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School of Engineering
Daniel J. Epstein Department of
Industrial and Systems Engineering

https://ise.usc.edu

Undergraduate Handbook
2023-2024
(consistent with 2023-2024 *USC Catalogue*)

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INTRODUCTION

Welcome to the Daniel J. Epstein Department of Industrial and Systems Engineering. As you begin your undergraduate studies in the department, you are entering into a type of apprenticeship. Over the next few years, you will be developing the skills and knowledge needed to practice our profession. Successful practice of a profession involves appropriate conduct in the workplace and adequate performance on assigned tasks. Your path toward becoming an engineer also involves making choices about areas of specialization that you will explore and tools that you will use. This handbook describes our expectations of you and provides advice to help you make choices along the way.

DEPARTMENTAL COMMUNICATIONS

It is important that business messages between students, staff, and faculty be communicated in a way that creates a record that may be retrieved and reviewed, as needed. Consequently, information of an enduring nature (such as answers to frequently asked questions) is posted on the department web site, located at https://ise.usc.edu . The primary medium for current business communications within the department is e-mail. This means that you should be in the habit of checking your e-mail account for new messages regularly (at least once each week). You should also maintain your collection of saved messages (review and delete unneeded messages) so that sufficient space remains within your account folder to receive new messages. Typically, messages are sent to students from the isedept@usc.edu e-mail address, or from the e-mail address of an individual staff or faculty member.

PROGRAM MISSION, OBJECTIVES, and OUTCOMES

Mission

The mission of the Daniel J. Epstein Department of Industrial and Systems Engineering undergraduate program is to:

- provide students with (1) the skills and knowledge to obtain employment and achieve leadership within the industrial and systems engineering profession or to proceed with graduate education, (2) the intellectual resources to continue life-long learning, and (3) the knowledge of professional ethics and critical reasoning skills necessary for contributing to society;

- provide employers of industrial and systems engineering professionals with candidates who are technically competent, business aware, collaborative, able to communicate effectively, and are ethically grounded;

- maintain and enhance the reputation of the department within the engineering, business, and academic communities.

Objectives

Graduates of the Bachelor of Science in Industrial and Systems Engineering program are prepared to achieve any of the following accomplishments.

- obtain employment in an organization that values and rewards people who demonstrate both technical competence and business awareness

- pursue graduate or professional education

- assume a leadership role in their employment organization or community

- utilize critical reasoning, collaboration, and creativity to contribute to society

Outcomes

By the time of graduation, all USC Viterbi School of Engineering students will develop the following abilities and knowledge:

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

- an ability to communicate effectively with a range of audiences

- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

- an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Program Criteria

In addition to the abilities and knowledge listed among the Student Outcomes above, students in the Industrial and Systems Engineering undergraduate program will also develop an ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy.

COURSE REQUIREMENTS for Bachelor of Science in Industrial and Systems Engineering (BSISE)

Common Requirements for all BSISE Students

COMPOSITION/WRITING REQUIREMENT: 8
- WRIT 150   Writing and Critical Reasoning (4)
- WRIT 340   Advanced Writing (4)

GENERAL EDUCATION: 20
- One course in each of Category A, B, C, G, and H (4 ea)
- Category D is fulfilled by Biology Elective
- Category E is fulfilled by PHYS 151L or CHEM 105aL
- Category F is fulfilled by MATH 125

PRE-MAJOR REQUIREMENTS: 32

Math Requirements
- MATH 125   Calculus I (4)

- MATH 126   Calculus II, or
- MATH 129   Calculus II for Engineers and Scientists (4)

- MATH 225   Linear Algebra & Linear Differential Equations (4)

- MATH 226   Calculus III, or
- MATH 229   Calculus III for Engineers and Scientists (4)

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

Biology Elective
- BISC 103L   General Biology for the Environment and Life, or
- BISC 104L   How the Body Works, or
- BISC 230L   The Biology of the Brain: Current Topics in Neuroscience, or
- HBIO 205L   The Science of Sport (4)

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

MAJOR REQUIREMENTS: 52

Engineering Requirement
- ENGR 102   Engineering Freshman Academy (2)

Industrial & Systems Engineering Requirements
- ISE 105   Introduction to Industrial and Systems Engineering (2)
- ISE 150   Solving Engineering Problems via Computer Programming (4)
- ISE 220   Foundations of Probability Modeling (4)
- ISE 225   Foundations of Data Analysis (4)
- ISE 315   Engineering Project Management (4)
- ISE 330   Introduction to Optimization (4)
- ISE 350   Principles and Practices of Systems Engineering (4)
- ISE 370L   Human Factors in Work and Systems Design (4)
- ISE 382   Database Systems: Concepts, Design, and Implementation (4)
- ISE 410   Planning and Scheduling for Production and Supply Chains (4)
- ISE 435   Discrete Systems Simulation (4)
- ISE 440   Introduction to Socio-Technical Systems and Work Organizations (4)
- ISE 495abx   Senior Design Project (2;2)

MAJOR ELECTIVES: 16
- At least 8 units must be from the ISE Approved Electives list.

Total units required for the program: 128

ISE Approved Electives

Students must select at least 8 units. Courses not listed may be petitioned for approval through the Department.

ISE 232L	Manufacturing Processes (4)	
ISE 375L	Facilities Design (4)	
ISE 426	Statistical Process Control and Analytics (4) *prereq: ISE-225*	
ISE 460	Engineering Decisions, Economics and Ethics (4) *prereq: ISE-220 and ISE-315*	
ACCT 410	Foundations of Accounting (4)	
ITP 320x	Enterprise Information Systems (4)	

DSCI 250	Introduction to Data Science (4) *coreq: ITP-115*
DSCI 352	Applied Machine Learning and Data Mining (4) *prereq: DSCI-250 and MATH-208*
DSCI 454	Data Visualization and User Interface Design (4) *prereq: DSCI-250*
ITP 449	Applications of Machine Learning (4) *prereq: ITP-115 and ITP-249*
ITP 487	Enterprise Data Analytics (4) *prereq: ITP-249 or ITP-320 or DSCI-351*
DSO 428	Essentials and Digital Frontiers of Big Data (4)

ISE 344	Introduction to Engineering Management and Teamwork (4)
ISE 385	Human-Systems Integration for Global Engineering (4)
ISE 445	Principles and Practices of Global Innovation (4)
ISE 470	Human-Computer Interface Design (4)
ITP 466	Building the High Tech Startup (4)

ITP 325x	Ethical Hacking and Systems Defense (4) *prereq: ITP-125*

NSC 202	Navigation (3)
NSC 301	Naval Ship Systems I (Engineering) (3)
NSC 302	Naval Ship Systems II (Weapons) (3)

Students wishing to take courses not on the above list must petition the ISE Department for approval of the course. Please see Substitutions for Required Courses and Approval of Electives on page 15.

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Pathways to Graduation

The study plans below show the two paths to graduation. Both the Cardinal path and the Gold path allow for completion of all BSISE degree requirements in eight semesters. Students who remain on their assigned path, i.e. complete courses shown on the prerequisite flow chart in the semesters shown on their assigned path, will find seats available in the courses they need each semester.

D-clearances for classes will be issued first to students who have a course listed on their assigned path for the coming semester. Students who stay on their assigned path will receive D-clearance for the courses on the path before their registration date. These students will be expected to register during the initial registration period. If they do not register for the course before their D-clearance expires, the seat in that class will become available to other students.

 Students who request to take a course in a semester that does not agree with their assigned path will be placed onto a waitlist, and will only be considered for D-clearances after the initial registration period has ended. If seats are available after the initial registration period, D-clearances will be issued to students on the waitlist as the available seating allows.

Classes are scheduled to provide a seat for each student who is expected to take a course. Knowing the number of students assigned to a graduation path is the best way for the Department to plan for the number of classes to be offered.

Remaining on your assigned path is the best way for a student to assure timely progress toward graduation.

Prerequisite Flow Chart for BSISE required courses

```
WRIT 150          MATH 125                                    These courses
                                                              have no
   │                 │                                        prerequisite
   ▼                 ▼                                        relationships
WRIT 340          MATH 126                      PHYS 151      ENGR 102
                                                              ISE 105
                                                              ISE 440
                                                              Chemistry
MATH 225          ISE 220        MATH 226  ╌╌▶  PHYS 152      Biology

   │                 │
   ▼                 ▼
ISE 330           ISE 225              ISE 382      ISE 150

   │                 │
   ▼                 ▼
ISE 410           ISE 350      ISE 315    ISE 495a    ISE 435

                                   │          │          │
                                   ▼          ▼          ▼
                                      ISE 495b  ◀──  ISE 370
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Legend: Prerequisite ───────▶
        Corequisite ╌ ╌ ╌ ▶
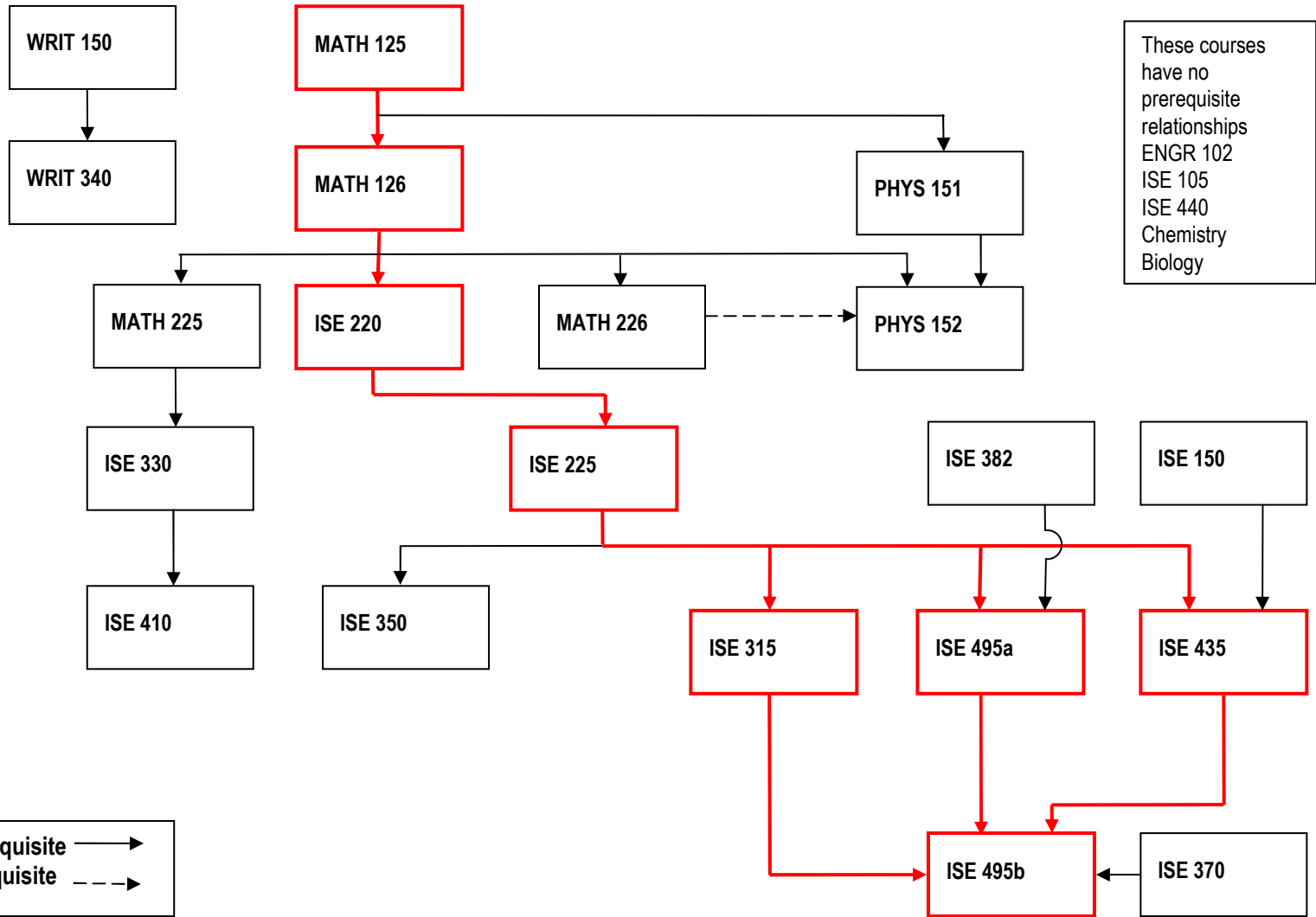
(longest course sequences are highlighted)

Study Plan for BSISE (Cardinal path)

<u>First Year, Fall Semester</u>

ISE 105	Introduction to Industrial and Systems Engineering (Fall only)	2
ENGR 102	Engineering Freshman Academy (Fall only)	2
MATH 125	Calculus I	4
WRIT 150	Writing and Critical Reasoning	4
General education	Category A,B,C,G, or H	<u>4</u>
		16

<u>First Year, Spring Semester</u>

ISE 150	Solving Engineering Problems via Computer Programming	4
MATH 126	Calculus II	4
PHYS 151L	Fundamentals of Physics I: Mechanics and Thermodynamics	4
General education	Category A,B,C,G, or H	<u>4</u>
		16

<u>Second Year. Fall Semester</u>

ISE 220	Foundations of Probability Modeling	4
MATH 225	Linear Algebra and Linear Differential Equations	4
MASC 110L	Materials Science, or	
CHEM 105aL	General Chemistry	4
General education	Category A,B,C,G, or H	<u>4</u>
		16

<u>Second Year, Spring Semester</u>

ISE 225	Foundations of Data Analysis	4
ISE 330	Introduction to Optimization	4
General education	Category A,B,C,G, or H	4
Free Elective		<u>4</u>
		16

<u>Third Year, Fall Semester</u>

ISE 315	Engineering Project Management	4
ISE 370L	Human Factors in Work and Systems Design	4
ISE 382	Database Systems: Concepts, Design and Implementation	4
MATH 226	Calculus III	<u>4</u>
		16

<u>Third Year, Spring Semester</u>

ISE 435	Discrete Systems Simulation	4
ISE 495ax	Senior Design Project	2
PHYS 152L	Fundamentals of Physics II: Electricity and Magnetism	4
General education	Category A,B,C,G, or H	4
Free Elective		<u>4</u>
		18

<u>Fourth Year, Fall Semester</u>

ISE 350	Principles and Practices of Systems Engineering	4
ISE 495bx	Senior Design Project	2
WRIT 340	Advanced Writing	4
ISE Approved Elective		<u>4</u>
		14

<u>Fourth Year, Spring Semester</u>

ISE 410	Planning and Scheduling for Production and Supply Chains	4
ISE 440	Introduction to Socio-Technical Systems and Work Organizations	4
ISE Approved Elective		4
Biology Elective		<u>4</u>
		16

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

Revised 6/15/23

Study Plan for BSISE (Gold path)

First Year, Fall Semester

ISE 105	Introduction to Industrial and Systems Engineering (Fall only)	2
ENGR 102	Engineering Freshman Academy (Fall only)	2
MATH 125	Calculus I	4
WRIT 150	Writing and Critical Reasoning	4
General education	Category A,B,C,G, or H	<u>4</u>
		16

First Year, Spring Semester

MATH 126	Calculus II	4
PHYS 151L	Fundamentals of Physics I: Mechanics and Thermodynamics	4
ISE Approved Elective		4
General education	Category A,B,C,G, or H	<u>4</u>
		16

Second Year. Fall Semester

ISE 150	Solving Engineering Problems via Computer Programming	4
MATH 226	Calculus III	4
MASC 110L	Materials Science, or	
CHEM 105aL	General Chemistry	4
General education	Category A,B,C,G, or H	<u>4</u>
		16

Second Year, Spring Semester

ISE 220	Foundations of Probability Modeling	4
MATH 225	Linear Algebra and Linear Differential Equations	4
Biology Elective		4
General education	Category A,B,C,G, or H	<u>4</u>
		16

Third Year, Fall Semester

ISE 225	Foundations of Data Analysis	4
ISE 330	Introduction to Optimization	4
PHYS 152L	Fundamentals of Physics II: Electricity and Magnetism	4
General education	Category A,B,C,G, or H	<u>4</u>
		16

Third Year, Spring Semester

ISE 315	Engineering Project Management	4
ISE 370L	Human Factors in Work and Systems Design	4
ISE 382	Database Systems: Concepts, Design and Implementation	4
Free Elective		<u>4</u>
		16

Fourth Year, Fall Semester

ISE 410	Planning and Scheduling for Production and Supply Chains	4
ISE 435	Discrete Systems Simulation	4
ISE 440	Introduction to Socio-Technical Systems and Work Organizations	4
ISE 495ax	Senior Design Project	<u>2</u>
		14

Fourth Year, Spring Semester

ISE 350	Principles and Practices of Systems Engineering	4
ISE 495bx	Senior Design Project	2
WRIT 340	Advanced Writing	4
ISE Approved Elective		4
Free Elective		<u>4</u>
		18

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

General Education and Writing Requirements

Students must complete the indicated number of courses from each of the eight categories shown below. Lists of courses that satisfy each category are available on the USC Schedule of Classes web site.

Core Literacies
> GE - A   The Arts (1 course)
> GE - B   Humanistic Inquiry (2 courses)
> GE - C   Social Analysis (2 courses)
> GE - D   Life Sciences (1 course)
> GE - E   Physical Sciences (1 course)
> GE - F   Quantitative Reasoning (1 course)

Global Perspectives
> GE - G   Citizenship in a Global Era (1 course)
> GE - H   Traditions and Historical Foundations (1 course)

Some courses listed in GE - G also appear in GE - C. Some courses listed in GE - H also appear in GE - B. So, careful selection of courses to satisfy GE - G and GE - H will also satisfy one course of the two-course requirement in each of GE - B and GE - C.

Furthermore, students are allowed to use courses required for their major to satisfy GE requirements. Typically, BS ISE students will satisfy GE - E by completing either PHYS 151L or CHEM 105aL. Similarly, BS ISE students will satisfy GE - F by completing MATH 125. GE - D should be fulfilled by completing the Biology elective, which consists of selecting one from among four biology courses that are directly related to ISE study.

With careful choice of courses, students can satisfy all of the General Education requirements listed above by completing five individual courses, in addition to PHYS 151L , MATH 125, and the Biology elective. So, the Study Plans given in this handbook incorporate five GE courses.

The writing requirement involves completion of WRIT 150 and WRIT 340, which require that you develop and demonstrate an ability to write acceptable college-level expository prose. The Viterbi School of Engineering writing program offers sections of WRIT 340 that are specifically designed to complement the study plans of engineering students. All Epstein ISE Department students are strongly encouraged to complete a section of WRIT 340 identified as Advanced Writing Communication for Engineers.

COURSE REGISTRATION

Basic Registration Process

Each semester, you should follow the steps below to register for the next semester's courses.

1. Review your progress – Compare your completed and in-progress courses to the Course Requirements and Prerequisite Flow Charts shown in this handbook.

2. Identify courses to take – Take note of the next required course that you need to take along each of the prerequisite chains. Look at the Study Plan for your assigned path toward graduation, to be aware of electives that you should complete. Your advisor will tell you which study plan you should follow, based upon the courses you have completed when you join the Department. Lists of courses that satisfy General Education requirements may be found in the *USC Catalogue* (http://catalogue.usc.edu). The *USC Catalogue* is also a good reference to browse for free electives.

3. Build a schedule – Visit the Schedule of Classes web site (http://classes.usc.edu) to find the days/times when courses are offered. Identify available sections of courses that do not create time conflicts with each other. The Spring semester schedule is usually posted in mid-October. The Fall semester schedule is usually posted in late-March. The Epstein ISE Department will generally schedule classes in accordance with the Study Plans shown in this handbook. Some courses are scheduled only one semester each year. Courses that are planned to be taken in different semesters may be scheduled at the same time on the same days. *The Epstein ISE Department does not control the scheduling of classes offered by other departments.*

4. Meet with your advisor – First-semester Freshman ISE students receive initial academic advising from the Viterbi First Year Excellence advisor, Renata Figueroa. Renata's office is located in RTH 110. Second-semester Freshman, Sophomore, Junior, and Senior ISE students receive advising from the ISE Undergraduate Advisor, Krystian Ruiz. Krystian's office is in GER 240. Your advisor will review your schedule to verify that it will produce acceptable progress toward your degree.

   It is necessary that you schedule an appointment to meet with an advisor. Because of the number of students with whom an advisor works to prepare for registration, walk-in access is not practical. To meet with Krystian, appointments may be scheduled by accessing his Calendly calendar (https://calendly.com/krystianise).

5. Clear registration holds – You are not allowed to register for courses until all registration holds have been cleared from your records. All ISE students are required to meet with an advisor each semester. When you meet with your advisor, the mandatory advisement registration hold for that semester will be removed from your record. To review other registration holds that have been placed on your record, log in to the On-line Academic Student Information System (https://camel2.usc.edu/oasis) and click on Permit to Register. A listing of contact information for University offices that may place registration holds on your record is available on the Registration Instructions page of the Schedule of Classes web site (http://classes.usc.edu/term-20223/roadmap/basic-steps). You may also access OASIS from the myUSC web portal.

6. Request departmental clearances – Courses that require an approval before registration are identified on the Schedule of Classes web site with section numbers that end in D. Most ISE courses require departmental approval before you can register. After your advisement meeting, your advisor will enter D-clearances for courses that appear on your graduation path for the next semester. To obtain D-clearances for other ISE courses, email isedept@usc.edu with your request. Your name will be added to a waitlist for the course. Once all students with priority registration for the course have registered, you will be notified if a seat is available. D-clearances for courses offered by other departments must be obtained from the offering department.

7. Register online – All students register for courses via the USC Web Registration site (https://webreg.usc.edu/Login). *You may select courses on the site only after the time indicated on your Permit to Register.* Links to instructions for using the web registration site are available on the site's log in page. You may also access Web Registration from the myUSC web portal.

8. Pay tuition and fees – You must pay your tuition and fees to complete the registrations process. See the Settle Your Bill section on the Registration Instructions page of the Schedule of Classes web site for information about making payments to the University.

Transferring 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 (https://arr.usc.edu/services/articulation/generalinfo.html) for further information.

- Each course must have a grade of C- or better to transfer.

- If a course was failed at USC, the course may not be repeated elsewhere for unit credit.

- General education courses may not be taken outside of USC without prior permission from the Degree Progress Department.

- No engineering courses may be taken outside of USC without prior permission from the Epstein ISE Department for credit toward the BSISE.

- Physics courses used to substitute for PHYS-151 are transferable only on approval from the Physics Department.

- All students must satisfy the Residence Requirement (see the *USC Catalogue* for the Residence Requirement that applies to you).

- All non-ISE courses to be transferred must be approved by the USC Degree Progress Department for unit credit. The course must also be approved by the Epstein ISE Department, as a substitute for a BSISE degree requirement (see below).

- 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. Courses taken at institutions that operate on quarter-system calendars will be reviewed on a case-by-case basis.

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

Substitutions for Required Courses and Approval of Electives

Substitutions for any required course or requests to use courses not listed in this handbook as satisfying an approved engineering elective must be petitioned for approval by the faculty. To submit a petition, please take note of the following instructions.

- Blank petition forms may be found on the Forms section of the Department's Undergraduate Program web page (https://ise.usc.edu/academics/undergraduate-program).

- The first line of any petition should clearly state the action to be approved, e.g. "Substitute IE 1234 from UC Riverside for ISE 330". Any explanation for the request may then follow.

- The petition form must be accompanied by a syllabus for the course that is requested to be approved.

- Completed petition forms and syllabi should be submitted via email to isedept@usc.edu.

The Epstein ISE Department faculty cannot approve unit credit for courses taken outside of USC. Only the USC Degree Progress Department can approve unit credit for transfer courses. Only the Epstein ISE Department faculty may approve a substitute course as satisfying an ISE degree requirement. Any unit deficiencies that result from a course substitution must be covered by other units on the student's transcript.

OTHER COURSEWORK

Cooperative Education (Co-Op) – ENGR 395

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 Viterbi School of Engineering Career Services Office (https://viterbicareers.usc.edu/students), RTH 218, (213) 740-9677. Please contact them for further details.

Co-Op activities are encouraged by the Epstein 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:

1. 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.

2. The student must present the study plan to his/her faculty advisor for approval prior to starting Co-Op.

3. 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.

4. 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.

Special Problems -- ISE 390

The Epstein 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 USC 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.

Directed Research -- ISE 490

The Epstein ISE Department also offers ISE 490x Directed Research, 2-8 units, which is available by special petition to the Department for any junior or senior ISE student interested in pursuing faculty-guided study in topics not covered in regularly scheduled classes. The student and the faculty member must prepare a written contract of course requirements for approval by the Department Chair. Blank forms for the Directed Research contract may be found on the Forms section of the Department's Undergraduate Program web page (https://ise.usc.edu/academics/undergraduate-program). 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.

Study Abroad

There are two programs offered at USC that allow a student to study for a full semester at a university in another country while earning credits that apply directly to the student's USC transcript. The Dornsife College of Letters, Arts and Sciences offers an Overseas Study program that is open to engineering majors (https://dornsife.usc.edu/Engineering-overseas/) . The Viterbi School of Engineering offers an Exchange program with partner universities (http://viterbiundergrad.usc.edu/overseas/exchange). For information about study abroad courses that apply toward BSISE degree requirements, contact the ISE Department Associate Chair, Dr. Kurt Palmer.

COMPUTING

Throughout your undergraduate program, you will be introduced to several software tools that are useful for doing engineering work. Some of these tools are general-purpose office productivity programs, which are widely available at most businesses. Such office productivity programs have typically been adapted by the original developers, or copied by other developers, to run in a variety of Operating System (OS) environments, due to broad acceptance of these tools by home users.

By the way, not all versions of office productivity programs are identical. Available features can differ between versions of a program written by a single developer. Similar programs written by different developers often have different features. This means that software features demonstrated by instructors in ISE courses cannot be depended upon to exist in the software that you have on your computer. The current office productivity suite installed on Epstein ISE Department computers is Microsoft Office 2019.

You will also be introduced to several software tools that are specifically designed to perform engineering analyses. Such engineering software tools have typically been developed to run only in the Windows OS. The reason for this is that the Windows OS is, by far, the dominant OS installed on computers owned by companies who do engineering work. Software developers are not able to sell enough copies of their programs to people who use OS environments other than Windows to recover the cost of adapting their programs for those OS environments. Consequently, the Viterbi MyDesktop (vitual desktop environment made available to students enrolled in specific ISE courses) uses the Windows OS. The Viterbi MyDesktop can be accessed from the internet. It is the only source at USC where some software tools are available to students.

Some of the software licenses held by the Epstein ISE Department allow us to distribute copies of the software to students. These software tools run only in the Windows OS. The Windows OS is commonly installed on Personal Computers (PCs). If you own a Mac, it is possible to install the Windows OS; but, you must take extra steps to allow the Windows OS and Mac OS to both exist on your Mac.

There are at least three ways (discussed below) to run software written for the Windows OS on an Intel-based Mac. All three ways require that you have a genuine copy of the Windows OS to install onto your Mac.

Boot Camp:

This is a component of the Mac OS 13 Ventura operating system. It allows a Mac machine to load the Windows 10 OS rather than the Mac OS. Only one of the two operating systems can function at one time. The selection of operating system to load is made by the user during the system start up. For further information, visit https://support.apple.com/boot-camp

VirtualBox:

This open source project offers a freeware virtualization software for the Mac OS that supports the Windows OS as a guest operating system. It is possible to install Windows 10, Windows 8, or Windows 7 in the VirtualBox environment. Doing so will allow a Mac machine to run both the Mac OS and a Windows OS simultaneously.   VirtualBox will function on Mac OS 12 Monterey, Mac OS 11 Big Sur and Mac OS 10 Catalina. For further information, visit www.VirtualBox.org

Parallels:

This is a third party, commercial product that allows for simultaneous execution of Windows 11 compatible software inside the Mac OS. The Parallels software will function on Mac OS 13 Ventura, Mac OS 12 Monterey, Mac OS 11 Big Sur. The full version of Parallels Desktop 18 for Mac is available for $100 at www.parallels.com/products/desktop
A Student Edition is available for a reduced price.

Mac machines using the Apple M series processors can only support Windows 11 OS using the Parallels software.

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 regulations, policies and procedures printed in the *USC Catalogue*. Any changes in regulations, policies and procedures are immediate and supersede those in any prior catalogue.

STARS Reports

STudent Academic Records System (STARS) reports are produced by the Office of Academic Records and Registrar. This report contains all USC course work and accepted transfer work that applies toward degree requirements. The STARS report will list all requirements necessary for degree completion and indicate the student's current status as shown in official USC records. Students can access their reports on OASIS (www.usc.edu/oasis). You must use USC ID number and password to log in to OASIS directly. You may also access OASIS from the myUSC web portal, without needing your USC ID number. Any discrepancies on the STARS Report should be reported to the Epstein ISE Department Undergraduate Advisor, GER 243, (213) 740-7549, or isedept@usc.edu.

Degree Checks

Your advisor will complete a formal degree progress review during your third and fifth semesters at USC. Your advisor will generate a Course Plan for you using information from your STARS report. The Course Plan shows the courses you still need to complete for your degree and a recommended schedule to complete them. The Course Plan will be sent to you via e-mail with the subject Third Semester Audit or Fifth Semester Audit. During mandatory advisement meetings, your advisor will discuss with you your progress along the Course Plan.

Graduation

During the mandatory advisement meeting in the semester you are enrolled in ISE 495a (usually the first semester of your fourth year), your advisor will check to be sure that your courses for the next semester will complete your degree requirements. If your STARS report indicates that additional courses are required, your advisor will discuss with you a Course Plan that will show how to complete your degree requirements.

Commencement information will be posted on the USC Commencement web page (https://commencement.usc.edu) and on the Viterbi School of Engineering web page (http://viterbiundergrad.usc.edu/commencement). Printed material will be available in RTH 110 approximately two months prior to Commencement.

BEYOND GRADUATION

Career Services

The search for full-time employment as an engineer should begin at least two semesters prior to graduation. The Viterbi School of Engineering Career Services Office offers resume and interview preparation workshops, career fairs, company information sessions, and scheduling of on-campus interviews. A calendar of events may be found at the Career Services web site (https://viterbicareers.usc.edu/students). From time to time, the Epstein ISE Department receives notices of available positions from our network of alumni and friends. These notices are distributed to students via messages from the isedept@usc.edu e-mail address.

Progressive Degree Program

ISE students have the opportunity to simultaneously complete the requirements for the BS and MS degrees in five years. Students are eligible to apply after completing at least 64 units toward their BS with a GPA of 3.2 or higher. Applications must be submitted before you complete 96 units toward the BS degree. Applicants are not required to take the Graduate Record Exam (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 from the Viterbi School of Engineering Office of Admissions and Student Affairs (http://viterbiundergrad.usc.edu/future/pdp). Students should see their departmental advisors for assistance with course selection.

ACADEMIC HONORS

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.

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 Epstein ISE Department supports the activities of three student organizations: the Student Chapter of Institute of Industrial and Systems Engineers; Human Factors and Ergonomics Society; and Engineering Management Society. ISE Department students are also leaders in the Information Systems Association, a student organization sponsored by the Data Sciences and Operations Department of the Marshall School of Business. 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 organization's student officers or faculty advisor for more information. Contact information may be found on the USC Student Organizations web site (https://campusactivities.usc.edu/organizations).

Student Chapter of the Institute of Industrial and Systems Engineers

The Institute of Industrial and Systems 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. The student officers are listed in the display case located outside the Epstein ISE Department Office (GER 240). The organization's website is https://usciise.wordpress.com/

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 Viterbi School of Engineering, and the Epstein Department of Industrial and Systems Engineering 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
https://ise.usc.edu

APPENDIX: TWO-YEAR STUDY PLAN

Students who transfer into the Epstein ISE department from another program after completing four or more semesters of courses will need to follow a study plan that is different from the four-year plans shown earlier in this handbook. The study plans on the following pages show how to complete the required ISE courses in two years (four semesters). It is not possible to complete all of the required ISE courses in less than four semesters.

The study plan shown below assumes that you have already completed at least Calculus II (MATH 126) and computer programming (ISE-150).

You should also have completed the first writing course (WRIT 150), as well as the vast majority of the General Education, math (MATH 225, MATH 226), physics (PHYS 151, PHYS 152), chemistry (MASC 110 or CHEM 105a), and biology (BISC 103 or BISC 104 or BISC 230 or HBIO 205) course requirements.

Two-Year Study Plan for BSISE

<u>First Year, Fall Semester</u>

ISE 220	Foundations of Probability Modeling **	4
ISE 370L	Human Factors in Work and Systems Design	4
Open Schedule Block		4
Open Schedule Block		<u>4</u>
		16

<u>First Year, Spring Semester</u>

ISE 225	Foundations of Data Analysis **	4
ISE 330	Introduction to Optimization	4
ISE 382	Database Systems: Concepts, Design and Implementation	4
Open Schedule Block		<u>4</u>
		16

<u>Second Year. Fall Semester</u>

ISE 315	Engineering Project Management **	4
ISE 435	Discrete Systems Simulation **	4
ISE 495ax	Senior Design Project **	2
Open Schedule Block		<u>4</u>
		14

<u>Second Year, Spring Semester</u>

ISE 350	Principles and Practices of Systems Engineering	4
ISE 410	Planning and Scheduling for Production and Supply Chains	4
ISE 440	Introduction to Socio-Technical Systems and Work Organizations	4
ISE 495bx	Senior Design Project **	2
Open Schedule Block		<u>4</u>
		18

** must occur in the indicated semester

Open Schedule Blocks may be used for any of the following
- Math and Basic Science
- General Education and Writing
- ISE Approved Electives
- Free Electives