



USC UNIVERSITY OF SOUTHERN CALIFORNIA
*Daniel J. Epstein Department of
Industrial and Systems Engineering*

www.usc.edu/dept/ise

Undergraduate Handbook 2006-2007



Dear Prospective ISE Student:

Thank you for expressing interest in the Industrial and Systems Engineering program at the University of Southern California. The faculty and staff of this Department are dedicated to providing the best possible experience for students who want an education that integrates engineering, computer science and business.

Our undergraduate program provides students with the skills to design and improve organizations that produce a wide variety of goods and services. We have graduates working in consulting, technology development, software, supply chains and engineering management. A Bachelor's degree in Industrial and Systems Engineering is also ideal for students who eventually want to earn an MBA degree and assume leadership positions in engineering and technology.

We are especially proud of our Information Systems Engineering option. This innovative degree program educates students in the use of computer science in the design and operation of organizations. Information Systems Engineering is perfect for students who are interested in becoming technical leaders in the application of computers in business environments.

No matter whether you choose a traditional ISE degree or the Information Systems option, the ISE Department provides close and personal contact, in classes and through advisement. Please feel free to contact any of our staff, especially our Educational Services Coordinator, Evelyn Felina, at 213-740-7549. We look forward to working with you to make your education a success.

Sincerely,

James E. Moore, II
Professor and Chair

DISCLAIMER

This handbook is produced by the USC Industrial and Systems Engineering Department as an unofficial guide to undergraduate studies in the department. The source for much of the information in this booklet is the *USC Catalogue*, the document of authority for all students of the University of Southern California. Degree requirements listed in the *USC Catalogue* supersede any information which may be contained in any bulletin of any school or department. The *USC Catalogue* is updated and published annually by the University of Southern California. Other sources for information contained in this booklet are the *School of Engineering Bulletin*, the *General Education Addendum*, the *Schedule of Classes*, and the *SCampus*. The student is referred to these publications for the definitive answers to any questions whether or not they are covered in this booklet. Matters of department policy not covered in the above publications may be referred to the ISE Educational Services Coordinator or to the ISE Faculty.

Although the University of Southern California, the School of Engineering, and the Industrial and Systems Engineering Department have many resources to help each student achieve his/her desired education and training goals, it is ultimately the student's responsibility to see that all requirements for graduation are satisfied.

Students are expected to be familiar with university policies and to monitor their own academic progress. They should keep all records of official grades earned, degree requirements met, transfer credits accepted and actions taken on requests for substitutions or exceptions to university policies and regulations.

USC Catalogue

**FOR MORE INFORMATION ON USC OR THE ISE DEPARTMENT VISIT
www.usc.edu/dept/ise**

INDUSTRIAL AND SYSTEMS ENGINEERING

In today's economy, successful graduates need to be skilled in technology, computing and business. To get these skills, there is no better major than Industrial and Systems Engineering (ISE), and there is no better place to study Industrial and Systems Engineering than University of Southern California (USC). USC graduates

- Design and implement information systems to control supply chains, production equipment and business operations.
- Lead development projects for computers, software, communication equipment and bio-tech devices
- Manage technology workers in design firms, manufacturers, and service organizations, such as hospitals and airlines.
- Create human/computer interfaces and inventing technology to meet human needs.

A bachelor's degree from USC's ISE Department enables students to enter careers in consulting, information system design, supply chain management and technology development.

WHY USC

Students come to USC because of our academics and innovative programs, but we also offer:

- Outstanding, well-paid, career opportunities in California's high-tech economy.
- Personal contact with a top-ranked faculty, who are both world-renowned researchers and experienced engineers.
- A modern and challenging curriculum emphasizing information technology
- Top students who are attracted to Los Angeles' international economy from around the world.

Students also choose USC because of its leadership in ISE research. Our faculty works with the National Science Foundation, the Integrated Media Systems Center (based at USC) and private companies, to stay at the forefront of innovation in software, control systems and engineering management.

USC's research leadership is reflected in our faculty's membership in the prestigious National Academy of Engineering, publications in leading journals and patents for innovative computer based technologies.

PROGRAM OBJECTIVES

BS ISE students have two choices. The Information Systems Engineering Option is designed for students who want to combine an education in computer science/information systems with an education in technology and productivity management. The traditional BS ISE degree is for students who want a more traditional education in industrial engineering, with more depth in the areas of human factors and operations research. Either program opens up excellent career opportunities.

The undergraduate degree is ordinarily completed in four years. In the first two years students acquire general engineering, science and mathematics skills, while satisfying breadth requirement in General Education. The last two years are more focused on Industrial Engineering Courses. Throughout the program, the industrial engineering department emphasizes: (1) integrated education in business and engineering, (2) development of written and oral communication skills, (3) technical knowledge in the use of computers and information systems, and (4) abilities to solve complex problems that arise in organizations of all sizes.

Our objective is to prepare students for successful careers by teaching students to:

- (1) Describe the essential components and inter-connective relationships within complex systems.
- (2) Design and execute experiments and create mathematical, numerical, heuristic, and other objective models.
- (3) Understand the innovations that form the building blocks of the modern technological world.
- (4) Generate and validate solutions to a problem.
- (5) Work with others in a collaborative environment and contribute to the success of an organization.
- (6) Clearly articulate and communicate findings.
- (7) Understand contemporary developments in the field.
- (8) Describe the principles for managing and operating production systems within their area of emphasis.

COURSE REQUIREMENTS FOR BSISE

COMPOSITION/WRITING REQUIREMENT: 7

- WRIT 140 Writing and Critical Reasoning (4)
- WRIT 340 Advanced Writing (3)

GENERAL EDUCATION: 20

Category III is fulfilled by PHYS/CHEM requirement.

PRE-MAJOR REQUIREMENTS: 32

Math Requirement

- MATH 125 Calculus I (4)
- MATH 126 Calculus II (4)
- MATH 226 Calculus III (4)
- MATH 225 Linear Algebra & Linear Differential Equations (4)

Physics Requirements

- PHYS 151 Fundamentals of Physics I (4)
- PHYS 152 Fundamentals of Physics II (4)

Chemistry Elective

- MASC 110L Materials Science, or
- CHEM 105aL General Chemistry, or
- CHEM 115aL Advanced General Chemistry (4)

Economics Requirement

- ECON 203 Principles of Microeconomics (4)

MAJOR REQUIREMENTS: 60

Business Course

- ACCT 410x Accounting for Non-Business Majors (4)

Engineering

- ENGR 102 Engineering Freshman Academy (2)

Electrical Engineering Course

- EE 326L Essentials of Electrical Engineering (4) or
- AME 341a Mechnoptonics Laboratory (3)

Computer Science Courses

- CSCI 101 Fundamentals of Computer Programming (3)
- ISE 382 Introduction to Computer Systems, or
- CSCI 485 File and Database Management (3)

Industrial & Systems Engineering Courses

- ISE 105 Introduction to Industrial and Systems Engineering (2, Fa)
- ISE 220 Probability Concepts in Engineering (3, Fa)
- ISE 225 Engineering Statistics I (3, Sp)
- ISE 232 Manufacturing Processes (3, Fa)
- ISE 310L Production I: Facilities and Logistics (4, Sp)
- ISE 330 Introduction to Operations Research: Deterministic Models (3, Fa)
- ISE 331 Introduction to Operations Research: Stochastic Models (3, Sp)
- ISE 370L Human Factors in Work Design (4, Fa)
- ISE 410 Production II: Production, Scheduling and Control (3, Fa)
- ISE 426 Statistical Quality Control (3, Fa)
- ISE 435 Discrete Systems Simulation (3, Fa)
- ISE 440 Work, Technology, and Organization (3, Sp)
- ISE 460 Engineering Economy (3, FaSpSu)
- ISE 495abx Senior Design Project (2-2)

MAJOR ELECTIVES

- Approved engineering electives* 3
- Free Electives 7

Total units required for the program: 128

*Students selecting EE 326 are only required to complete 2 units of approved engineering elective.

COURSE REQUIREMENTS FOR BSISE WITH INFORMATION SYSTEMS ENGINEERING OPTION (COMPUTER SCIENCE TRACK)

COMPOSITION/WRITING REQUIREMENT: **7**

- WRIT 140 Writing and Critical Reasoning (4)
- WRIT 340 Advanced Writing (3)

GENERAL EDUCATION: **20**

Category III is fulfilled by PHYS/CHEM requirement.

PRE-MAJOR REQUIREMENTS: **30**

Math Requirement

- MATH 125 Calculus I (4)
- MATH 126 Calculus II (4)
- MATH 226 Calculus III (4)
- MATH 225 Linear Algebra & Linear Differential Equations (4)

Physics Requirement

- PHYS 151 Fundamentals of Physics I (4)
- PHYS 152 Fundamentals of Physics II (4)

Chemistry Elective

- MASC 110L Materials Science, or
- CHEM 105aL General Chemistry, or
- CHEM 115aL Advanced General Chemistry (4)

Engineering

- ENGR 102 Engineering Freshman Academy (2)

COMPUTER SCIENCE TRACK REQUIREMENTS: **48**

Computer Science Courses

- CSCI 101L Fundamentals of Computer Programming (3)
- CSCI 102L Data Structures (4)
- CSCI 201L Principles of Software Development (4)

Industrial & Systems Engineering Courses

- ISE 105 Introduction to Industrial and Systems Engineering (2, Fa)
- ISE 220 Probability Concepts in Engineering (3, Fa)
- ISE 225 Engineering Statistics I (3, Sp)
- ISE 310L Production I: Facilities and Logistics (4, Sp)
- ISE 330 Introduction to Operations Research: Deterministic Models (3, Fa)
- ISE 382 Introduction to Computer Systems (3, Sp)
- ISE 410 Production II: Production, Scheduling and Control (3, Fa)
- ISE 435 Discrete Systems Simulation (3, Fa)
- ISE 440 Work, Technology, and Organization (3, Sp)
- ISE 460 Engineering Economy (3, FaSpSu)
- ISE 470 Human/Computer Interface Design (3, Sp)
- ISE 495abx Senior Design Project (2-2)

MAJOR ELECTIVES:

- Computer Science/Information Technology Program Electives* 10
- Departmentally Approved Electives 3
- Free Electives 10

Total units required for the program: **128**

*Electives in the CSCI/ITP or approved engineering electives lists are geared so that students can take courses in an area of interest. Courses not listed may be petitioned for approval through the department.

**COURSE REQUIREMENTS FOR BSISE WITH INFORMATION SYSTEMS ENGINEERING OPTION
(INFORMATION & OPERATIONS MANAGEMENT TRACK)**

COMPOSITION/WRITING REQUIREMENT: 7

- WRIT 140 Writing and Critical Reasoning (4)
- WRIT 340 Advanced Writing (3)

GENERAL EDUCATION: 20

Category III is fulfilled by PHYS/CHEM requirement.

PRE-MAJOR REQUIREMENTS: 30

Math Requirement

- MATH 125 Calculus I (4)
- MATH 126 Calculus II (4)
- MATH 226 Calculus III (4)
- MATH 225 Linear Algebra & Linear Differential Equations (4)

Physics Requirement

- PHYS 151 Fundamentals of Physics I (4)
- PHYS 152 Fundamentals of Physics II (4)

Chemistry Elective

- MASC 110L Materials Science, or
- CHEM 105aL General Chemistry, or
- CHEM 115aL Advanced General Chemistry (4)

Engineering

- ENGR 102ab Engineering Freshman Academy (2)

INFORMATION & OPERATIONS MANGEMENT TRACK REQUIREMENTS: 52

Business Courses

- IOM 431 Computer-Based Business Systems (4)
- IOM 433 Business Information Systems Analysis and Design (4)
- IOM 435 Business Database Systems (4)

Computer Science Courses

- CSCI 101L Fundamentals of Computer Programming (3)

Industrial & Systems Engineering Courses

- ISE 105 Introduction to Industrial and Systems Engineering (2, Fa)
- ISE 220 Probability Concepts in Engineering (3, Fa)
- ISE 225 Engineering Statistics I (3, Sp)
- ISE 310L Production I: Facilities and Logistics (4, Sp)
- ISE 330 Introduction to Operations Research: Deterministic Models (3, Fa)
- ISE 382 Introduction to Computer Systems (3, Sp)
- ISE 410 Production II: Production, Scheduling and Control (3, Fa)
- ISE 435 Discrete Systems Simulation (3, Fa)
- ISE 440 Work, Technology, and Organization (3, Sp)
- ISE 460 Engineering Economy (3, FaSpSu)
- ISE 470 Human/Computer Interface Design (3, Sp)
- ISE 495abx Senior Design Project (2-2)

MAJOR ELECTIVES:

- Computer Science/Information Technology Program Electives* 6
- Departmentally Approved Electives 3
- Free Electives 10

Total units required for the program: 128

*Electives in the CSCI/ITP or approved engineering electives lists are geared so that students can take courses in an area of interest. Courses not listed may be petitioned for approval through the department.

LIST OF DEPARTMENTALLY APPROVED TECHNICAL ELECTIVES

CSCI/ITP Electives

CSCI 271	Discrete Methods in Computer Science (4)
CSCI 303	Design and Analysis of Algorithms (3)
CSCI 351	
EE/CSCI 357	Basic Organization of Computer Systems (3)
EE/CSCI 450	Introduction to Computer Networks (3)
EE/CSCI 457	Computer Systems Organization (3)
CSCI 460	Introduction to Artificial Intelligence (3)
CSCI 477L	Design and Construction of large Software Systems (4)
CSCI 480	Computer Graphics(3)
CSCI 485	File and Database Management (3)
ITP 109x	Java (2)
ITP 150x	Visual Basic (2)
ITP 165x	Introduction to C++ (2)
ITP 203x	Advanced Programming with Engineering Applications (3)
ITP 211x	Multimedia Authoring (2)
ITP 215x	3D Modeling, Animation, Compositing and Special Effects (2)
ITP 250x	Building Client/Server Applications (2)
ITP 321x	Programming Enterprise Wide Information Systems (2)

Approved Engineering Electives

Any of the courses listed below that are not specifically required in a student's program may be selected to satisfy the approved engineering elective requirement. Substitutions of a graduate level ISE course will be considered upon petition.

AME 341ab	Mechoptronics Laboratory I and II (Fa:3; Sp:3)
CE 408	Risk Analysis in Civil Engineering (Fa: 3)
CE 460	Construction Engineering (3)
CE 471	Principles of Transportation Engineering (Fa: 3)
ISE 331	Introduction to Operations Research II (Sp: 3)
ISE 426	Statistical Quality Control (Fa: 3)
ISE 470	Human/Computer Interface Design (Sp: 3)

GENERAL EDUCATION REQUIREMENTS

General education requirements are described in the *USC Catalogue*. Common to all programs is the writing requirement, which requires that you demonstrate your ability to write acceptable college-level expository prose. Details of meeting this requirement are explained in the *USC Catalogue*.

DEPARTMENTALLY APPROVED TECHNICAL ELECTIVES

All BSISE students (not pursuing the Information Systems Engineering Option) must take a minimum of 3 units of Approved Engineering Electives. Engineering Electives should reflect a coherent body of work in a topic which interests the student. For example, a student interested in pursuing a career in environmental engineering may wish to take electives in the Civil Engineering and Environmental Engineering Departments. Generally, a course may be accepted as an elective if it contains a significant component in engineering science and/or design. Other courses may be acceptable as elective upon special petition to the ISE Department. Procedures for substitutions are the same as for transferring courses (see TRANSFERRING COURSEWORK).

Students pursuing the option in Information Systems Engineering must take a minimum of 13 units of Departmentally Approved Technical Electives specifically from Computer Science or Information Technology Program (7 units), ISE (3 units) and any departmentally approved elective (3 units). Other courses may be acceptable as electives upon special petition to the ISE Department. Procedures for substitutions are the same as for transferring courses (see TRANSFERRING COURSEWORK).

The list of DATEs and approved electives appears on the previous page. A number of restrictions apply:

1. ALI, PHED, foreign language, MATH 108, and all "x" MATH, CHEM, or PHYS courses are not acceptable electives. They will, however, appear on your transcript as extra units.
2. ENGR 395, Cooperative Education, will only be accepted if an ISE faculty member agrees to serve as the faculty coordinator for the Co-Op prior to enrolling in the class, and the student satisfactorily completes at least 3 units of ENGR 395 with CR. All ENGR 395 together count as only one course, ENGR 395 may not substitute for ISE 495x. See OTHER COURSEWORK, Cooperative Education, for further information on ENGR 395.
3. Only one of MATH 458 and ME 489 will count as an elective.

TRANSFERRING/SUBSTITUTING COURSEWORK

Many USC students take courses outside of USC because of economic or time constraints, or because they have transferred from another college. The following is a partial list of requirements and regulations regarding transferring work from outside USC. Refer to the *USC Catalogue* and/or to the Office of Academic Registration and Registrar web page at <http://www.usc.edu/dept/ARR/> for further information.

1. Each course must have a grade of C- or better to transfer.
2. If a course was failed at USC, the course may not be repeated elsewhere for unit credit.
3. General education courses may not be taken outside of USC without prior permission from the Degree Progress Department.
4. No engineering courses may be taken outside of USC without prior permission from the ISE Department for credit toward the BSISE.
5. Physics courses are transferable only on approval from the Physics Department.
6. All students must satisfy the Residence Requirement (see the *Catalogue* for the Residence Requirement that applies to you).
7. All non-ISE courses to be transferred must be approved by the USC department offering the course to be substituted. For Example, a substitution for the required EE 326xL course must be approved by the Electrical Engineering Department.

- Accounting courses from other institutions will be accepted toward the BSISE if the courses were taken at an accredited two- or four-year institution for a minimum of three (3) semester hours of credit. Exceptions will be made for courses taken on the quarter system on a case-by-case basis.

Any unit deficiencies resulting from substitutions must be covered by other units on the student's transcript.

DEPARTMENTALLY APPROVED TECHNICAL ELECTIVES

Students wishing to take courses not on the list of Departmentally Approved Technical Electives must petition the ISE Department for approval of the course. The procedure is the same as for transferring coursework.

OTHER SUBSTITUTIONS

Any substitutions not previously listed must be petitioned through the ISE Department Office. Contact the Educational Services Coordinator for further information.

OTHER COURSEWORK

Cooperative Education (Co-Op)

Obtaining work experience, professional contacts, and job skills prior to graduating is an excellent idea for juniors and seniors. The Co-Op program matches the interests of students with the needs of companies who are willing to participate in the program. Once the match is made, a faculty supervisor is selected, and a Student Training Plan/Learning Objectives form is completed with your employer supervisor. The Co-Op program is administered through the School of Engineering Undergraduate Student Affairs Office, RTH 110, (213) 740-4530. Please contact them for further details.

Co-Op activities are encouraged by the ISE Department as a relevant and valuable experience for undergraduate students. However, participation in Co-Op does not guarantee credit toward the BSISE requirements or electives. In order to use Co-Op toward the BSISE, the following conditions must be met:

- Prior to starting Co-Op, the student must prepare a study plan outlining how the Co-Op experience will enhance his/her undergraduate experience. The work to be completed under Co-Op must incorporate educational or research content in industrial and systems engineering.
- The student must present the study plan to his/her faculty advisor for approval prior to starting Co-Op.
- The faculty advisor is required to periodically review the student's performance in Co-Op activities to ensure that progress is being made and that goals outlined in the study plan are being met.
- The student must submit material as proof of original work, preferably in the form of a written report, to the faculty advisor for approval at the end of the Co-Op session. The contents of the report should adequately cover the objectives in the study plan.

Directed Research--ISE 390 And ISE 490

The ISE Department offers ISE 390 Special Problems, 1-4 units, which is available by special petition for seniors who need to complete degree requirements through individual study when regularly-offered courses would not do so. Enrollment in ISE 390 requires approval by the Committee on Academic Policies and Procedures (CAPP). CAPP will consider ISE 390 petitions only with evidence that the problem was created beyond the student's control. The student and the instructor must prepare a written contract of course requirements for presentation with the petition to CAPP. In all cases, ISE 390 registration must be recommended by the Department Chairman and the Dean of the School of Engineering. ISE 390 is only available for credit toward the BSISE.

It is the student's responsibility to schedule his/her courses to obviate the need to take ISE 390. If courses are taken in the recommended sequence, there should be no need for a ISE 390 registration. Please note that some courses are only offered in the fall or only offered in the spring.

The ISE Department also offers ISE 490x Directed Research, 2-8 units, which is available by special petition to the Department for any upper division ISE student interested in pursuing directed research in topics not covered in regularly scheduled classes. The student and the instructor must prepare a written contract of course requirements for approval by the Department Chair. ISE 490x is not available for graduate credit and not available for any student on academic probation (or any

other restricted academic status). A student may only have a maximum of eight units of ISE 490x on the transcript, and a maximum of sixteen units of all 490x classes on the transcript.

ACADEMIC HONORS

Academic Awards

The Department and the School of Engineering may, from time to time, nominate students for awards and scholarships. If you feel you may qualify for any award or recognition based on academic performance, leadership, extra-curricular activities, or any combination of the above, please let the Department know. We are always happy to give you the recognition you deserve and would not want anyone to miss out because of our oversight.

Student Organizations

To build character and leadership skills, and to acknowledge academic achievement, the ISE Department supports the activities of three student organizations: the Student Chapter of Institute of Industrial Engineers; Alpha Pi Mu; and Omega Rho. These organizations are run by ISE students to further academic and professional goals. Each organization has an ISE faculty member as an advisor. The quality of each of these organizations is directly affected by the quality of its student members, and particularly its officers. Your active participation is, therefore, encouraged. Interested students should contact the Educational Services Coordinator for details.

Student Chapter of the Institute of Industrial Engineers

The Institute of Industrial Engineers is the professional organization for industrial engineers. Its mission is to promote and foster industrial engineering as a profession. Reduced membership dues are available to student members.

Alpha Pi Mu

Alpha Pi Mu is the industrial engineering honors society. Its purpose is to recognize high academic achievement by juniors, seniors, and graduate students in industrial engineering. Membership is by invitation only.

Omega Rho

Omega Rho is the operations research honors society. Its purpose is to recognize high academic achievement by undergraduate and graduate students in operations research. Membership is by invitation only.

DEGREE PROGRESS AND GRADUATION

Although this handbook was created to assist students throughout their academic career, the students are ultimately responsible for completing degree requirements. Undergraduates are subject to current catalogue regulations, policies and procedures. Any changes in regulations, policies and procedures are immediate and supersede those in any prior catalogue.

STAR Reports

Student Academic Records (STAR) Reports are printed by the Office of Academic Records and Registrar. The report is generated after every semester the student has completed at USC. The report will indicate all courses taken at USC and courses transferred for the degree to date. Students can access individual reports on OASIS (Online Academic Student Information System) at <http://www.usc.edu/dept/ARR/oasis/>. The student must have his/her student ID # or Social Security Number and password (which is the birth date, until after the first login on Touch Tone Registration) in order to access any records on OASIS.

Degree Checks

Degree Summary Reports will be generated after 106 units have been completed. Students can access Degree Summary Reports on OASIS. Any discrepancies on the STARS or the Degree Summary Report should be reported to the departmental advisor in the ISE Office, GER 240, (213) 740-7549 or isedept@usc.edu.

Graduation

If a Degree Summary Report has not been generated, the student should go to the Office of Degree Progress at SAS 010 to request for the degree check. If there are any discrepancies, please contact the departmental advisor in the ISE Office, GER 240, (213) 740-7549 or isedept@usc.edu.

Commencement information will be posted on the USC main web page at <http://www.usc.edu> and on the School of Engineering web page at <http://www.usc.edu/dept/engineering/>. Printed material will be available in RTH 110 approximately two months prior to Commencement.

4+1 Program

ISE students have the opportunity to simultaneously complete the requirements for the BS and MS degrees in five years. Students are eligible upon completing 96 or more units toward their BS with a GPA of 3.2 or higher. Eligible students will be automatically accepted to the MS program without need to take the GRE. All requirements for both the MS and BS must be met. Up to six units of course work will be counted towards both programs.

Application information may be obtained in the Viterbi School of Engineering Office of Admissions and Student Affairs. Students should see their departmental advisors for assistance with course selection.

SAMPLE STUDY PLAN FOR BS ISE

First Year, First Semester

ISE 105	Introduction to Industrial and Systems Engineering	2
ENGR 102	Engineering Freshman Academy	2
MATH 125	Calculus I	4
WRIT 140*	Writing and Critical Reasoning	4
General education*	Social Issues	<u>4</u>
		16

First Year, Second Semester

CSCI 101L	Fundamentals of Computer Programming	3
MASC 110L	Materials Science, or	
CHEM 105aL	General Chemistry, or	
CHEM 115aL	Advanced General Chemistry	4
MATH 126	Calculus II	4
General education		<u>4</u>
		15

Second Year, First Semester

ISE 220	Probability Concepts in Engineering	3
ISE 232	Manufacturing Processes	3
MATH 226	Calculus III	4
PHYS 151L**	Fundamentals of Physics 1: Mechanics, Waves, and Sound	4
ECON 203	Principles of Microeconomics	<u>4</u>
		18

Second Year, Second Semester

ISE 225	Engineering Statistics	3
MATH 225	Linear Algebra and Linear Differential Equations	4
PHYS 152L	Fundamentals of Physics II: Thermodynamics, Electricity, and Magnetism	4
General education		<u>4</u>
		15

Third Year, First Semester

ISE 330	Introduction to Operations Research: Deterministic Models	3
ISE 370L	Human Factors in Work Design	4
ISE 460	Engineering Economy	3
WRIT 340	Advanced Writing	3
General education		<u>4</u>
		17

Third Year, Second Semester

ISE 310L	Production I: Facilities and Logistics	4
ISE 331	Introduction to Operations Research: Stochastic Models	3
ISE 382	Introduction to Computer Systems, or	
CSCI 485	File and Database Management	3
EE 326Lx	Essentials of Electrical Engineering	4
General education		<u>4</u>
		18

Fourth Year, First Semester

ISE 410	Production II: Production, Scheduling and Control	3
ISE 426	Statistical Quality Control	3
ISE 435	Discrete Systems Simulation	3
ISE 495ax	Senior Design Project	2
ACCT 410x	Accounting for Non-Business Majors	4
Free Elective		<u>3</u>
		18

Fourth Year, Second Semester

ISE 440	Work, Technology, and Organization	3
ISE 495bx	Senior Design Project	2
Elective***	Departmentally approved elective	4
Free electives		<u>3</u>
		12

Total units required for the program: **128**

*Taken concurrently.

**Satisfies general education Category III.

***Electives in the CSCI/ITP, ISE or departmentally approved technical electives lists are geared so that students can take courses in an area of interest. Courses not listed may be petitioned for approval through the department.

SAMPLE STUDY PLAN FOR BSISE WITH INFORMATION SYSTEMS ENGINEERING OPTION BSISIS (CS Track)

First Year, First Semester

ISE 105	Introduction to Industrial and Systems Engineering	2
ENGR 102	Engineering Freshman Academy	2
MATH 125	Calculus I	4
WRIT 140*	Writing and Critical Reasoning	4
General education*	Social Issues	4
		16

First Year, Second Semester

CSCI 101L	Fundamentals of Computer Programming	3
MASC 110L	Materials Science, or	
CHEM 105aL	General Chemistry, or	
CHEM 115aL	Advanced General Chemistry	4
MATH 126	Calculus II	4
General education		4
		15

Second Year, First Semester

ISE 220	Probability Concepts in Engineering	3
CSCI 102L	Data Structures	4
MATH 226	Calculus III	4
PHYS 151L**	Fundamentals of Physics I: Mechanics, Waves, and Sound	4
		15

Second Year, Second Semester

ISE 225	Engineering Statistics	3
CSCI 201L	Principles of Software Development	4
MATH 225	Linear Algebra and Linear Differential Equations	4
PHYS 152L	Fundamentals of Physics II: Thermodynamics, Electricity, and Magnetism	4
Free elective		3
		18

Third Year, First Semester

ISE 330	Introduction to Operations: Deterministic Models	3
ISE 460	Engineering Economy	3
General Education		4
WRIT 340	Advanced Writing	3
CSCI/ITP elective***		3
		16

Third Year, Second Semester

ISE 310L	Production I: Facilities and Logistics	4
ISE 382	Introduction to Computer Systems	3
CSCI/ITP elective***		3
Free Elective		3
General education		4
		17

Fourth Year, First Semester

ISE 410	Production II: Production, Scheduling and Control	3
ISE 435	Discrete Systems Simulation	3
ISE 495ax	Preparation for Senior Design Project	2
CSCI/ITP Elective***		4
General education		4
		16

Fourth Year, Second Semester

ISE 440	Work, Technology, and Organization	3
ISE 470	Human/Computer Interface Design	3
ISE 495bx	Senior Design Project	2
Approved Engineering Elective***		3
Free Elective		4
		15

Total units required for the program: 128

*Taken concurrently.

**Satisfies general education Category III.

***Electives in the CSCI/ITP, ISE or departmentally approved technical electives lists are geared so that students can take courses in an area of interest. Courses not listed may be petitioned for approval through the department.

SAMPLE STUDY PLAN FOR BISE WITH INFORMATION SYSTEMS ENGINEERING OPTION BSIS (IOM Track)

First Year, First Semester

ISE 105	Introduction to Industrial and Systems Engineering	2
ENGR 102	Engineering Freshman Academy	2
MATH 125	Calculus I	4
WRIT 140*	Writing and Critical Reasoning	4
General education*	Social Issues	4
		16

First Year, Second Semester

CSCI 101L	Fundamentals of Computer Programming	3
MASC 110L	Materials Science, or	
CHEM 105aL	General Chemistry, or	
CHEM 115aL	Advanced General Chemistry	4
MATH 126	Calculus II	4
General education		4
		15

Second Year, First Semester

ISE 220	Probability Concepts in Engineering	3
MATH 226	Calculus III	4
PHYS 151L**	Fundamentals of Physics I: Mechanics, Waves, and Sound	4
General Education		4
Free Elective		3
		18

Second Year, Second Semester

ISE 225	Engineering Statistics	3
IOM 431	Computer –Based Business Systems	4
MATH 225	Linear Algebra and Linear Differential Equations	4
PHYS 152L	Fundamentals of Physics II: Thermodynamics, Electricity, and Magnetism	4
CSCI/ITP Elective ***		2
		17

Third Year, First Semester

ISE 330	Introduction to Operations Research I	3
ISE 460	Engineering Economy	3
IOM 433	Business Information Systems Analysis and Design	4
WRIT 340	Advanced Writing	3
Free elective		4
		17

Third Year, Second Semester

ISE 310L	Production I: Facilities and Logistics	4
ISE 382	Introduction to Computer Systems	3
IOM 435	Business Database Systems	4
General education		4
		15

Fourth Year, First Semester

ISE 410	Production II: Production, Scheduling and Control	3
ISE 435	Discrete Systems Simulation	3
ISE 495ax	Preparation for Senior Design Project	2
Free elective		3
CSCI/ITP elective***		4
		15

Fourth Year, Second Semester

ISE 440	Work, Technology, and Organization	3
ISE 470	Human/Computer Interface Design	3
ISE 495bx	Senior Design Project	2
Approved Engineering Elective***		3
General Education		4
		15

Total units required for the program:

128

*Taken concurrently.

**Satisfies general education Category III.

***Electives in the CSCI/ITP, ISE or departmentally approved technical electives lists are geared so that students can take courses in an area of interest. Courses not listed may be petitioned for approval through the department.