will be discussed in the area of data base theory. PREREQUISITE: CS-662 Data Base Management System Architecture

CS-687 Special Topics in Operating Systems Special topics will be discussed in the area of operating systems. PREREQUISITE: CS-652 Operating Systems Implementation

CS-690 Directed Project in Computer Science Topics will be selected of mutual interest to instructor and student.

CS-692 Advanced Topics Seminar This seminar will focus on topics of mutual interests to faculty and students.

CS-694 Management in Data Processing Develops an awareness of the task of the manager of a data processing activity. The course introduces the student to the techniques and responsibilities of the manager in order to develop a better working relationship.
CS-695 Management in Data Processing Practicum The techniques of data processing management will be applied to practical examples. PREREQUISITE: CS-694 Management in Data Processing

CS-696 Management of Research and Development This course analyzes the role of R&D in the company, its relation to other activities. The planning and organization of R&D, its control and evaluation.


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 Electromagnetic, 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. PREREQUISITES: Networks III and Energy Systems (same as EE-450)

EGR-555 Probability and Statistics Probability function, random events, expectation, conditional probability, distribution functions, foundations of statistics. PREREQUISITE: Calculus I

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-627 Operations Research Analytic formulation and solution of decision problems using mathematical techniques. Linear and dynamic programming, queuing, searching, maximizing/minimizing techniques. Scheduling and inventory models, forecasting and time series analysis. (same as CS-627)

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.

EGR-633 Advanced Engineering Design Principles of design applied to topic of interest to student and faculty advisor.

EGR-634 Fundamentals of Robotics Control systems interfacing with artificial intelligence; introduction to robotics; applications of robotics in industry.

EGR-640 Computer Systems Fundamentals Introduction to digital computers including memory, storage allocation, operating systems, compilers, assemblers and peripheral devices; investigation of common programming techniques. This course is designed for engineers who do not have a background in computer science. May not be taken by computer science majors.

EGR-642 Computer-Aided Design An introduction to the Principles of computer-aided design. (same as CS-642)

EGR-643 Principles of Computer Graphics Use of computers to illustrate and display civil, electrical, mechanical, and chemical designs in two and three dimensions; modifications of design layouts and the flow of materials. (same as CS-643)

EGR-644 Engineering Data Management Principles of data management applied to engineering-related problems.

EGR-671 Management of Technical Projects The principles of project management including planning, time estimation techniques, budgeting, interpersonal relations, scheduling and quality control with respect to managing a project. Case studies will be discussed. (same as CS-671)

EGR-688 Industrial Systems Analysis Engineering analysis including engineering economics, process flow, process evaluation, resource layout, quality control, budgeting.
UNDERGRADUATE

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 Micro-computers 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-201 Programming Methods (CPS-101) Intended to provide students with an understanding of the basics of computer programming. How to flowchart, program in Basic, and implement and debug programs in Basic. This course is for non-computer science majors. PREREQUISITE: CS-111 or CS-112.

CS-202 Programming Methods II Continuation of CS-201.

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-291 Special Topics in Computer Science Topics in computer science that are not included in regular course offerings and may be taken without prerequisites. Specific content is announced in the course schedule for a given term. Students may re-enroll for Special Topics covering differing content.
CS-315 Advanced COBOL A continuation of CS-220, COBOL, with emphasis on advanced computer problem solving. PREREQUISITE: CS-220.

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, macrofacilities. 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-345 Distributed Data Processing An examination of the features and impact of distributed systems in the business environment. PREREQUISITE: CS-112, CS-220.


CS-355 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-410 System Design and Analysis Advanced topics in design of digital computer systems and components. PREREQUISITE: CS-405.

CS-420/520 Operating System Concepts Methods in the analysis and design of large scale systems, including concepts of semaphores, processed, linear address space, resource allocation, protection and basic topics in operating system development. PREREQUISITE: CS-460.

CS-430/530 Simulation and Modeling Construction and use of complex models on digital computers; structures of simulation language, verification and validation of models, statistical analysis of results. Students will design and run a number of simulations. PREREQUISITE: CS-210, CS-330.

CS-440/540 Microcomputers Design elements of microcomputers including both hardware and software aspects. PREREQUISITE: Senior standing.

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-475 EDP Audit and Control Introduction to EDP auditing with emphasis on EDP controls, audit types, and audit techniques including their effects on computer system development. PREREQUISITE: CS-315 and CS-345.

CS-480/580 Introduction to Compilers and Interpreters An introduction to compiler/interpreter design. Topics include lexical analysis, parsing, intermediate code, final code generation, optimization, and error recovery. PREREQUISITE: CS-320 or CS-631.

CS-485/585 Theory Computation Theoretical approach to computer science. Topics include correctness, automata and Turing machines, finite state machines, grammars, PREREQUISITE: CS-210, MAT-210.

CS-490 Directed Project in Computer Science A major project in computer science will be completed by the student under the direction of a faculty member. PREREQUISITE: requires senior standing.


EE-255 Electricity Laboratory Basic laboratory to complement Networks I. PREREQUISITE or COREQUISITE: EE-210.


EE-335 Electronics Lab I (1 credit) Laboratory work to complement electronics theory course. PREREQUISITE or COREQUISITE: EE-330.


EE-345 Electronics II Lab (1 credit) Lab work to complement electronics theory course. PREREQUISITE: EE-335, EE-340.


EE-405 Networks III Continuation of Networks II emphasizing Laplace transforms for solving advanced network problems. PREREQUISITE: EE-310, MAT-305, MAT-310, EE-340.

EE-410 Electromagnetic Theory Fundamentals of electric and magnetic fields, Ampere’s law, Gauss’ law and Maxwell’s equations, coordinate systems and boundary conditions, PREREQUISITE: PHY-150, MAT-305, MAT-310, 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).

EE-470 Electrical Engineering Design
Application of design techniques to special projects in Electrical Engineering. PREREQUISITE: This is a senior-level Electrical Engineering course and requires that most Electrical Engineering courses be completed.

ES-220 Engineering Drawing
Introduction to the use and preparation of engineering graphics including basic drawing techniques, dimensioning of orthographic drawings, auxiliary and oblique views section drawings, working drawings, blueprint readings, freehand sketching, methods and symbols.

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.

ES-320 Industrial Planning
An introduction to industrial processes and planning, development of cost, time and material estimates, production planning, procurement. PREREQUISITE: Must have Junior standing.

ES-330 Statics
Equilibrium of coplanar force systems; analysis of frames and trusses, friction, non-coplanar force systems, centroids and moments of inertia. PREREQUISITE: PHY-140, MAT-220.

ES-340 Dynamics

ES-390 Thermodynamics
First and second laws of thermodynamics, application to fluid dynamic processes, energy conversion cycles and combustion phenomena, the reversible processes, characteristics of gases, mixture of gases and vapors with thermodynamic equilibrium considerations. PREREQUISITE: PHY-140, PHY-150, PHY-160, MAT-220.

LSC-105 Concepts in Biology
This course is designed to explore the major concepts in Biology from the cell to the behavior of the whole integrated plant and animal. This course is intended for non-science students.

MAT-092 Foundations of Mathematics A
basic course which will prepare the student for college level mathematics courses. Students not achieving all of the required competencies will receive a grade of PR and may re-enroll. Credit does not count toward graduation.

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.

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 Precalculus. 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-201 Finite Math
Study of mathematical concepts and models and their practical application to problem solving techniques in the areas of business, social science and economics. The main topics covered in this course will be a review of algebra graphs of functions, permutations, combination probability, probability distributions, linear equations and an introduction to statistics.
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-305 Calculus III Sequences and series. Taylor series, vector analysis, functions of several variables, partial derivatives, total differential chain rule, multiple integral and application functions of a complex variable. PREREQUISITE: MAT-220.


MAT-315 Introduction to Statistics An introduction to the analysis of variance including chi square and contingency tables. Non-parametric statistical methods and applications. Use of statistical packages for computers will be included. PREREQUISITE: MAT-105 or MAT-135.

MAT-320 Advanced Calculus Infinite series and sequences, uniform convergence, vector functions of several variables, the Jacobian matrix, inverse function theorem, the Laplacian in cylindrical and spherical coordinates. Lagrange multipliers. Vector differential and integral calculus including Green's, Stokes and Gauss' theorem. The change of variable in multiple integrals. PREREQUISITE: MAT-305.


MAT-430 Functions of a Complex Variable The general theory of functions of a complex variable including analytical functions, the Cauchy-Riemann equations, the Cauchy integral theorem and formulas. Taylor series. Laurent series, singularities and residues, conformal mappings with application to problems in applied science and engineering. PREREQUISITE: MAT-305.

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.


PHY-101 Introduction to Physical Sciences A survey course in physical sciences for non-science majors. Topics include the concepts of motion, electricity and light, matter, atoms and nuclear and solar system.

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-150 Physics II** Electrostatics, electric currents, electric fields and electric potential, AC and DC circuits, magnetic fields, capacitance, inductance and electromagnetic waves. 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.

**PHY-220 Introduction to Astronomy** An introduction to astronomy which examines in brief both the solar system and the universe. Topics include: fundamentals and history of astronomy, study of the earth, moon, planets and optical instruments used in astronomy. In addition, the sun, the stars, galaxies and cosmology are also examined.

**PHY-226 Conservation of Natural Resources** Study of the natural resources within the framework of the man-environment system. Included are problems relating to pollution, populations, technology growth, conservation of the environment and developmental planning as they relate to the various geographic areas of the western and non-western world. IDENTICAL TO GEO-226.

**PHY-291 Special Topics in Physical Science** Topics in physical science that are not included in regular course offerings and may be taken without prerequisites. Specific content is announced in the course schedule for given term. Students may re-enroll for Special Topics covering differing content.

**PHY-310 Modern Physics** An introduction to modern concepts of physics including atomic structure and microscopic structure of matter, quantum mechanics, elementary particles, special relativity, wave particle duality, statistical physics, X-rays, molecular binding, nuclear physics, including nuclear structure. PREREQUISITE: PHY-140, PHY-150, PHY-160, MAT-210.

**TEC-320 Technical Communications** Technical vocabulary, methods for developing technical materials, skills for presenting technical and non-technical audiences, oral presentations of technical material. PREREQUISITE: LAN-311, BUSINESS COMMUNICATION or demonstrated competency on Nova College examination.

**TEC-330 Technical Writing** Basic techniques for technical writing, techniques for writing reports, description of processes, instructions, proposal and progress reports and oral presentations. PREREQUISITE: LAN-311 or demonstrated competency on Nova College examination.

**TEC-350 Production of Technical Communication Materials** Production techniques for various forms of media used in technical communication including print, slide, tape, videotape.

**TEC-370 Technical Documentation I** Development of technical documentation material and analysis of documentation, techniques for testing, the validation process and quality control, technical editing. PREREQUISITE: TEC-330.

**TEC-380 Technical Documentation II** Continuation of TEC-370. PREREQUISITE: TEC-370.

**TEC-450 Legal Aspects of Technical Communication** A discussion of the legal requirements of technical documents, implications of technical communication material, releases, copyright, contracts and implied warranties, international aspects of technical communications. PREREQUISITE: TEC-380.

**TEC-460 Technical Communication Project Management** Management of the technical communication project including scheduling, time management of various stages, budget, and management of interdepartment interfaces, inter-company interfaces and international interfaces. PREREQUISITE: TEC-380, TEC-450.

**TEC-470 Seminar in Technical Communications** Advanced topics in technical communications including quality control. PREREQUISITE: TEC-380.
Personnel
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M.A. Temple University

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<table>
<thead>
<tr>
<th>Name</th>
<th>Degrees</th>
</tr>
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<tbody>
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Spring 1983  
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*Shared with another Center  

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Nova University Degree Offerings

**Doctoral and Professional Degrees**
- Doctor of Arts (D.A.) in Information Science
- Doctor of Business Administration (D.B.A.)
- Doctor of Education (Ed.D.) in Early and Middle Childhood Higher Education Leadership in Adult Education School Administration Vocational, Technical, and Occupational Education
- Juris Doctor (J.D., Law)
- Doctor of Philosophy (Ph.D.) Applied Developmental Psychology Clinical Psychology Oceanography
- Doctor of Psychology (Psy.D.) in Clinical Psychology
- Doctor of Public Administration (D.P.A.)

**Master’s Degrees**
- Master of Accounting (M.Ac.)
- Master of Arts in Teaching (M.A.T.)
- Master of Business Administration (M.B.A.)
- Master of Public Administration (M.P.A.)

**Specialist Degrees**
- Counseling Specialist (C.S.) in Mental Health Counseling
- Educational Specialist (Ed.S.) in Computer Education Education (23 majors) Microcomputer Applications in Higher Education Microcomputer Applications in Leadership in Adult Education Microcomputer Applications in Vocational, Technical, and Occupational Education School Psychology
Bachelor’s Degrees
Bachelor of Science (B.S.) in
  Accounting
  Administrative Studies
  Business Administration
  Computer Engineering
  Computer Information Systems
  Computer Science
  Computer Systems
  Electrical Engineering
  Elementary Education
  Exceptional Education
  Health Care Services
  Life Science
  Mathematics/Computer Programming
  Professional Management
  Psychology—Community, General, and Organizational
  Secondary Education

Special Undergraduate Programs
Bachelor of Arts in Leadership Studies
Bachelor of Science in General Studies
Computer Education Specialty
Latin American and Caribbean Studies Specialty
Law School Preparation
Medical School Preparation
The provisions set forth in this bulletin are not to be regarded as an irrevocable contract between the student and Nova University. The regulations and requirements herein, including tuition and fees, are necessarily subject to change without notice at any time at the discretion of the administration. The University further reserves the right to require a student to withdraw at any time, as well as the right to impose probation on any student whose conduct is unsatisfactory. Any admission on the basis of false statements or documents is void upon the discovery of the fraud, and the student is not entitled to any credit for work which he may have done at the University. Upon dismissal or suspension from the University for cause, there will be no refund of tuition and fees. The balance due Nova University will be considered receivable and will be collected.

A transcript of a student's academic record cannot be released until all his/her accounts, academic and non-academic, are paid.

Nova University maintains a system of records which includes application forms, letters of recommendation, admission test scores and transcripts of students' previous academic records and Nova University transcripts. These records may be made available upon written request through the Office of Registrar. The law limits access and disclosure to a third party. Such access is given only upon consent of the student or if required by law. A person does not have the right of access to educational records until he or she has been admitted and has actually begun attending Nova University. There is no prohibition from disclosing such information to the parents of students who are listed on their parents' federal income tax forms.

Parents or eligible students will be provided a hearing by Nova University if they wish to challenge the content of the record. If still not satisfied, the parents or eligible student may add explanatory or rebuttal matter to the record. If the student or parents are denied access to a hearing or if records are alleged to have been illegally disclosed to a third party, the student or parents may file a complaint with the Family Educational Rights and Privacy Act (FERPA) Office, U.S. Department of Health, Education and Welfare, Washington, D.C. 20201.

Nova University does not discriminate on the basis of handicap, sex, race, religion, national or ethnic origin in admission, access or employment for any of its programs and activities. The University Registrar and Director of Personnel have been designated as student and employee coordinators, respectively, to assure compliance with the provisions of the applicable laws and regulations relative to non-discrimination. Nova University programs are approved by the coordinator for Veterans Approval, State of Florida, Department of Education, for veterans' educational benefits.

The school is authorized under Federal Law to enroll non-immigrant alien students.

The Nova University general policies on Student Relations are on file in the office of the registrar.