The USC Viterbi School of Engineering's Undergraduate Handbook is published annually. Inquiries regarding this publication should be directed to:

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This handbook draws heavily upon other official University publications including the USC Catalogue and a variety of departmentally-distributed information pieces. Although every attempt has been made to ensure the accuracy of the information found herein, the USC Catalogue and official addenda should be considered the documents of authority for all University students. The program requirements listed in the USC Catalogue supersede any information which may be contained in this or any other publication of any school or department. The University reserves the right to change its policies, rules, regulations, requirements and course offerings at any time.

The USC Viterbi School of Engineering Undergraduate Handbook is intended to serve as a supplement, not a replacement, to the USC Catalogue. This publication is designed to synthesize all academic information pertinent to engineering undergraduates. Students entering USC Viterbi in the fall of 2018 or the spring of 2019 are bound by the requirements set forth in this booklet and the 2018-2019 University Catalogue.

Title IX
While it is often thought of as a law that gives women equal opportunities in athletics, Title IX is about so much more. Title IX also covers admissions, financial aid, housing, educational programs, campus safety (including sexual assault), and sex discrimination.

Title IX states: No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.

Undergraduate Program Accreditation
The University of Southern California is accredited by WASC, the Western Association of Schools and Colleges. The Bachelor of Science degrees in aerospace engineering, astronautical engineering, biomedical engineering, chemical engineering, civil engineering, computer engineering and computer science, electrical engineering, environmental engineering, industrial and systems engineering, and mechanical engineering are accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. The Bachelor of Science degrees in computer engineering and computer science and in computer science are accredited by the Computing Accreditation Commission of ABET, http://www.abet.org.

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PRO TIP

Stay Up to Date!

viterbiundergrad.usc.edu
fb.com/USCViterbiUndergrad
instagram & twitter: @ViterbiUndergrad

Your starting point for information is the undergraduate website but stay up-to-date with our Facebook, Instagram, and Twitter accounts. Look out for Viterbi Connect—a weekly email every Sunday with a review of recent announcements and upcoming events that are about the Viterbi community.
Starting college is both exhilarating and challenging and your Viterbi peers, faculty, and staff are here to serve as a resource as you begin thinking of what engineering means to you and your place within it. USC Viterbi Dean Yannis C. Yortsos describes this process of becoming a Viterbi student as "Engineering +", where engineers become better engineers by engaging and making connections within other academic disciplines in order to think critically about today's challenges.

Viterbi students are encouraged to find their own "+" in Engineering+ through the Grand Challenge initiative whose vision is to encourage the development of a growth mindset among undergraduate engineering students, namely one that focuses on competencies such as entrepreneurship and innovation, interdisciplinary collaboration and research, cultural awareness and societal consciousness.

Dean Yortsos describes the Grand Challenges as, "changing the conversation about engineering, by providing key aspirational goals and by inspiring the new generations about the importance of engineering as the enabling discipline of our times."

This handbook is a road map framed around the Grand Challenges vision, inspiring you to think about what kind of experience you want to create here at Viterbi. Your handbook is more than a first-year guide. It is a four-year plan to help guide you through your own story of success.

There is no "one" way to be a successful Viterbi student or a successful global citizen. We are here to help guide you on this journey. Fight on!
ADVISING & ACADEMICS
THE JOURNEY BEGINS HERE

READ ON FOR:
- Advising
- Academic Programs
- Honors
- Academic Resources
Academic advising in Viterbi is more than choosing classes and looking at degree requirements. Your advisor is your coach, advocate and resource in helping you define and accomplish your goals, both for your USC experience and for life after graduation. Your advisor will help you design a personalized academic plan that reflects your academic, career and co-curricular goals.

As specialists in student development and engagement, we view student success through the cumulative outcome of academics and personal growth. At the end of your undergraduate Viterbi journey, our goal is that students have not only excelled in their academic pursuits but also challenged themselves as leaders and mentors as well as fostered an engaged community of their peers, faculty and advisors.

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**PRO TIP**

_work with your advisor—they are your guide in navigating your first year at Viterbi and helping you build a strong base for your time at USC._
Orientation marks a new beginning for your Viterbi journey and serves as the foundation for the USC and Viterbi student experience. This is your time to prepare for your first semester, from meeting fellow and current Trojans to registering for courses with your academic advisor.

Viterbi invites all new undergraduate students to our annual **New Student Welcome** on **August 16th** during Welcome Week, which begins with move-in day and continues through the first week of classes. This is your chance to connect with current students, faculty and staff at a classic Trojan event and learn about getting involved in student organizations, meeting faculty from all departments, and being part of your class photo!

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Academic Expectations

No matter what your ability is, effort is what ignites that ability and turns it into accomplishment.

*Carol Dweck

Mindset: The New Psychology of Success*
All first-year students in Viterbi are invited to become a part of Freshmen Academy (ENGR 102) their first semester in Viterbi. Students starting in the spring semester can participate in Spring Academy. Freshmen Academy provides a birds-eye view of the field of engineering by tackling the ethical, societal, and political impact of engineering and technology use, focusing on the NAE Grand Challenges.

The academy class meets once a week and is taught by engineering faculty across all disciplines. The seminar focuses on building community through collaborative projects while using case studies, discussions, and group projects to explore how engineering intersects with other areas in society, including education, the environment, new technologies, the community, and more.

Each Academy section is also facilitated by upper-division Viterbi coaches who, along with being student leaders in their respective majors, also serve as resources and mentors to first-year Viterbi students.

“Freshmen Academy showed me that we need different perspectives to identify all aspects of a problem. It taught me the value of Viterbi engineers working together to help each other succeed.”
- Aliyah Arunasalam, Senior, Biomedical

“Freshmen Academy is the first step in creating your Viterbi network! It introduces freshmen to their peers, mentors and professors, and is the first impression of the engineering community on campus.”
- Sofia Tavella, Junior, Biomedical (Mechanical)
ACADEMIC ADVISING

First Year Advisors
As a first-year student, you will begin working with your First Year Advisor at Orientation and continue through the end of your second semester at USC. Your First Year Advisor's role is to help with academic planning and career goals along with supporting your transition to college and acclimating to life at USC.

Department Advisors
As a transfer or sophomore student, you will begin working directly with an advisor specific to your major. As you begin to take more major-related coursework, department advisors will continue to help you build on the academic, co-curricular and career goals you started your first year.

PRO TIP
Get free peer tutoring when you need it for 50+ math, science & engineering courses.
Sign up for the Viterbi Academic Resource Center (VARC) at viterbiundergrad.usc.edu/varc.

minors
Did you know USC has hundreds of minors to choose from? It's your chance to explore!
Page 17

overseas programs
Looking for that global, once-in-lifetime experience? There's a lot to choose from at USC and Viterbi.
Page 22

research opportunities
Want to see if research is for you? Viterbi offers tons of undergraduate research opportunities.
Page 16

tutoring
Need some one-on-one help in math, science or engineering? Looking for study groups for a specific class? We can help you find what you need.
Page 12

career goals
Viterbi has a career resource center that sponsors workshops and on-campus interviews. Let us help you get started.
Page 20

student orgs
USC has over 1,000 student organizations. If you can't find what you want - start your own!
Page 20
Advising Timeline

Mandatory Advisement

All USC Viterbi students are required to meet with their academic advisor at least once per semester for a mandatory academic advisement. Your appointment should take place before your assigned registration date and time since you will not be able to register for the following semester until you meet with an advisor.

The USC Viterbi school requires that you meet with your advisor at least once per semester to ensure that you are working towards your goals, meeting your degree requirements, and staying on track for graduation.

Use this time to delve into your ideas of how to you want to enact your Engineering+ experience.

PRO TIP

Mandatory advisement

Schedule your appointment early through MyUSC so you have plenty of time to work out any scheduling kinks.

SEMESTER START

Have questions about the drop/add deadline, how to get involved, or anything else? Come to drop-in advising Monday–Friday, 3:00 – 4:00 pm in RTH 110.

MID-SEMESTER

Viterbi Advising meets with students every semester for Mandatory Advisement to talk about classes and explore how to make your interests into a reality.

REGISTRATION

The Registrar’s Office will assign you a Permit to Register - a specific day and time to you are eligible to register for classes. Until that time, you can build your ideal schedule.

END OF SEMESTER

Still have questions? You can still meet with your advisor to help you finish out the semester strong.

Drop-in Advising

my.usc.edu

Check your STARS

Stay Connected!
USC and Viterbi offer a wide range of programs and services to use for academic support. These resources can help you more deeply engage with faculty, students and staff to help you further define your academic interests and get connected with the USC and Viterbi communities.

**ACADEMIC RESOURCES**

**What resources are there?**

- **Honors Science Courses**: Advance-level science courses for foundational physics, chemistry and biology.
- **Thematic Option**: Interdisciplinary honors general education program.
- **OASIS**: Online Academic Student Information System (OASIS) to see your registration time, account holds, and course schedule.
- **USC Kortschak Center for Learning & Creativity**: Center that can provide insight and guidance on your learning style.
- **Supplemental Instruction (SI)**: Academic support program facilitating peer-led study sessions.
- **Viterbi Academic Resource Center**: Free peer-to-peer tutoring for math, science & engineering courses.
- **Grand Challenge Scholars Program**: Specialized opportunity to participate in National Academy of Engineering’s Grand Challenges.
- **STARS Report**: Student Academic Record System (STARS) that reflects the progress of your degree completion.
- **USC Kortschak Center for Learning & Creativity**: Center that can provide insight and guidance on your learning style.
It’s never too early to start thinking about graduate school. If you have a clear idea of what type of degree you want to pursue—or if you don’t—connect with your academic advisor and check out Viterbi’s resources to begin devising your grad school plan. Viterbi students go on to achieve all kinds of advanced degrees, from MBAs to PhDs.

Preparing for Graduate School
While it may seem early, we want to make sure you are thinking about all of your possible opportunities in the future. Be on the lookout for special workshops designed to help you prepare for your application to Masters and Ph.D. programs, applying for fellowships, mentoring relationships with faculty, and more.

Progressive Degree Program (B.S. + M.S.)
You can receive both your B.S. and M.S. in reduced time through the Progressive Degree Program (PDP). PDP allows you to start graduate-level coursework while finishing your undergraduate degree and can reduce the units required for your master's degree. Typically, students complete both their B.S. and M.S. in five years. In addition, both degrees do not need to be from the same discipline. You are eligible to apply for PDP once you have completed 64 units of study (in or by your junior year) and before you complete 96 units. A 3.2 GPA is required for consideration.

PRO TIP
Interested in two different fields of Engineering?
Consider pursuing one field as a B.S. and one as an M.S. in the PDP program.
READ ON FOR:

- The Grand Challenges Scholars Program
- Research Opportunities
- International Experiences
- Service-Learning
- Student Organizations

PRO TIP

Want to Graduate with Honors?
You can graduate from USC with honors in engineering when you earn a minimum overall grade point average of 3.5 for cum laude, 3.7 for magna cum laude or a 3.9 for summa cum laude.
GRAND CHALLENGES SCHOLARS

**USC Viterbi School of Engineering students have the unique opportunity to participate in the National Academy of Engineering (NAE) Grand Challenge Scholars Program (GCSP). Grand Challenges Scholars drive their educational experiences towards discovering, exploring, and potentially solving one of the NAE Grand Challenges. Viterbi students can earn recognition at graduation from USC and the National Academy of Engineering by completing Grand Challenges Scholars Program.**

The Viterbi Grand Challenges Scholars Program

USC Viterbi encourages students to pursue their academic and co-curricular involvement within the Grand Challenges framework. The USC Viterbi Grand Challenges Scholars Program (GCSP) helps you organize how you engage in exploring projects that benefit society.

Each year, the top students who successfully complete the USC Viterbi GCSP areas will be named National Academy of Engineering Grand Challenge Scholars, recognized both by USC Viterbi at graduation and the National Academy of Engineering.

Students interested in earning this designation as a Grand Challenges Scholar will need to demonstrate their involvements related to a specific Grand Challenges topic in all of these areas:

- Research/Creativity
- Multidisciplinary
- Entrepreneurship
- Cultural Competence
- Social Consciousness

Aspiring Grand Challenges scholars can apply for review once eligible as a graduating senior. The application should reflect your focus across the five dimensions. Visit [viterbiundergrad.usc.edu/gcsp](viterbiundergrad.usc.edu/gcsp) for more information.
UNDERGRADUATE RESEARCH

Gain a practical application of your classroom knowledge by getting involved in research. Finding research at Viterbi can be as easy as identifying research topics of interest to you and connecting with faculty who may have opportunities in their labs. Viterbi students participate in research through a variety of sources including formal programs, student organizations, national competitions, volunteering in a lab, the Undergraduate Fabrication Lab, and through coursework.

Merit Research Program
Each year, a select group of entering freshmen are invited to work with faculty on current research projects. The Merit Research Award is a renewable award provided they make satisfactory academic progress towards the engineering degree, maintain a "B" average overall, and complete a short renewal form by March 1st.

Provost and Rose Hills Research Fellowships
The Office of the Provost provides fellowships for undergraduate research each academic year in the fall and spring semesters. The Rose Hills Foundation, which supports non-profit organizations that serve the citizens of Southern California, has generously provided funding for students who would like to obtain Science and Engineering Fellowships during the summer.

WiSE Research
Undergraduate women in the Viterbi School are eligible to apply for a grant from the Women in Science and Engineering (WiSE) Program. This program gives female undergraduates an opportunity to receive funds to support their research activities in the laboratory with our faculty.

Tips for finding a research project
» Search faculty webpages to learn more about the types of research being conducted at USC and in Viterbi. Think about your interests and don’t hesitate to contact someone outside of your major.

» After learning more about the types of research at USC, use your network! Talk with your professors, TAs, and students you already know. It is possible they know the faculty member(s) you want to work alongside and they may be able to connect you with that person.

» Once you’ve found some projects, faculty members, or labs that you’re interested in, it’s time to contact to faculty to see if working in their lab will be a good fit.

» Remember to cast a wide net! You might contact several faculty before you find a good fit. Don’t get discouraged!
Dean Yortsos states: “The new canvas on which engineers now paint is one that I can characterize as Engineering + {subject}.” Engineering + encapsulates the idea of exploring your interests outside of engineering so that you can think critically about today’s challenges. Whether you want to pick up a second major, add a minor, study abroad, or conduct research; these are all examples of Engineering +.

Engineering Honors Program
The W.V.T. Rusch Undergraduate Engineering Honors Program provides a unique opportunity to participate in a dynamic academic structure focusing on the National Academy of Engineering’s Grand Challenges.

Students can choose between two thematic tracks: Innovation or Entrepreneurship and Research, with each track culminating into an experience similar to that of a senior thesis. Participants may also enroll in the Honors Colloquium, a seminar where students can attend weekly lectures and network with leaders in the field of engineering. The program also features an annual fall retreat, additional lunches with guest speakers, and special events including the end of semester BBQ and the senior brunch. Students can apply the end of their freshmen year.

Double Majors
With over 150 majors at USC, the world is your oyster. Engineering students have added a second major in everything from Dramatic Arts to East Asian Languages and Cultures. Depending on your unique goals and interests, you can create a double major combination that meets your passions and helps to achieve your goals. Typically, a second major requires a minimum of an additional 32 units of coursework. If you have a double major you would like to pursue, start working with your engineering advisor to see how it may fit into your long term plan.

Minors
A minor is a great way for you to explore an area of interest outside of your major and help you think about today’s engineering challenges in a different way. You can minor in programs through the various academic units at USC, such as the Annenberg School of Communication, the Dornsife College of Letters, Arts and Sciences and the Marshall School of Business.

Get Recognized as a Renaissance Scholar
Take your double major or minor experience and apply to be a USC Renaissance Scholar in your senior year. The Renaissance Scholars program honors students whose broad interests help them excel academically. Students whose majors and minors are from widely separated fields of study can compete for this $10,000 prize. For more information visit ahf.usc.edu/scholars.
The Viterbi School of Engineering promotes, encourages, and nurtures entrepreneurship and innovation of both its students and faculty. Here are some ways you can get involved.

**Viterbi Student Institute for Innovation**
VSI2 serves as a crucible for innovation for Viterbi students, who will learn how to turn their ideas or research into successful business ventures. VSI2 offers educational programs, new venture creation support and networking opportunities to help cultivate the next generation engineering entrepreneur.

**Viterbi Startup Garage**
The Viterbi Startup Garage is located in the heart of Silicon Beach and is a meeting space for innovation and professional education for aspiring startups.

**Synchotron**
Have an idea? Take it to Synchotron, an 8-week educational program for start-up teams held at the Viterbi Startup Garage. Viterbi students have the opportunity to participate in this incubator program. Select teams with deep technologies are considered for $25,000 in seed money.

**Hacker House**
Hacker House is a Viterbi student organization that attracts builders, doers, makers, and entrepreneurs.

**Maseeh Entrepreneurship Prize Competition**
Through a generous gift from Fariborz Maseeh, the Viterbi School of Engineering has established the MEPC, a yearly business plan competition to help inspire USC Viterbi innovators to be at the forefront of these solutions. The MEPC’s goal is to make engineering innovators more business-savvy and to empower them with refined business plans that define an effective go-to-market strategy for their ideas and inventions.

**The Min Family Engineering Social Entrepreneurship Challenge**
This competition provides USC students an opportunity to develop innovations in engineering and technology toward sustainable and effective solutions for global problems and to affect the greater global society positively.

**ABC Program**
USC Viterbi offers USC undergraduate students an opportunity to use innovation to develop solutions in: Atoms – engineering hardware products; Bits – digital projects, such as mobile and web apps, including AI, ML applications; and Cells – biomedical or bioengineering projects. Check out [viterbiinnovation.usc.edu/abc/](http://viterbiinnovation.usc.edu/abc/) for more information.
Engineering is a global profession and the skills needed to practice mindful inclusivity and cultural competency is of utmost importance for the well being of the citizens of the world. Now, more than ever, companies are international in scope and collaborate with overseas partners. The chance to study, work, or conduct research abroad provides you with the opportunity to gain meaningful international exposure prior to entering the workforce.

**Center for Engineering Diversity**
The Center for Engineering Diversity promotes an inclusive community of engineering scholars who are historically underrepresented in engineering. Through partnerships with Viterbi students affairs professionals, faculty, alumni, and corporate representatives, The Center advances initiatives and provides programming that enhances the academic, personal, and professional experiences of students.

**Engineers Without Borders**
Engineers Without Borders USA builds a better world through engineering projects that empower communities to meet their basic human needs and equip leaders to solve the world’s most pressing challenges. The USC chapter’s most recent project was designing and implementing a sustainable system for providing clean water to a community in Guatemala and Kenya. To learn more, visit ewb-usc.org.

**Problems Without Passports**
Problems Without Passports provides you with the opportunity for coursework that combines problem-based or inquiry learning research exercises with study in a foreign country.

**Tsinghua Summer Research Program**
This six to seven week program provides an opportunity for an exchange of undergraduate students between the Viterbi School of Engineering and Tsinghua University in Beijing, China to participate in research with faculty at each institution.

**Viterbi Summer Overseas Program**
Viterbi Summer Overseas program is a seven week program offered each summer in cities throughout Europe. By participating in this program you can make progress towards your engineering degree by taking up to two major-related courses while also exploring those cities. Currently, the program runs each summer rotating through cities such as: Florence, Italy, London, United Kingdom, Madrid, Spain, Paris, France, and Rome, Italy.

**Viterbi iPodia Program**
IPodia is a new pedagogy which promotes peer-to-peer interactions among participating learners across disciplinary, institutional, physical and cultural boundaries. The "i" in iPodia stands for "inverted", "interactive", "international", and any combinations of the above.

**Viterbi Exchange Program**
Gain firsthand experience with current engineering globalization issues by participating in an exchange program for an excellent opportunity to learn from peers and faculty in other countries.

[PRO TIP]
**Earn a Global Scholar Distinction when you Graduate**
The Global Scholars program recognizes undergraduates who have excelled in their studies both at home and abroad, including spending at least ten weeks outside the U.S. as part of their undergraduate experience. Up to ten of these students will also be selected to receive a $10,000 prize to be applied toward graduate study. For more information, visit ahf.usc.edu/scholars.

viterbiundergrad.usc.edu/overseas
USC Viterbi cares about its community, both inside our campus and throughout Los Angeles and an important part of Viterbi life is getting involved. Getting involved helps you forge a deeper connection with your fellow USC Trojans and helps you develop the leadership and collaboration skills you need to succeed at USC. The Viterbi challenge from Dean Yortsos is to have students to collectively contribute 100,000 hours of volunteer community outreach every year: "Such outreach would cultivate in all of them a mindset of societal consciousness, a mindset of societal impact of engineering."

Within USC Viterbi, we have over 60 organizations and design teams that appeal to the diverse interests of our student body.

**Women in Engineering**
The Women in Engineering program offers professional, academic and social opportunities for all women in Viterbi. Events such as the Faculty Student Luncheon and Introduce a Girl to Engineering Day are just a couple of the programs available for the female engineering community. In addition, there are female-oriented engineering student organizations, such as the Society of Women Engineers (SWE), the engineering sorority Alpha Omega Epsilon (AOE), Athena Hacks, and Girls in Tech for students to get involved and meet fellow female engineers.

**STEM Educational Outreach Programs**
Help promote engineering in K-12 education by volunteering for Math, Engineering, Science Achievement (MESA), Mission Science Program, or other programs.

**Viterbi Impact Program (VIP)**
The Viterbi Impact Program connects undergraduate Viterbi students with the Los Angeles community. VIP participants play an important role in bringing engineering to the community as they work as partners with local schools and organizations.

**USC Volunteer Center**
The USC Volunteer Center is dedicated to promoting volunteerism and service in the USC and greater Los Angeles communities. The Volunteer Center organizes numerous service projects, identifies volunteer opportunities, and houses an extensive database of over 200 non-profits and other agencies that offer volunteer opportunities. To see how you can get involved, visit [campusactivities.usc.edu/volunteer](http://campusactivities.usc.edu/volunteer).

**Involvement Fair**
"Get Connected!" is an engineering student involvement fair held in the spring semester.

**KIUEL**
The Klein Institute for Undergraduate Engineering Life (KIUEL) provides Viterbi students a variety of personal and professional activities to enhance your experience outside the classroom. KIUEL events are designed, organized, and implemented by the KIUEL Programming Committee, a team of student leaders selected to enhance Viterbi’s community through these school-wide events.

**Student Organizations**
Student organizations are a great way for you to get involved and connect with your fellow students.
CAREER CONNEXIONS
CONNECT TO YOUR FUTURE

READ ON FOR:

- On-Campus Recruiting
- Career Prep Resources and Workshops
- Viterbi and USC Career Fairs
- Alumni Panels and Mentoring

PRO TIP
Login to join Viterbi Career Gateway ASAP

Viterbi Career Gateway is our job portal and career resource platform dedicated to Viterbi students. This system allows you to search for engineering internship/co-op and full time jobs, gives you access to information about Viterbi-specific events and resources, and includes a customized resume builder. Learn more at viterbicareers.usc.edu/gateway
**INTERNSHIPS, CO-OPS, & JOBS**

*Viterbi Career Connections offers future-focused support to prepare you for internships, co-ops and full-time employment or graduate school. We host a variety of technical companies throughout the year. Starting in your first year, you can take advantage of extensive services specifically designed for engineering students and your future.*

**Viterbi Career & Internship Fairs**
The Viterbi Career & Internship Fair that happens each semester and allows you to talk directly with recruiters about employment opportunities.

**Career Conference**
The Viterbi Career Conference, designed specifically for Viterbi undergraduates, takes place each fall and is an invaluable opportunity for you to develop job search skills and to connect with company representatives and alumni.

**On-campus Interviews**
To participate in on-campus interviews, students can use ConnectSC and Viterbi Career Gateway for submission to the companies interviewing on campus. If selected, you can sign up for interviews.

**Information Sessions**
Company representatives hold presentations to give you more in-depth information about companies and opportunities offered. They also allow you to build relationships with employers to be potentially considered for interviews.

**Workshops**
These workshops hosted by the Career Center and employers give comprehensive information about career-related topics and help prepare you to be more successful in your job search process:
- Writing Effective Resumes
- How to Write a Cover Letter
- Interviewing Strategies & Techniques
- Navigating the Internship & Job Search Process
- Networking Basics
- Maximizing your Linked In Profile

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**CONNECTIONS & ALUMNI**

*Alumni provide advice on everything from classes to landing your first job. Viterbi provides many ways for you to meet and stay connected with alums through programs offered throughout the year.*

**Viterbi Student-Alumni Mentor Program**
This program offers USC Viterbi students the opportunity to develop a mentoring relationship with an alumnus who shares their educational and professional experience to help students achieve their academic and career pursuits.

**Viterbi Industry Networking Event (VINE)**
This event provides juniors and seniors the chance to practice their networking skills by engaging with top engineering companies in a professional networking environment before the Career & Internship Fair.

**Spotlight Programs**
If you’re not sure about which field of engineering you want to pursue, or you just want to learn more about the different majors, we host a panel of alumni and industry representatives who share their experiences and how they utilized their education. You also get the opportunity to practice your networking skills and mingle with the panelists.

**Viterbi Trek**
Trek creates a personal connection between USC Viterbi students, Silicon Beach and Silicon Valley by inviting groups of current students to visit various companies in Los Angeles and the San Francisco Bay area. The experience builds a global network of USC Viterbi students and alumni toward connecting participants into internships and/or full-time positions.
DEGREE REQUIREMENTS

GENERAL EDUCATION & UNIVERSITY POLICIES

PRO TIP

USC Catalogue
The USC Catalogue (usc.edu/catalog) is your resource for academic policies, major and minor curriculum requirements, and course descriptions for all USC classes. Although this handbook tells you all the required courses for Viterbi majors, the Catalogue contains all of the course descriptions for your classes.

READ ON FOR:
- How to fulfill GE requirements
- USC Writing requirements
- AP & IB Credit
- Tracking degree progress
- Course planning tools
Student success is one of USC Viterbi’s highest priorities and advisors and faculty are invaluable resources as you craft and monitor your own academic progress by using your STARS report through OASIS on my.usc.edu. University policies can be found in this handbook and in other university publications such as the USC Catalogue (www.usc.edu/catalogue).

General Education at USC
USC General Education or "GE" for short, prepares students to be informed citizens of the 21st century. In GE courses, you will learn to think critically about the texts you read and the analysis you encounter, evaluate competing ideas and consider what is being assumed and what alternatives might exist.

As the world becomes interconnected, there is an increased need for critical thought, self-reflection, moral discernment, appreciation of diversity, aesthetic sensibility, civility, reconciliation and empathy across all spheres of life. The USC GE program is designed to provide you with the skills and knowledge necessary to meet the challenges of a globalized world and live a satisfying personal life.

Core Literacies
There are eight courses required across six Core Literacies. Some of these can be waived with AP/IB/A-Level credit.

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
There are two courses required. USC Viterbi students are encouraged to satisfy GE G and H with a course that also satisfies a Core Literacy.

GE G: Citizenship in a Global Era (1 Course)
GE H: Traditions and Historical Foundations (1 Course)

GESM
All first-year students must take one of the Core Literacy courses in the GE Seminar format. These specially designated seminars take place in a small classroom setting limited to 19 students. Ask your advisor for help in identifying these seminars and to determine which semester you need to satisfy this requirement.

Meeting Your GE Requirements
Although 11 general education requirements must be met, USC Viterbi students can meet all 11 requirements by taking 8 classes through a careful selection of classes. You may select a GE A, B or C that also satisfies a GE G, GE H or GESM requirement. Additionally, some of your major requirements satisfy GEs. Be sure to check with your advisor to make certain you are meeting your GE requirements efficiently.

GE Course Guide
The GE Course Guide (dornsife.usc.edu/2015ge) provides more information about the GE courses offered for a specific semester. You can view the course descriptions, day and time the class is offered, and the professor teaching the course.

Writing Requirement
All majors have a two course writing requirement. The first course, WRIT 150: Writing and Critical Reasoning, is usually taken the first year of college. The second writing course, usually taken in the junior or senior year, is WRIT 340: Advanced Writing.
Your hard work in high school definitely pays off. AP, IB & A-Level credit will increase your flexibility at USC to take courses that are of interest to you. The USC Office of Articulation website specifies how your advanced work in high school can help with USC degree requirements: usc.edu/articulation

Advanced Placement (AP) Exams
Any AP exam with a score of 4 or 5 will get you 4 units of credit at USC. In addition to unit credits, some AP scores can help satisfy degree requirements. Most commonly for engineering students, the following exams can satisfy or waive the following classes:

- Calculus AB $\rightarrow$ MATH 125 + GE-F
- Calculus BC (score of 4) $\rightarrow$ MATH 125 + GE-F
- Calculus BC (score of 5) $\rightarrow$ MATH 126 + GE-F
- Chemistry $\rightarrow$ CHEM 105AL + GE-E
- Biology $\rightarrow$ BISC 120L OR 220L + GE-D
- Physics (1, 2, B, or C) $\rightarrow$ GE-E
- Art History $\rightarrow$ GE-A
- European History $\rightarrow$ GE-H
- U.S. History $\rightarrow$ GE-H
- World History $\rightarrow$ GE-H
- Statistics $\rightarrow$ GE-F
- Macroeconomics $\rightarrow$ GE-F
- Microeconomics $\rightarrow$ GE-F

International Baccalaureate (IB) Exams
IB credit can be granted either from the International Baccalaureate Diploma or individual Higher Level Exams. You can receive either 20 units of credit from the IB Diploma with a score of 30 or higher, or 6 semester units of credit for each score of 5, 6, or 7 on Higher Level exams, up to a maximum of four exams, whichever is higher.

- Mathematics (6 or 7) $\rightarrow$ MATH 125 + GE-F
- Chemistry (6 or 7) $\rightarrow$ CHEM 105A + GE-E
- Biology (6 or 7) $\rightarrow$ BISC 120L OR 220L + GE-D
- Physics $\rightarrow$ GE-E
- Economics $\rightarrow$ GE-F
- History (Route 1) $\rightarrow$ GE-H
- History (Route 2, 20th Century World History: Europe and the Middle East) $\rightarrow$ GE-H
- History (Route 2, 20th Century World History: Asia and Oceania or History of Africa or History of the Americas) $\rightarrow$ GE-G
- Dance, Film, Music, Theatre, or Visual Arts $\rightarrow$ GE-A
- Global Politics $\rightarrow$ GE-G

A-Level exams
USC awards 8 semester units of elective credit for A-level exams, along with H2 exams in Singapore, with a score of B or better. Students may not receive credit for both an AP exam (or IB or other international exam) and a college course taken before high school graduation covering the same subject matter, nor for an AP and IB exam covering the same subject matter.

- Art & Design, Music $\rightarrow$ GE-A
- Biology & Marine Science $\rightarrow$ GE-D
- Chemistry $\rightarrow$ CHEM 105A + GE-E
- Physics $\rightarrow$ GE-E
- Economics $\rightarrow$ GE-F
- Mathematics $\rightarrow$ MATH 125 + GE-F
- Classical Studies, Divinity and Islamic Studies $\rightarrow$ GE-H
- History $\rightarrow$ GE-G

PHYSICS NOTE FOR COMPUTER SCIENCE MAJORS:

- AP, IB, and A-Level physics exams are not equivalent to PHYS 151. However, AP Physics C (Mechanics and Electricity/Magnetism) with a 4 or 5 score can fulfill basic science requirements for Computer Science (CSCI), Computer Science/Business Administration (CSBA), and Computer Science (Games) (CSGM). Please note the following for these specific majors:
  - **CSCI**: AP Physics C (Mechanics) + AP Physics C (Electricity & Magnetism) or PHYS 151 + AP Physics C (Electricity & Magnetism) satisfies the Basic Science I & II requirement.
  - **CSBA**: AP Physics C (Mechanics) or AP Physics C (Electricity & Magnetism) satisfies the Basic Science requirement.
  - **CSGM**: AP Physics C (Mechanics) satisfies the PHYS 151 requirement.

A score of 6 or 7 on the IB Higher Level Physics exam and a score of B or better on the A-level Physics exam satisfies the basic science requirement for CSCI, CSBA, and CSGM.
In the following pages you will find Major Course Plans for each USC Viterbi major. These plans provide a general layout of how your next four years may look depending on the major. These suggested course plans are your guide to use with your academic advisor in customizing an academic plan tailored to your individual needs and interests.

The Major Course Plans only reflect the required courses for each major. You are required to complete a minimum of 128 units or more depending on the major.

**Prerequisites & Co-Requisites**
Many of the math, science and engineering courses have one or more prerequisites or co-requisites to ensure adequate preparation for courses in a sequence. The diagram below illustrates how to read the course requirements on the course plans.

**Here are some helpful terms to keep in mind:**

**OPTIONAL ELECTIVE:** Although they do not satisfy major requirements, you can enroll in optional electives that count towards your total USC units.

**REQUIRED ELECTIVE:** Some majors require you to take elective courses in order to make up the 128 units needed to complete your degree. These required electives can also be satisfied with AP/IB and transfer credit.

**TECHNICAL ELECTIVE:** Some majors require elective courses that are more technical. Academic Departments have lists of approved courses that satisfy the technical elective requirement.

Remember, your academic advisor is here to help when you have questions about the Major Course Plans.

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**PRO TIP**

**Your STARS Report**
Use your STARS report (Student Academic Record System), available on OASIS, to track your degree progress. Your STARS report shows you which requirements you have completed, still outstanding, and currently in progress.
AEROSPACE & MECHANICAL

MAJORS & AREAS OF EMPHASIS

» Aerospace Engineering (Tracks: Aeronautics, Structures, Controls, Thermal Systems, Design)
» Mechanical Engineering (Tracks: Computational, Design, Dynamics/Control, Thermo/Fluids)
» Mechanical (Petroleum) Engineering

LEARN MORE: viterbi.usc.edu/ame
Aerospace and Mechanical Engineers design complex mechanical, thermal, fluidic, acoustical, optical, and electronic systems, with characteristic sizes ranging from microns to tens of kilometers. Such systems are used everywhere, from the depths of the ocean and far underground, to near-Earth, planetary, interplanetary and galactic space.

Aerospace and Mechanical Engineering (AME) students conduct basic and applied research within and across the usual disciplinary boundaries. AME students develop core and valuable problem-solving skills in the areas of mechanics, thermodynamics, fluid mechanics, heat transfer, materials and design. Our graduates are frequently at the leading edge of industry, tackling innovative, significant and exciting challenges.

AME students have the opportunity to work with the world-renowned faculty on research projects including turbulence control, emerging fuel cell technologies, computational fluid mechanics, combustion, heat transfer, automatic control systems, biomechanics, robotics, and nonlinear dynamics. Recent undergraduate research and student projects include the design of fixed and flapping wing systems for small unmanned aircrafts, the search for low drag solutions for the global cargo shipping industry, sports injury and helmet design for shock reduction, and optimal control of wheelchairs for humans and hovering flight for animals.

AME Research
We advance and define research frontiers that shape the future of our life in the air, on the ground, and in space. We push forward the understanding of environments both natural (oceans, atmosphere) and engineered (internal combustion, pulsed ignition). Other efforts advance our understanding of control and dynamics of autonomous systems and robotics, advance manufacturing technology, aircraft design and flight mechanics of very small and very fast flying machines, and biodynamical systems in medical devices, natural propulsion, and evolutionary system dynamics.

We have a balance of programs — theoretical, computational, and experimental — which exemplify the Viterbi School's approach to intensive and collaborative research.
# AEROSPACE ENGINEERING

## 2018-19 MAJOR COURSE PLAN

### FIRST YEAR

#### FALL SEMESTER
- **GE B**
- AME 105
- MATH 125 (GE F)
- CHEM 105AL or MASC 110L
- ENGR 102

#### SPRING SEMESTER
- WRIT 150
- GE A
- MATH 126 or MATH 129
- PHYS 151L (GE E)
- ITP 168

### SECOND YEAR

#### FALL SEMESTER
- **GE C**
- AME 201
- MATH 226 or MATH 229
- PHYS 152L
- AME 204
- WRIT 150

#### SPRING SEMESTER
- AME 261
- MATH 245
- AME 231L
- ASTE 280
- WRIT 340

### THIRD YEAR

#### FALL SEMESTER
- **GE D**
- AME 301
- AME 310 (MATH 229)
- AME 308
- AME 341AL
- OPTIONAL ELECTIVE

#### SPRING SEMESTER
- **GE C**
- AME 302
- MATH 246
- PHYS 153L
- AME 341bL
- OPTIONAL ELECTIVE

### FOURTH YEAR

#### FALL SEMESTER
- **GE B**
- AME 404
- TECHNICAL ELECTIVE
- TECHNICAL ELECTIVE
- AME 441aL
- OPTIONAL ELECTIVE

#### SPRING SEMESTER
- WRIT 340
- AME 436
- AME 451
- AME 481
- OPTIONAL ELECTIVE

### MATHEMATICS (16 UNITS)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### PHYSICS (12 UNITS)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism
- PHYS 153L: Optics and Modern Physics

### CHEMISTRY / MATERIALS SCIENCE (4 UNITS)
- CHEM 105AL: General Chemistry
- or MASC 110L: Materials Science

### GENERAL EDUCATION (32 UNITS)
- 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)
- GE G,H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### ENGINEERING (67 UNITS)
- AME 105: Intro. to Aerospace Engineering
- AME 201: Statics Course
- AME 204: Strength of Materials
- AME 231L: Mechanical Behavior of Materials
- AME 261: Basic Flight Mechanics
- AME 301: Dynamics
- AME 302: Dynamic Systems
- AME 308: Comp.-Aided Analysis for Design
- AME 309: Dynamics of Fluids
- AME 310: Engineering Thermodynamics
- AME 341AL: Mechatronics Laboratory I
- AME 341BL: Mechatronics Laboratory II
- AME 404: Comp. Solutions to Engr. Problems
- AME 436: Energy and Propulsion
- AME 441AL: Senior Projects Laboratory
- AME 451: Linear Control Systems I
- AME 481: Aircraft Design
- ASTE 280: Astronautics & Space Environment I
- ENGR 102: Engineering Freshman Academy
- ITP 168: Introduction to MATLAB

### OPTIONAL ELECTIVES
- Consult with your academic advisor to explore optional elective courses. These courses are not required.

### TECHNICAL ELECTIVES
- Any upper-division course in engineering, Chemistry, Physics, and Mathematics. See major advisor for exceptions/substitutions.

### SPECIAL NOTES
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE B and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

2018-19 MAJOR COURSE PLAN
Optional Course Tracks for the Aerospace Engineering Degree:

The Aerospace Engineering curriculum covers foundational concepts in a number of areas, ranging from dynamics and aerodynamics to computer aided analysis for design to computational solutions to engineering problems. Through your first five to six semesters, students will gain exposure to foundational concepts in Aerospace and Mechanical Engineering.

Your final two to three semesters in the program, you may continue and graduate with the Aerospace Engineering Standard Track listed to the left or choose to specialize. Students following the standard program will have the opportunity to take more technical and AME Core electives, while students following a specialized track will take more specific courses.

Aerospace Engineering offers the following tracks:
Aeronautics, Structures, Controls, Thermal Systems and Design.

### AERONAUTICS

**Fourth Year: FALL SEMESTER**
- **GE B**
- AME 459 3
- AME 451 3
- AME 457 AME 459 or AME 443 3
- AME 441a AME 431bL 3
- **OPTIONAL ELECTIVE** 2

**Fourth Year: SPRING SEMESTER**
- **WRIT 340**
- AME 436 3
- AME 481 4
- AME 460 3
- **OPTIONAL ELECTIVE** 5

### STRUCTURES

**Fourth Year: FALL SEMESTER**
- **GE B**
- AME 459 or AME 451 3
- AME 459 or CE 358 3
- AME 441a AME 341bL 3
- **OPTIONAL ELECTIVE** 3

**Fourth Year: SPRING SEMESTER**
- **WRIT 340**
- AME 436 3
- AME 481 4
- AME 403 or AME 420 or MATH 245 3
- AME 408 or CE 458 3
- **OPTIONAL ELECTIVE** 2

### CONTROLS

**Fourth Year: FALL SEMESTER**
- **GE B**
- AME 451 AME 350 or AME 309 or CE 400 3
- AME 459 or ASTE 480 3
- AME 441a AME 341bL 3
- **OPTIONAL ELECTIVE** 3

**Fourth Year: SPRING SEMESTER**
- **WRIT 340**
- AME 436 or AME 350 or CE 309 3
- AME 481 4
- AME 443 or AME 420 or MATH 245 3
- AME 453 or CE 458 3
- **OPTIONAL ELECTIVE** 3

### THERMAL SYSTEMS

**Third Year: SPRING SEMESTER**
- **GE C**
- AME 302 MATH 245 3
- AME 309 MATH 245 3
- AME 331 AME 310 or AME 310 or CE 309 3
- AME 341b AME 341dL 3
- **OPTIONAL ELECTIVE** 3

**Fourth Year: FALL SEMESTER**
- **GE B**
- AME 451 AME 350 or AME 309 or CE 400 3
- AME 430 or AME 430 or AME 310 3
- AME 441a AME 341bL 3
- **OPTIONAL ELECTIVE** 3

**Fourth Year: SPRING SEMESTER**
- **WRIT 340**
- AME 436 or AME 350 or CE 309 3
- AME 481 4
- PHYS 153 or PHYS 316 3
- **OPTIONAL ELECTIVE** 3 or 4

### DESIGN

**Fourth Year: FALL SEMESTER**
- **GE B**
- AME 451 AME 350 or AME 309 or CE 400 3
- AME 459 or ASTE 480 3
- AME 441a AME 341bL 3
- AME 430 or AME 430 or AME 310 3
- **OPTIONAL ELECTIVE** 3

**Fourth Year: SPRING SEMESTER**
- **WRIT 340**
- AME 436 or AME 350 or CE 309 3
- AME 481 4
- AME 408 or AME 284 or CE 225 3
- **OPTIONAL ELECTIVE** 5
# 2018-19 MAJOR COURSE PLAN

## ENGINEERING MAJOR

### MECHANICAL ENGINEERING

#### FIRST YEAR

**FALL SEMESTER**
- **GE B**
- **MATH 125 (GE F)**
  - CHEM 105aL or MASC 110L
- **ENGR 102**

**SPRING SEMESTER**
- **WRIT 150**
  - GE A
- **MATH 126 or MATH 129**
  - PHYS 151L (GE E)
- **ITP 168**

#### SECOND YEAR

**FALL SEMESTER**
- **GE C**
  - AME 201
  - MATH 126 or MATH 129
- **MATH 226 or MATH 229**
  - PHYS 152L
- **OPTIONAL ELECTIVE**

**SPRING SEMESTER**
- **GE D**
  - AME 204
  - MATH 245
- **MATH 226 or MATH 229**
  - PHYS 153L
- **WRIT 340**
  - WRIT 150

#### THIRD YEAR

**FALL SEMESTER**
- **AME 310**
  - MATH 125
- **AME 301**
  - MATH 126 or MATH 129
- **AME 308**
  - MATH 245
- **AME 302**
  - MATH 124b
- **AME 309**
  - MATH 245
- **AME 331**
  - MATH 300 or 320
- **AME 341aL**
  - MATH 300
  - MATH 320
- **OPTIONAL ELECTIVE**

**SPRING SEMESTER**
- **GE B**
  - AME 304
  - MATH 245
- **GE C**
  - AME 308
  - MATH 245
- **AME 341bL**
  - AME 341aL
- **AME 341bL**
  - AME 341aL

#### FOURTH YEAR

**FALL SEMESTER**
- **AME 451**
  - ENGR 102
- **AME CORE**
- **AME DESIGN ELECTIVE**
- **AME 441aL**
- **OPTIONAL ELECTIVE**

**SPRING SEMESTER**
- **GE C**
  - AME 308
  - MATH 245
- **GE C**
  - AME CORE
- **AME CAPSTONE ELECTIVE**
  - AME 441aL
- **OPTIONAL ELECTIVE**

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### MATHEMATICS (16 UNITS)

- **MATH 125**: Calculus I
- **MATH 126** or **MATH 129**: Calculus II
- **MATH 226** or **MATH 229**: Calculus III
- **MATH 245**: Mathematics of Phys. and Engr.

### PHYSICS (12 UNITS)

- **PHYS 151L**: Mechanics and Thermodynamics
- **PHYS 152L**: Electricity and Magnetism
- **PHYS 153L**: Optics and Modern Physics

### CHEMISTRY / MATERIALS SCIENCE (4 UNITS)

- **CHEM 105AL**: General Chemistry
- **MASC 110L**: Materials Science

### GENERAL EDUCATION (32 UNITS)

- **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)
- **GE G,H** Global Perspectives (2 Courses)*
- **GESM** General Education Seminar (1 Course)*

### WRITING (7 UNITS)

- **WRIT 150**: Writing and Critical Reasoning
- **WRIT 340**: Advanced Writing

### ENGINEERING (66 UNITS)

- **AME 101L**: Intro. to Mech. Engr. & Graphics
- **AME 201**: Statics
- **AME 204**: Strength of Materials
- **AME 301**: Dynamics
- **AME 302**: Dynamic Systems
- **AME 308**: Comp.-Aided Analysis for Design
- **AME 309**: Fluid Dynamics
- **AME 310**: Engineering Thermodynamics I
- **AME 331**: Heat Transfer
- **AME 341AL**: Mechatronics Laboratory I
- **AME 341BL**: Mechatronics Laboratory II
- **AME 441AL**: Senior Projects Laboratory
- **AME CORE**
- **AME DESIGN ELECTIVE**
- **AME CAPSTONE ELECTIVE**
- **ENGR 102**: Engineering Freshman Academy
- **ITP 168**: Introduction to MATLAB
- **MASC 310**: Mechanical Behavior of Materials

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### TECHNICAL ELECTIVES

- **AME 305**, **308**, **408**, **410**, **415**, **423**, **430**, **443**
- **AME 409**, **415**, **423**, **430**, **443**
- **AME 305**, **308**, **408**, **410**, **415**, **430**, **443**

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### SPECIAL NOTES

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

**GE**: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

**OPTIONAL ELECTIVES**: Consult with your academic advisor to explore optional elective courses. These courses are not required.

**AME CORE**: Any upper-division AME course not already required.

**AME CAPSTONE ELECTIVE**: AME 409, 415, 423, 430, or 443

**AME DESIGN ELECTIVE**: AME 305, 408, 410, 415, 430, or 481
Optional Course Tracks for the Mechanical Engineering Degree:

The Mechanical Engineering curriculum covers foundational concepts in a number of areas, ranging from dynamics and aerodynamics to computer aided analysis for design to computational solutions to engineering problems. Through your first five to six semesters, students will gain exposure to foundational concepts in Aerospace and Mechanical Engineering.

Your final two to three semesters in the program, you may continue and graduate with the Mechanical Engineering Standard Track listed to the left or choose to specialize.

As you will notice in the curriculum, students following the standard program will have the opportunity to take more technical and AME Core electives, while students following a specialized track will take specific courses relative to the specialization.

Mechanical Engineering offers the following tracks:
Thermo/Fluids, Dynamics/Controls, Design, and Computational.

**COMPUTATIONAL**

**Fourth Year: FALL SEMESTER**
- ITP 165
- AME 404
- AME 415
- EE 141L
- AME 441a
- \( \text{OPTIONAL ELECTIVE} \)

**Fourth Year: SPRING SEMESTER**
- GE C
- MATH 445
- CSCI 455
- AME 408
- \( \text{OPTIONAL ELECTIVE} \)

**DESIGN**

**Fourth Year: FALL SEMESTER**
- AME 305
- \( \text{AME 352, AME 245} \)
- AME 451
- AME 410
- AME 441a
- \( \text{OPTIONAL ELECTIVE} \)

**Fourth Year: SPRING SEMESTER**
- GE C
- AME 403
- AME 409
- AME 408
- AME 420

**DYNAMICS & CONTROLS**

**Fourth Year: FALL SEMESTER**
- GE C
- \( \text{AME 302, AME 245} \)
- AME 451
- TECH ELECTIVE
- AME 303
- \( \text{AME 310, EE 215} \)
- AME 441a
- \( \text{OPTIONAL ELECTIVE} \)

**Fourth Year: SPRING SEMESTER**
- AME 423
- \( \text{AME 310, PHYS 152} \)
- AME 420
- AME 443
- AME 453
- TECH ELECTIVE

**THERMO & FLUIDS**

**Fourth Year: FALL SEMESTER**
- TECH ELECTIVE
- AME 415
- AME 430
- AME 457
- AME 441a
- \( \text{OPTIONAL ELECTIVE} \)

**Fourth Year: SPRING SEMESTER**
- GE C
- \( \text{AME 310} \)
- AME 312
- AME 436
- TECH ELECTIVE
- TECH ELECTIVE

**OPTIONAL ELECTIVE**
# Mechanical (Petroleum) Major Course Plan

## First Year

### Fall Semester
- **GE B**
  - AME 101L: Intro. to Mech. Engr. & Graphics (3 units)
  - MATH 125: Calculus I (4 units)
  - CHEM 105AL or MASC 110L (4 units)
  - ENGR 102 (GE F) (2 units)

### Spring Semester
- **WRIT 150** (4 units)
- **GE A**
  - MATH 126 or MATH 129 (4 units)
  - PHYS 151L (GE E) (4 units)
  - ITP 168 (2 units)

## Second Year

### Fall Semester
- **GE C**
  - AME 201 (4 units)
  - MATH 226 or MATH 229 (3 units)
  - PHYS 152L (4 units)
  - WRIT 340 (3 units)
  - AME 301 (3 units)

### Spring Semester
- **GE B**
  - AME 204 (3 units)
  - MATH 245 (3 units)
  - PHYS 153L (4 units)
  - WRIT 150 (2 units)

## Third Year

### Fall Semester
- **AME 301** (3 units)
  - AME 204 or CE 205 (3 units)
  - MATH 245 (3 units)
  - AME 341aL (3 units)

### Spring Semester
- **AME 308** (3 units)
  - AME 309 (4 units)
  - PTE 464 (3 units)
  - AME 341bL (3 units)

## Fourth Year

### Fall Semester
- **GE C**
  - PTE 461 (3 units)
  - PTE 465 (3 units)
  - AME 408 (3 units)
  - AME 441aL (3 units)

### Spring Semester
- **GE D**
  - GE 331L (3 units)
  - AME 409 (4 units)
  - TECHNICAL ELECTIVE (4 units)

### Special Notes
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.
- OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.
- TECHNICAL ELECTIVES: Any upper-division course in engineering, Chemistry, Physics, and Mathematics. See major advisor for exceptions/substitutions.

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### Mathematics (16 Units)
- MATH 125: Calculus I
- MATH 126 or 129: Calculus II
- MATH 226 or 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### Physics (12 Units)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism
- PHYS 153L: Optics and Modern Physics

### Chemistry / Materials Science (4 Units)
- CHEM 105AL: General Chemistry
- MASC 110L: Materials Science

### General Education (32 Units)
- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### Writing (7 Units)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

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### Engineering (66 Units)
- AME 201L: Statics
- AME 204: Strength of Materials
- AME 301: Dynamics
- AME 302: Dynamic Systems
- AME 308: Comp.-Aided Analysis for Design
- AME 309: Fluid Dynamics
- AME 310: Engineering Thermodynamics I
- AME 331: Heat Transfer
- AME 341AL: Mechoptronics Laboratory I
- AME 341BL: Mechoptronics Laboratory II
- AME 408: Comp.-Aided Design of Mech Systems
- AME 409: Senior Design Project
- AME 441AL: Senior Projects Laboratory
- ENGR 102: Engineering Freshman Academy
- ITP 168: Introduction to MATLAB
- PTE 461: Formation Evaluation
- PTE 463L: Intro. to Transport Processing in Porous Media
- PTE 464L: Petroleum Reservoir Engineering
- PTE 465L: Drilling Technology
- MASC 310: Mechanical Behavior of Materials

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*Special Notes:*
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.
- OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.
- TECHNICAL ELECTIVES: Any upper-division course in engineering, Chemistry, Physics, and Mathematics. See major advisor for exceptions/substitutions.
MAJORS & AREAS OF EMPHASIS

» Astronautical Engineering

LEARN MORE: viterbi.usc.edu/aste
Astronautical engineers design, build, and operate space vehicles for exploration and applications beyond the Earth’s atmosphere. This program prepares students for engineering careers in the space sector of the aerospace industry, space research, development, and operations in industry and government centers and laboratories, as well as for graduate study.

The Astronautical Engineering (ASTE) program provides the fundamentals of science and engineering, specialized courses in astronautical engineering, and technical electives to broaden as well as deepen the coursework. ASTE students learn spacecraft and launch vehicle design and operations, propulsion, orbital mechanics, spacecraft dynamics and control, navigation, instrumentation and sensors, and much more.

**ASTE RESEARCH**

The Department of Astronautical Engineering (ASTE) is at the center of exciting and innovative research in spacecraft and space exploration, from basic science to new ways of designing and integrating spacecraft. ASTE operates world-class research facilities such as the Collaborative High Altitude Flow Facility (CHAFF) space simulation chamber, a six-meter cryogenically cooled chamber capable of testing propulsion systems in high vacuum.

Astronautical engineering students can engage in research under faculty guidance as early as the freshman year. In addition, ASTE has several ongoing hands-on student projects. The Microsatellite Project designs and builds CubeSats, small spacecraft approximately the size of a loaf of bread. Its second spacecraft, which has the first dish antenna ever used on a cubesat, has been successfully operating for more than a year. The Rocket Propulsion Laboratory designs and builds solid-fueled rockets. Its goal is to be the first student group ever to send a rocket to 100 km altitude (see photo at left). The Lunar Lander group builds subscale models of landing craft. These use jet engines for primary thrust and auxiliary thrusters for attitude and sideways motion. The goal is to demonstrate fully autonomous liftoff, travel and landing.

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### RESEARCH HIGHLIGHTS

- Spacecraft architecture and design
- Space science, space instrumentation and sensors
- Advanced spacecraft propulsion
- Processes in the heliosphere and planetary magnetospheres
- Atomic and molecular interactions
- Plasma interactions in spacecraft environment
- Multi-spacecraft formation flying
- Self-diagnosing and self-repairing spacecraft

### COMPANIES THAT HIRE ASTE STUDENTS

Aerospace Corporation, The Boeing Company, Defense Advanced Research Projects Agency (DARPA), Lockheed Martin, Northrop Grumman, various government agencies, Jet Propulsion Laboratory (JPL), NASA Research Centers (Glenn, Marshall, Johnson), Raytheon, SpaceX, Virgin Galactic...

And many more!

### CAREER OPTIONS

- Design rocket vehicles
- Design, build, and test satellites
- Operate unmanned spacecrafts and probes
- Build space instrumentation and sensors
- Conduct government research
- Lead space operations
- Become a researcher at a university or government research center
# Astronautical Engineering

## First Year
### Fall Semester
- **WRIT 150**: Writing and Critical Reasoning (4 units)
- **ASTE 101L**: Introduction to Astronautics (4 units)
- **MATH 125 (GE F)**: Calculus I (4 units)
- **CHEM 105AL or MASC 110L**: General Chemistry or Materials Science (4 units)
- **ENGR 102**: Engineering Freshman Academy (2 units)

### Spring Semester
- **GE A**: The Arts (1 course)
- **MATH 126 or MATH 129**: Calculus II (4 units)
- **PHYS 151L (GE E)**: Mechanics and Thermodynamics (4 units)
- **IPM 168**: Introduction to MATLAB (2 units)

## Second Year
### Fall Semester
- **AME 201**: Statics (3 units)
- **MATH 226 or MATH 229**: Calculus III (4 units)
- **PHYS 152L**: Electricity and Magnetism (4 units)
- **AMG 301**: General Chemistry (3 units)

### Spring Semester
- **AME 204**: Strength of Materials (3 units)
- **MATH 245**: Mathematics of Physics and Engr. (4 units)
- **PHYS 153L**: Electricity and Magnetism (4 units)

## Third Year
### Fall Semester
- **AME 301**: Statics (3 units)
- **ASTE 301A**: Thermal and Statistical Systems I (3 units)
- **ASTE 300**: Advanced Writing (3 units)
- **AME 308**: Strength of Materials (3 units)

### Spring Semester
- **WRIT 340**: Writing and Critical Reasoning (3 units)
- **ASTE 301B**: Thermal and Statistical Systems II (3 units)

## Fourth Year
### Fall Semester
- **AME 404**: Advanced Writing (3 units)
- **ASTE 470**: Spacecraft Propulsion (3 units)
- **AME 441AL**: Senior Projects Laboratory (3 units)

### Spring Semester
- **GE B**: Humanistic Inquiry (2 courses) (3 units)
- **ASTE 480**: Spacecraft Dynamics (3 units)

## Mathematics (16 Units)
- **MATH 125**: Calculus I (4 units)
- **MATH 126 or MATH 129**: Calculus II (4 units)
- **MATH 226 or MATH 229**: Calculus III (4 units)
- **MATH 245**: Mathematics of Physics and Engr. (4 units)

## Physics (12 Units)
- **PHYS 151L**: Mechanics and Thermodynamics (3 units)
- **PHYS 152L**: Electricity and Magnetism (3 units)
- **PHYS 153L**: Electricity and Magnetism (3 units)

## Chemistry/Materials Science (4 Units)
- **CHEM 105AL**: General Chemistry (3 units)
- **MASC 110L**: Materials Science (1 unit)

## General Education (32 Units)
- **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)
- **GE G,H**: Global Perspectives (2 courses)*
- **GESM**: General Education Seminar (1 course)*

## Technical Electives
Any upper-division course in engineering, Chemistry, Physics, Mathematics, or MATH 225 except ENGR 404, 412, 440, and 444. No more than 3 units of ASTE 490 or ASTE 491 coursework can be used for Technical Electives.

## Writing (7 Units)
- **WRIT 150**: Writing and Critical Reasoning (4 units)
- **WRIT 340**: Advanced Writing (3 units)

## Engineering (68 Units)
- **AME 201**: Statics (3 units)
- **AME 204**: Strength of Materials (3 units)
- **AME 301**: Dynamics (3 units)
- **AME 308**: Comp.-Aided Analysis for Design (3 units)
- **AME 301AL**: Mechatronics Laboratory I (3 units)
- **AME 308L**: Mechatronics Laboratory II (3 units)
- **AME 404**: Comp. Solutions to Engr. Problems (3 units)
- **AME 441AL**: Senior Projects Laboratory (3 units)
- **ASTE 101L**: Intro. to Astronautics (3 units)
- **ASTE 280**: Astronautics & Space Environment I (3 units)
- **ASTE 301A**: Thermal and Statistical Systems I (3 units)
- **ASTE 301B**: Thermal and Statistical Systems II (3 units)
- **ASTE 330**: Astronautics & Space Environment II (3 units)
- **ASTE 421**: Space Mission Design (3 units)
- **ASTE 470**: Spacecraft Propulsion (3 units)
- **ASTE 480**: Spacecraft Dynamics (3 units)
- **ENGR 102**: Engineering Freshman Academy (3 units)

## Technical Electives
Consult with your academic advisor to explore optional elective courses. These courses are not required.

## Optional Electives
Courses with this symbol may be satisfied with AP, IB, or A-Level exams. See page 22 for more information.

## GE
Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

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* SPECIAL NOTES
Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.

TECHNICAL ELECTIVES: Any upper-division course in engineering, Chemistry, Physics, Mathematics, or MATH 225 except ENGR 404, 412, and 440. No more than 3 units of ASTE 490 or ASTE 491 coursework can be used for Technical Electives.
MAJORS & AREAS OF EMPHASIS

» Biomedical Engineering
» Biomedical (Biochemical) Engineering
» Biomedical (Electrical) Engineering
» Biomedical (Mechanical) Engineering

LEARN MORE: viterbi.usc.edu/bme
The interdisciplinary field of Biomedical Engineering (BME) combines elements of engineering (electronics, systems analysis, mechanics) with the life sciences (biology, physiology, biochemistry) to define and solve problems in biology and medicine.

Students choose Biomedical Engineering (BME) for the excitement of working with people and living systems, and for the opportunity to apply advanced technology to the complex problems of medical care.

Students can participate in a variety of directed study courses or classroom projects at facilities such as the County-USC Medical Center, House Ear Institute, the Biomedical Simulations Resource Center, the Medical Ultrasonic Transducer Resource Center, Rancho Los Amigos National Rehabilitation Center and Children's Hospital-Los Angeles (CHLA).

**EMPHASES & OPTIONS**

While many students choose a primary degree in Biomedical Engineering with no added specialization, we do offer the opportunity to deepen your education in three separate programs: Biochemical (BMEC), Electrical (BMEN, and Mechanical (BMEL).

Biomedical (Biochemical) Engineering (BMEC) combines biomedical engineering with chemistry. As a BMEC student, you will take additional coursework in areas like Separation Processes (design, operation and optimization for processes like distillation and absorption), Chemical Engineering Thermodynamics and Biomaterials.

Biomedical (Electrical) Engineering (BMEN) is for students interested in the building of electronic biomedical devices and the effects of electrical stimulation. As a BMEN student, you will take additional coursework in areas like Linear Circuits, Digital Logic, Electromagnetics and Digital Electronic Circuit Design.

Biomedical (Mechanical) Engineering (BMEL) is for students interested in the mechanics and dynamics of medical devices and biological systems. As a BMEL student, you will take additional coursework in areas like Mechanics, Thermodynamics, Biomechanics, Materials Behavior and Processing, and Fluid Mechanics.

The BME programs are easily adapted to include the prerequisites for most medical schools, while also providing applied technical training beyond the basic life sciences. USC Pre-Med students are supported throughout the medical school application process by the Pre-Health Advisement office. Graduates go on to attend top medical, dental and pharmacy schools around the country, including the USC Keck School of Medicine.

**RESEARCH HIGHLIGHTS**

- Retinal prostheses
- Medical imaging
- Neural prostheses
- Biomedical photonics
- Cortical prostheses
- Sensory neurophysiology
- Sensorimotor control
- Cardio-respiratory control and dynamics
- Ultrasound imaging
- Computational neurobiology
- Mechanisms of memory and learning
- System modeling and simulation

**COMPANIES THAT HIRE BME STUDENTS**

Abbott Laboratories, Advanced Bionics, Alfred E. Mann Institute, Amgen, Edwards Lifesciences, House Ear Institute, Lifescan, Medtronic, Neutrogena, Nike...

And many more!

**CAREER OPTIONS**

- Become physicians or pharmacists
- Build advanced therapeutic & surgical devices
- Create safe implantable artificial materials
- Conduct biomedical research
- Develop artificial organs
- Design natural prosthetics
- Improve medical imaging devices
# Biomedical Engineering

## 2018-19 Major Course Plan

### First Year

#### Fall Semester
- **BME 101** or **GE B**
- **WRIT 150**
- **MATH 125** (GE F)
- **CHEM 105aL** (GE E)
- **ENGR 102**

#### Spring Semester
- **BME 101** or **GE B**
- **GE A**
- **MATH 126 or MATH 129**
- **CHEM 105bL**
- **OPTIONAL ELECTIVE**

### Second Year

#### Fall Semester
- **BME 402**
- **GE C**
- **MATH 226 or MATH 229**
- **PHYS 151L** (GE E)
- **OPTIONAL ELECTIVE**

#### Spring Semester
- **BISC 220L**
- **BME 210**
- **MATH 245**
- **PHYS 152L**
- **OPTIONAL ELECTIVE**

### Third Year

#### Fall Semester
- **WRIT 340**
- **EE 202L**
- **BME 423**
- **CHEM 322aL**
- **BME ANCHOR COURSE**

#### Spring Semester
- **BME 302L**
- **GE C**
- **CHEM 322bL**
- **OPTIONAL ELECTIVE**

### Fourth Year

#### Fall Semester
- **BISC 320L**
- **BME 403L** or **405L**
- **BME 402**
- **BME 405L**
- **BME 410**

#### Spring Semester
- **GE B**
- **BME 405L** or **403L**
- **OPTIONAL ELECTIVE**

### Mathematics (16 Units)
- MATH 125: Calculus I
- MATH 126 or 129: Calculus II
- MATH 226 or 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### Physics (8 Units)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### Chemistry (16 Units)
- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- CHEM 322AL: Organic Chemistry
- CHEM 322BL: Organic Chemistry

### Biology (8 Units)
- BISC 220L: Cell Biology & Physiology
- BISC 320L: Molecular Biology

### General Education (32 Units)
- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### Writing (7 Units)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### Engineering (55 Units)
- BME 101: Intro. to Biomedical Engineering
- BME 210: Biomed. Comp. Simulation Methods
- BME 302L: Medical Electronics
- BME 402: Control & Comm. in Nerv. System
- BME 403L: Physiological Systems
- BME 405L: Senior Projects: Meas. and Inst.
- BME 410: Intro. to Biotransport & Tissue Engr.
- BME 413: Biocircuit Design
- BME 425: Intro. to Biomedical Imaging
- EE 202L: Linear Circuits
- ENGR 102: Engineering Freshman Academy
- BME ANCHOR COURSE: BME 404 or BME 430 or BME 451 or BME 452

### Technical Electives
- At least 8 units, taken from ONE of the following three areas of specialization:
  - Bioelectronics/Computers: BME 201, BME 416, BME 451, BME 452, BME 453, CSCI 1455, EE 152L, EE 338, EE 348L, EE 352L, EE 354L, EE 454L, EE 483, ENGR 345 or ITP 308 or Biomechanics: AME 201, AME 204, AME 301, AME 302, AME 308 or ITP 308, AME 309, BME 201, BME 412, BME 414, BME 416, BME 453 or MASC 310L Biochemical Engineering: BME 201, BME 408, BME 414, BME 430, BME 453, BME 458, CHE 330, CHE 350, CHE 460L, CHE 489, ENGR 305, ITP 308, or MASC 310L

### Special Notes
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, or C only. See page 21 for more information and consult your advisor for detailed assistance.

- **OPTIONAL ELECTIVES:** Consult with your academic advisor to explore optional elective courses. These courses are not required.
## BIOMEDICAL (BIOCHEMICAL)

### FIRST YEAR

<table>
<thead>
<tr>
<th>FALL SEMESTER</th>
<th>SPRING SEMESTER</th>
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<tbody>
<tr>
<td>BME 101 or GE B</td>
<td>WRIT 150</td>
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<td>MATH 125 (GE F)</td>
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<td>MATH 125 or MATH 129</td>
<td>CHEM 105aL (GE E)</td>
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<td>GE A</td>
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| SECOND YEAR
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<td>BME 101 or GE B</td>
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| FOURTH YEAR
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<td>MASC 310</td>
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<td>CHE 489</td>
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<td>BME 405L</td>
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<td>BME 416</td>
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### MATHEMATICS (16 UNITS)
- MATH 125: Calculus I
- MATH 126 or 129: Calculus II
- MATH 226 or 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### PHYSICS (8 UNITS)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### CHEMISTRY (16 UNITS)
- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- CHEM 322AL: Organic Chemistry
- CHEM 322BL: Organic Chemistry

### BIOLOGY (12 UNITS)
- BISC 220L: Cell Biology & Physiology
- BISC 230L: Molecular Biology
- BISC 330L: Biochemistry

### GENERAL EDUCATION (62 UNITS)
- 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)

- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### ENGINEERING (55 UNITS)
- BME 101: Intro. to Biomedical Engineering
- BME 402: Control & Comm. in Nervous Sys.
- BME 403L: Physiological Systems
- BME 405L: Senior Projects Measurements & Instrumentation
- BME 410: Intro. to Biomaterials & Tissue Engr.
- BME 413: Bioengineering Signals & Systems
- BME 416: Dev. & Reg. of Medical Products
- BME 423: Statistical Methods in BME
- BME 430: Principles & Applications of Systems Biology
- CHE 330: Chemical Engr. Thermodynamics
- CHE 350: Intro. to Separation Processes
- CHE 489: Biochemical Engineering
- EE 202L: Linear Circuits
- ENGR 102: Engineering Freshman Academy
- MASC 310L: Materials Behavior & Processing

### SPECIAL NOTES
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, or C, only. See page 21 for more information and consult your advisor for detailed assistance.
- OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.
# Biomedical (Electrical)

## First Year

### Fall Semester
- BME 101 or GE B
- WRIT 150
- MATH 125 (GE F)
- CHEM 105aL (GE E)
- ENGR 102

### Spring Semester
- GE A
- MATH 126 or MATH 129
- CHEM 105bL
- PHYS 151L (GE E)
- ITP 165

## Second Year

### Fall Semester
- BME 402
- GE C
- MATH 226 or MATH 229
- PHYS 151L (GE E)
- OPTIONAL ELECTIVE

### Spring Semester
- EE 109L
- BME 210
- MATH 245
- PHYS 152L
- OPTIONAL ELECTIVE

## Third Year

### Fall Semester
- EE 202L
- BME 423
- BME 425
- WRIT 340

### Spring Semester
- FIRST TRACK COURSE: EE 338 OR 354L
- BME 413
- BME 423
- TECHNICAL ELECTIVE

## Fourth Year

### Fall Semester
- BISC 320L
- GE C
- BME 413
- BME 403L
- OPTIONAL ELECTIVE

### Spring Semester
- CHEM 322aL
- SECOND TRACK COURSE: EE 348L OR EE 454L
- BME 405L
- BME 425
- TECHNICAL ELECTIVE

## Mathematics (20 Units)
- MATH 125: Calculus I
- MATH 126 or 129: Calculus II
- MATH 226 or 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr. I

## Physics (8 Units)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

## Chemistry (12 Units)
- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- CHEM 322AL: Organic Chemistry

## Biology (8 Units)
- BISC 220L: Cell Biology & Physiology
- BISC 320L: Molecular Biology

## General Education (32 Units)
- 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)
- GE G,H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

## Writing (7 Units)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

## Engineering (60 Units)
- BME 101: Intro. to Biomedical Engineering
- BME 210: Biomed. Comp. Simulation Methods
- BME 402: Control & Comm. in Nerv. System
- BME 403L: Physiological Systems
- BME 405L: Senior Projects Measurements & Instrumentation
- BME 413: Biomechanical Systems & Systems
- BME 416: Development and Regulation of Medical Products
- BME 423: Statistical Methods in BME
- BME 425: Basics of Biomedical Imaging
- EE 109L: Introduction to Embedded Systems
- EE 202L: Distributed Systems for the Internet of Things
- EE 202L: Linear Circuits
- ITP 165: Introduction to C++ Programming
- DIGITAL TRACK: EE 354L: Introduction to Digital Circuits
- Analog Track: EE 338L: Physical Electronics & EE 348: Electronic Circuits
- ENGR 102: Engineering Freshman Academy
- TECHNICAL ELECTIVES

### SPECIAL NOTES
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, or C, only. See page 21 for more information and consult your advisor for detailed assistance.
- OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.
- TECHNICAL ELECTIVES: Six units of upper-division engineering coursework, including at least three units of 400-level BME coursework.
## BIOMEDICAL (MECHANICAL)  

### FIRST YEAR  

**FALL SEMESTER**  
- BME 101 or GE B  
- WRIT 150  
- MATH 125 (GE F)  
- CHEM 105aL (GE E)  
- ENGR 102  

**SPRING SEMESTER**  
- BME 101 or GE B  
- MATH 125 or MATH 129  
- CHEM 105BL  
- GE A  
- OPTIONAL ELECTIVE  

### SECOND YEAR  

**FALL SEMESTER**  
- GE B  
- BME 402  
- MATH 226 or MATH 229  
- PHYS 151L (GE E)  
- OPTIONAL ELECTIVE  

**SPRING SEMESTER**  
- BISC 220L  
- BME 210  
- MATH 245  
- PHYS 152L  
- OPTIONAL ELECTIVE  

### THIRD YEAR  

**FALL SEMESTER**  
- EE 202L  
- ITP 308  
- BME 423  
- CHEM 322aL  
- AME 201  

**SPRING SEMESTER**  
- GE C  
- MASC 310  
- AME 301  
- AME 204  
- TECHNICAL ELECTIVE  

### FOURTH YEAR  

**FALL SEMESTER**  
- BISC 320L  
- BME 413  
- BME 403L  
- BME 404  
- WRIT 340  

**SPRING SEMESTER**  
- BME 405L  
- AME 309  
- GE C  
- BME 416  
- TECHNICAL ELECTIVE  

### MATHEMATICS (16 UNITS)  

- MATH 125: Calculus I  
- MATH 126 or 129: Calculus II  
- MATH 225 or 229: Calculus III  
- MATH 245: Mathematics of Phys. and Engr. I  

### PHYSICS (8 UNITS)  

- PHYS 151L: Mechanics and Thermodynamics  
- PHYS 152L: Electricity and Magnetism  

### CHEMISTRY (12 UNITS)  

- CHEM 105AL: General Chemistry  
- CHEM 105BL: Organic Chemistry  

### BIOLOGY (8 UNITS)  

- BISC 220L: Cell Biology & Physiology  
- BISC 320L: Molecular Biology  

### GENERAL EDUCATION (52 UNITS)  

- 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)  
- GE G,H: Global Perspectives (2 Courses)*  
- GESM: General Education Seminar (1 Course)*  

### WRITING (7 UNITS)  

- WRIT 150: Writing and Critical Reasoning  
- WRIT 340: Advanced Writing  

### ENGINEERING (63 UNITS)  

- AME 201: Statics  
- AME 204: Strength of Materials  
- AME 301: Dynamics  
- AME 308: Comp.-Aid. Analysis for Design  
- ITP 308: Comp.-Aid. Design for Bio-Mechanical Systems  
- AME 309: Dynamics of Fluids  
- BME 101: Intro. to Biomedical Engineering  
- BME 210: Biomed. Comp. Simulation Methods  
- BME 402: Control & Comm. in Nerv. System  
- BME 403L: Physiological Systems  
- BME 404: Biomechanics  
- BME 405L: Senior Projects: Meas. and Instrument  
- BME 413: Bioengineering Signals & Systems  
- BME 416: Development and Regulation of Medical Products  
- BME 423: Statistical Methods in BME  
- EE 202L: Linear Circuits  
- ENGR 102: Engineering Freshman Academy  
- MASC 310: Materials Behavior and Processing  

### TECHNICAL ELECTIVES  

Five units of upper-division engineering coursework, including at least three units of 400-level BME coursework.  

### SPECIAL NOTES  

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.  

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, or C, only. See page 21 for more information and consult your advisor for detailed assistance.  

OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.  

TECHNICAL ELECTIVES: Five units of upper-division engineering coursework, including at least three units of 400-level BME coursework.  

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CHEMICAL

MAJORS & AREAS OF EMPHASIS

» Chemical Engineering
» Chemical (Biochemical) Engineering
» Chemical (Environmental) Engineering
» Chemical (Nanotechnology) Engineering
» Chemical (Petroleum) Engineering
» Chemical (Polymers/Materials Science) Engineering
» Chemical (Sustainable Energy) Engineering

LEARN MORE: viterbi.usc.edu/mork
Chemical engineers design, control and optimize large-scale chemical, physiochemical and biochemical processes. They are also involved in the development and design of new materials ranging from advanced composites used in automotive and space-related industries to materials used in the biomedical and electronics fields.

Chemical Engineers work in a diverse array of fields, including chemical, pharmaceutical, energy, material and environmental industries. Emerging fields in chemical engineering include biotechnology, the design of environmentally-benign processes and the synthesis of new materials (including bio- and nanomaterials). Chemical engineers are uniquely qualified to provide solutions to pressing problems in energy, environment and materials science.

While many students choose a primary degree in chemical engineering, students can deepen their education by focusing on an emphasis program: Biochemical (CHEB), Petroleum (CHPE), Nanotechnology (CHEN), Polymers/Materials (CHPM), Environmental (CHEE), and Sustainable Energy (CHSE).

CHE RESEARCH
Researchers in the Mork Family Department of Chemical Engineering & Materials Science are at the forefront of investigations that will aid in emerging technologies. Research areas include technologies that impact oil and gas performance and maximize the world’s fossil fuel supply, the latest polymers and composites, and ways to remediate contaminated soils. In addition, researchers are creating new technologies for a more efficient, environmentally sensitive future.

The Mork Family Department is well-equipped for experimental research with modern instrumentation located in core laboratories across campus, including NMR spectrometers, electron microscopes, surface analysis instrumentation, and nanofabrication tools located in clean room space.

RESEARCH HIGHLIGHTS
» Nanobioparticle engineering
» Membrane separation, membrane reactors
» Material characterization, corrosion
» Polymers, ceramics and composites
» Statistical mechanics, molecular modeling and simulation
» Synthetic and systems biology
» Advanced computing and simulations
» Nano-, bio- and photonic materials
» Peptide and protein engineering
» Immunoeengineering for cancer therapy
» Modeling of oil and gas reservoir performance
» Fluid flow through porous media
» Studies of fluid, foam, and polymer flow
» Enhanced oil recovery
» Subsurface imaging
» Microfluidics for nanomaterial synthesis and bioanalysis

COMPANIES THAT HIRE CHE STUDENTS
Amgen, Baxter, CH2M-Hill, Chevron, ConocoPhillips, Dow Chemical, DuPont, Environ, ExxonMobil, Halliburton, Hewlett-Packard, Intel, Proctor & Gamble...

And many more!

CAREER OPTIONS
» Design and optimize cost-effective ways to produce energy, drugs, plastics and chemicals
» Develop new biological and therapeutic agents
» Establish new methods for chemical processing
» Find solutions for environmental problems
» Streamline petroleum exploration and refining
» Create new consumer products and manufacturing systems
» Regulate environmental health and safety standards
» Production, design, development and research in all fields that involve chemical changes
# CHEMICAL ENGINEERING

## FIRST YEAR

### FALL SEMESTER

<table>
<thead>
<tr>
<th>GE A</th>
<th>WRIT 150</th>
<th>MATH 125 (GE F)</th>
<th>CHEM 105aL (GE E)</th>
<th>ENGR 102</th>
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### SPRING SEMESTER

<table>
<thead>
<tr>
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<th>MATH 126 or MATH 129</th>
<th>CHEM 105bL</th>
<th>PHYS 151L (GE E)</th>
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## SECOND YEAR

### FALL SEMESTER

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<th>MATH 226 or MATH 229</th>
<th>PHYS 152L</th>
<th>CHE 205</th>
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### SPRING SEMESTER

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<th>CHEM 322aL (CHEM 105bL)</th>
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## THIRD YEAR

### FALL SEMESTER

<table>
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<th>TECHNICAL ELECTIVE</th>
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### SPRING SEMESTER

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<th>CHEM 444aL (CHEM 322bL or 431)</th>
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<th>CHEM 443</th>
<th>CHE 476</th>
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## FOURTH YEAR

### FALL SEMESTER

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<th>GE D</th>
<th>CHEM 444bL (CHEM 350, CHEM 410)</th>
<th>CHEM 445</th>
<th>CHE 485</th>
<th>APPROVED ELECTIVE</th>
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### SPRING SEMESTER

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<th>GE C</th>
<th>CHE 446</th>
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<th>CHEMISTRY ELECTIVE</th>
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**MATHEMATICS (16 UNITS)**

- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

**PHYSICS (8 UNITS)**

- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

**CHEMISTRY (24 UNITS)**

- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322AL: Organic Chemistry
- CHEM 430: Physical Chemistry: Thermodynamics & Kinetics
- CHEMISTRY ELECTIVE: CHEM 322bL or 431

**GENERAL EDUCATION (32 UNITS)**

- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

**WRITING (7 UNITS)**

- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

**ENGINEERING (54-57 UNITS)**

- CHE 120: Intro. to Chemical Engineering
- CHE 205: Numerical Methods in Chemical Engineering
- CHE 330: Chemical Engr. Thermodynamics
- CHE 350: Intro. to Separation Processes
- CHE 405: Probability and Statistics for CHE
- CHE 442: Chemical Reactor Analysis
- CHE 443: Viscous Flow
- CHE 444AL: Chemical Engineering Lab
- CHE 444BL: Chemical Engineering Lab
- CHE 445: Heat Transfer in CHE Processes
- CHE 446: Mass Transfer in CHE Processes
- CHE 460L: Chem. Proc. Dynamics & Control
- CHE 476: Chemical Engineering Materials
- CHE 480: Chem. Process and Plant Design
- CHE 485: Computer Aided Process Design
- ENGR 102: Engineering Freshman Academy

**APPROVED ELECTIVES**

- 8-9 units of approved electives including CHE 205 (2), EE 438L (3), and ISE 460 (3) or BUAD 301 (3) or other courses with department approval.

---

**SPECIAL NOTES**

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.

TECHNICAL ELECTIVE: Any upper-division CHE course that is not already required.

APPROVED ELECTIVES: 8-9 units of approved electives including CHE 205 (2), EE 438L (3), and ISE 460 (3) or BUAD 301 (3) or other courses with department approval.

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2018-19 MAJOR COURSE PLAN
## First Year

### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>GE A</td>
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<td>GE F</td>
<td>MATH 125 (G E F)</td>
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<td>GE E</td>
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### Spring Semester

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<td>CHE 120</td>
<td>CHEM 105bL</td>
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<td>CHE 120</td>
<td>WRIT 340</td>
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<td>MATH 226 or MATH 229</td>
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<td>PHYS 151L</td>
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### Second Year

### Fall Semester

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<td>GE B</td>
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### Third Year

### Fall Semester

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### Spring Semester

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<td>GE B</td>
<td>CHE 460L</td>
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### Fourth Year

### Fall Semester

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<tr>
<td>BIOELECTIVE</td>
<td>BME 410</td>
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### General Education (32 Units)

| 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) |

### Mathematics (16 Units)

| MATH 125 | Calculus I |
| MATH 126 or MATH 129 | Calculus II |
| MATH 226 or MATH 229 | Calculus III |
| MATH 245 | Mathematics of Phys. and Engr. |

### Physics (8 Units)

| PHYS 151L | Mechanics and Thermodynamics |
| PHYS 152L | Electricity and Magnetism |

### Chemistry (20 Units)

| CHEM 105AL | General Chemistry |
| CHEM 105BL | General Chemistry |
| CHEM 300L | Analytical Chemistry |
| CHEM 322aL | Organic Chemistry |
| CHEM 430 | Physical Chemistry: Thermodynamics & Kinetics |

### Biology (12 Units)

| BISC 300L | Intro to Microbiology |
| BISC 320L | Molecular Biology |
| BISC 330L | Biochemistry |

### General Education Seminar (1 Course)*

| GESM | General Education Seminar |

**Special Notes**

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

**Optional Electives:** Consult with your academic advisor to explore optional elective courses. These courses are not required.

**Bioelective:** Approved Bioengineering course or BISC 403

BISC 403: Must have 48 engineering units in order to register for this class.

---

**Writing (7 Units)**

| WRIT 150 | Writing and Critical Reasoning |
| WRIT 340 | Advanced Writing |

**Engineering (51-52 Units)**

| BME 410 | Intro to Biomaterials |
| BME 410 | Intro to Chemical Engineering |
| BME 410 | Numerical Methods in Chemical Engineering |
| BME 410 | Chemical Engr. Thermodynamics |
| BME 410 | Intro to Separation Processes |
| BME 410 | Applications of Probability & Statistics for Chemical Engineers |
| BME 410 | Biomechanics |
| BME 410 | Chemical Reactor Analysis |
| BME 410 | Viscous Flow |
| BME 410 | Chemical Engineering Laboratory |
| BME 410 | Heat Transfer in CHE Processes |
| BME 410 | Mass Transfer in CHE Processes |
| BME 410 | Chemical Process Dynamics |
| BME 410 | Chem. Process and Plant Design |
| BME 410 | Computer-Aided Plant Design |
| BME 410 | Biochemical Engineering |

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**Optional Electives**

Consult with your academic advisor to explore optional elective courses. These courses are not required.

**Bioelective:** Approved Bioengineering course or BISC 403

BISC 403: Must have 48 engineering units in order to register for this class.
# 2018-19 MAJOR COURSE PLAN

## CHEMICAL (ENVIRONMENTAL)

### FIRST YEAR

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<th>Course Title</th>
<th>Units</th>
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<td>CHEM 105aL (GE E)</td>
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<td>MATH 125 (GE F)</td>
<td>CHEM 105bL (GE E)</td>
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<td>MATH 125 or MATH 126 or MATH 129</td>
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### SECOND YEAR

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### THIRD YEAR

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<td>CHEM 443</td>
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### MATHEMATICS (16 UNITS)

- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### PHYSICS (8 UNITS)

- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### CHEMISTRY (20 UNITS)

- CHEM 105aL: General Chemistry
- CHEM 105bL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322aL: Organic Chemistry
- CHEM 430L: Physical Chemistry: Thermodynamics & Kinetics

### GENERAL EDUCATION (32 UNITS)

- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)

- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### ENGINEERING (63 UNITS)

- CE 453: Water Quality Control
- CE 463L: Water Chemistry and Analysis
- CHE 420: Intro. to Chemical Engineering
- CHE 430: Numerical Methods in Chemical Engineering
- CHE 433: Chemical Engr. Thermodynamics
- CHE 450: Intro. to Separation Processes
- CHE 455: Chemical Reactor Analysis
- CHE 443: Viscous Flow
- CHE 444aL: Chem. Engineering Laboratory
- CHE 444bL: Chem. Engineering Laboratory
- CHE 445: Heat Transfer in CHE Processes
- CHE 446: Mass Transfer in CHE Processes
- CHE 460L: Chemical Process Dynamics
- CHE 476: Chemical Engineering Materials
- CHE 480: Chemical Process Design
- CHE 485: Computer Aided Process Design
- CHE 486: Design of Environ. Benign Plants
- ENE 428: Air Pollution Fundamentals
- ENE 429: Air Pollution Control

### ISE 460: Engineering Economy

###OPTIONAL ELECTIVES:

Consult with your academic advisor to explore optional elective courses. These courses are not required.

---

**SPECIAL NOTES**

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

**GE:** Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

**OPTIONAL ELECTIVES:** Consult with your academic advisor to explore optional elective courses. These courses are not required.
# CHEMICAL (NANOTECHNOLOGY)

## First Year
### Fall Semester
- **GE A**
- **WRIT 150**
- **MATH 125 (GE F)**
- **CHEM 105aL (GE E)**
- **ENGR 102**

### Spring Semester
- **CHEM 120**
- **MATH 126 or MATH 129**
- **CHEM 105bL**
- **PHYS 151L (GE E)**
- **OPTIONAL ELECTIVE**

## Second Year
### Fall Semester
- **CHEM 330**
- **CHEM 300L**
- **MATH 226 or MATH 229**
- **PHYS 152L**
- **CHE 205**

### Spring Semester
- **CHEM 322aL**
- **CHEM 245**
- **CHEM 350**
- **WRIT 340**

## Third Year
### Fall Semester
- **CHEM 453**
- **CHEM 443aL**
- **CHE 443**
- **MASC 350L**
- **CHE 391**

### Spring Semester
- **CHEM 444aL**
- **CHEM 430**
- **CHE 487**
- **OPTIONAL ELECTIVE**

## Fourth Year
### Fall Semester
- **CHEM 446aL**
- **CHE 445**
- **CHE 485**
- **CHEM 491**

### Spring Semester
- **CHE 446**
- **CHE 460L**
- **CHE 480**
- **OPTIONAL ELECTIVE**

## Mathematics (16 Units)
- **MATH 125**: Calculus I
- **MATH 126** or **MATH 129**: Calculus II
- **MATH 226** or **MATH 229**: Calculus III
- **MATH 243**: Mathematics of Phys. and Engr.

## Physics (8 Units)
- **PHYS 151L**: Mechanics and Thermodynamics
- **PHYS 152L**: Electricity and Magnetism

## Chemistry (24 Units)
- **CHEM 105aL**: General Chemistry
- **CHEM 105bL**: General Chemistry
- **CHEM 300L**: Analytical Chemistry
- **CHEM 322aL**: Organic Chemistry
- **CHEM 430**: Physical Chemistry: Thermodynamics & Kinetics
- **CHEM 453**: Advanced Inorganic Chemistry

## General Education (12 Units)
- **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)
- **GE G, H**: Global Perspectives (2 Courses)*
- **GESM**: General Education Seminar (1 Course)*

## Writing (7 Units)
- **WRIT 150**: Writing and Critical Reasoning
- **WRIT 340**: Advanced Writing

## Engineering (15 Units)
- **CHE 120**: Intro. to Chemical Engineering
- **CHE 205**: Numerical Methods in Chemical Engineering
- **CHE 330**: Chemical Engr. Thermodynamics
- **CHE 350**: Intro. to Separation Processes
- **CHE 391**: Intro. to Nanotechnology Research
- **CHE 405**: Applications of Prob. & Stats. for CHE
- **CHE 442**: Chemical Reactor Analysis
- **CHE 443**: Viscous Flows
- **CHE 444aBL**: Chemical Engineering Lab
- **CHE 445**: Heat Transfer in CHE Processes
- **CHE 446**: Mass Transfer in CHE Processes
- **CHE 460L**: Chemical Process Dynamics & Control
- **CHE 480**: Chem. Process and Plant Design
- **CHE 483**: Comp.-Aided Chemical Process Design
- **CHE 487**: Nanotech and Nanoscale Engineering
- **CHE 491**: Nanotech Research for Undergrads
- **ENGR 102**: Engineering Freshman Academy

## Mathematics of Phys. and Engr. (4 Units)
- **MATH 229**: Calculus II
- **MATH 245**: Mathematics of Phys. and Engr.

## General Education Seminar (1 Course)*

## Nanotech. Elective

### Optional Electives
- **CHE 491**: Nanotech Research for Undergrads

### Special Notes

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your academic advisor for detailed assistance.

**Optional Electives**: Consult with your academic advisor to explore optional elective courses. These courses are not required.

**Nanotech. Elective**: EE/MASC 439L, CHE 489, or CHE/PTE 453L.

**Chemical 391, 491**: Technical electives may be taken in place of these courses. Consult the department for approved courses.
# 2018-19 Major Course Plan

## Chemical (Petroleum)

### First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
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<tr>
<td><strong>Fall</strong></td>
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<tr>
<td></td>
<td><strong>MATH 125</strong></td>
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<tr>
<td></td>
<td><strong>CHEM 105aL</strong></td>
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<td><strong>ENGR 102</strong></td>
<td>Environmental Engineering</td>
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<td><strong>Spring</strong></td>
<td><strong>CHE 120</strong></td>
<td>CHEM 105bL (CHEM 105aL)</td>
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<td><strong>MATH 126</strong></td>
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<td></td>
<td><strong>PHYS 151L</strong></td>
<td>Mechanics and Thermodynamics</td>
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### Second Year

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<td></td>
<td><strong>PHYS 152L</strong></td>
<td>Electricity and Magnetism</td>
<td>4</td>
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<tr>
<td></td>
<td><strong>CHE 205</strong></td>
<td>CHEM 205</td>
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<tr>
<td><strong>Spring</strong></td>
<td><strong>CHEM 300L</strong></td>
<td>Analytical Chemistry</td>
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<td><strong>MATH 245</strong></td>
<td>Calculus IV</td>
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<td><strong>CHEM 350</strong></td>
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### Third Year

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<td><strong>CHEM 405</strong></td>
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<td><strong>CHE 442</strong></td>
<td>CHEM 442</td>
<td>3</td>
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<td></td>
<td><strong>PTE 461</strong></td>
<td>CHEM 461</td>
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<td></td>
<td><strong>PTE 463L</strong></td>
<td>Trans. Processes in Porous Media</td>
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<td><strong>WRIT 340</strong></td>
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<td><strong>CHEM 444aL</strong></td>
<td>CHEM 444aL</td>
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<td></td>
<td><strong>PTE 464L</strong></td>
<td>Computer Aided Process Design</td>
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<td><strong>CHEM 443</strong></td>
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<td><strong>GE C</strong></td>
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### Fourth Year

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<td><strong>CHEM 445</strong></td>
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</table>

### Mathematics (16 Units)

- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### Physics (8 Units)

- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### Chemistry (24 Units)

- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322aL: Organic Chemistry
- CHEM 430: Physical Chemistry: Thermodynamics & Kinetics
- CHEMISTRY ELECTIVE: CHEM 322bL or 431

### General Education (32 Units)

- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### Writing (7 Units)

- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### Engineering (60 Units)

- CHE 120: Intro. to Chemical Engineering
- CHE 205: Numerical Methods in Chemical Engineering
- CHE 330: Chemical Engr. Thermodynamics
- CHE 350: Intro. to Separation Processes
- CHE 405: Probability and Statistics for CHE
- CHE 442: Chemical Reactor Analysis
- CHE 443: Viscous Flow
- CHE 444AL: Chemical Engineering Lab
- CHE 444BL: Chemical Engineering Lab
- CHE 445: Heat Transfer in CHE Processes
- CHE 446: Mass Transfer in CHE Processes
- CHE 460L: Chemical Process Dynamics
- CHE 476L: Chemical Engineering Materials
- CHE 485: Chem. Process and Plant Design
- CHE 485: Computer Aided Process Design

### Optional Electives

Consult with your academic advisor to explore optional elective courses. These courses are not required.

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### Special Notes

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

Optional Electives: Consult with your academic advisor to explore optional elective courses. These courses are not required.
### CHEMICAL (POLYMERS/MATERIALS)

#### FIRST YEAR

**FALL SEMESTER**
- GE A
- WRIT 150
- MATH 125 (GE F)
- CHEM 105aL (GE E)
- CHEM 120
- MATH 126 or MATH 129
- PHYS 151L (GE E)
- CHE 120
- WRIT 150
- PHYS 151L
- OPTIONS ELECTIVE

**SPRING SEMESTER**
- CHE 120
- MATH 126 or MATH 129
- CHEM 105bL
- PHYS 152L
- OPTIONS ELECTIVE

#### SECOND YEAR

**FALL SEMESTER**
- CHEM 330
- CHEM 300L
- MATH 226 or MATH 229
- PHYS 152L
- CHE 205
- CHEMISTRY ELECTIVE
- WRITING  (7 UNITS)
  - WRIT 150
  - WRIT 340
- ENGINEERING (57 UNITS)
  - CHE 120
  - CHE 205
  - CHEM 330
  - CHE 442
  - CHE 472
  - CHE 476
  - CHE 485
- OPTIONS ELECTIVES

**SPRING SEMESTER**
- GE B
- CHEM 322aL
- MATH 245
- WRIT 340
- CHEM 350
- OPTIONS ELECTIVE

#### THIRD YEAR

**FALL SEMESTER**
- POLYMER/MATERIALS SCI. ELECTIVE
- CHEM 430
- CHEM 442
- CHE 472
- GE C
- OPTIONS ELECTIVE

**SPRING SEMESTER**
- CHE 444aL
- CHEM 443
- CHE 476 or MASC 310
- OPTIONS ELECTIVE

#### FOURTH YEAR

**FALL SEMESTER**
- GED
- CHE 444bL
- CHE 445
- CHE 485
- CHE 405 or ISE 460 or BUAD 301
- OPTIONS ELECTIVES

**SPRING SEMESTER**
- GE C
- CHE 446
- CHE 460L
- CHE 480
- POLYMER/MATERIALS SCI. ELECTIVE
- MASC 350L

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**MATHEMATICS (16 UNITS)**
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

**PHYSICS (8 UNITS)**
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

**CHEMISTRY (24 UNITS)**
- CHEM 105aL: General Chemistry
- CHEM 105bL: General Chemistry
- CHEM 300L: Analytical Chemistry
- CHEM 322aL: Organic Chemistry
- CHEM 430: Physical Chemistry: Thermodynamics & Kinetics
- CHEMISTRY ELECTIVE: CHEM 322bL or 431

**GENERAL EDUCATION (32 UNITS)**
- 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)
- GE G, H Global Perspectives (2 Courses)*
- GEISM General Education Seminar (1 Course)*

**WRITING (7 UNITS)**
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

**ENGINEERING (57 UNITS)**
- CHE 120: Intro. to Chemical Engineering
- CHE 205: Numerical Methods in Chemical Engineering
- CHE 330: Chemical Engr. Thermodynamics
- CHE 350: Intro. to Separation Processes
- CHE 405: Probability and Statistics for CHE
- CHE 442: Chemical Reactor Analysis
- CHE 443: Viscous Flow
- CHE 444aBL: Chemical Engineering Lab
- CHE 445: Heat Transfer in CHE Processes
- CHE 446: Mass Transfer in CHE Processes
- CHE 460L: Chemical Process Dynamics
- CHE 472: Polymer Science & Engineering
- CHE 476: Chemical Engineering Materials
- CHE 480: Chem. Process and Plant Design

**POLYMER/ MATERIALS ELECTIVES**
- SELECT 9 units from BME 410, CHE 474L, 475, 477, 487, EE 438L, or MASC 440.

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* SPECIAL NOTES
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.
- OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.
- POLYMER/MAT ELECTIVES: Select 9 units from BME 410, CHE 474L, 475, 477, 487, EE 438L, or MASC 440.
## CHEMICAL (SUSTAINABLE ENERGY)

### FIRST YEAR

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<tr>
<td>GE A</td>
<td>MATH 125 (GE F)</td>
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<tr>
<td>WRIT 150</td>
<td>CHEM 105bL (GE E)</td>
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<td>CHE 120 (MATH 122, CHEM 105L)</td>
<td>PHYS 151L (GE E)</td>
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<tr>
<td>MATH 126 or MATH 129</td>
<td>CHEM 205</td>
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<tr>
<td>MATH 226 or MATH 129</td>
<td>CHEM 205</td>
</tr>
<tr>
<td>CHEM 300L</td>
<td>CHEM 350</td>
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<tr>
<td>CHEM 322aL</td>
<td>WRIT 340</td>
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<td>GE B</td>
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### SECOND YEAR

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<tr>
<td>CHEM 330</td>
<td>CHEM 300L</td>
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<tr>
<td>CHEM 322aL</td>
<td>MATH 245</td>
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<td>MATH 245</td>
<td>CHEM 350</td>
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<td>GE C</td>
<td>WRIT 340</td>
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### THIRD YEAR

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<td>CHEM 442</td>
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<td>CHEM 485</td>
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### FOURTH YEAR

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<td>CHEM 445</td>
<td>CHE 485</td>
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<td>CHEM 460L</td>
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<td>GE D</td>
<td>CHE 485</td>
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### MATHEMATICS (16 UNITS)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### PHYSICS (8 UNITS)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### CHEMISTRY (24 UNITS)
- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- CHEM 322AL: Analytical Chemistry
- CHEM 330L: Organic Chemistry
- CHEM 430L: Physical Chemistry: Thermodynamics & Kinetics
- Chemistry Technical Electives:
  - CHEM 322AL: Organic Chemistry
  - CHEM 431L: Physical Chemistry: Quantum Mechanics
  - CHEM 453L: Advance Inorganic Chemistry

### GENERAL EDUCATION (32 UNITS)
- 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)

### ENRICHMENT COURSES
- CHEM 450: Comp.-Aided Chemical Process Design
- ENGR 102: Engineering Freshman Academy
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### SPECIAL NOTES
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.
- OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.
- **SUSTAINABLE ENERGY ELECTIVE (3):**
  - Biofuel (CHE 301 or CHE 488 or CHE 489);
  - Geothermal (PTE 463L); Hydrogen (CHE 486 or PTE 519B); Solar (CHE 487 or EE 513);
- *Must have 49 engineering units to be able to take BUAD 301.*
CIVIL & ENVIRONMENTAL

MAJORS & AREAS OF EMPHASIS

» Civil Engineering
  Optional Track: Construction
  Optional Track: Water Resources
» Civil Engineering (Building Science)
» Civil Engineering (Structural Engr.)
» Environmental Engineering

LEARN MORE: viterbi.usc.edu/cee
Civil and Environmental Engineers address many of the vital needs of our modern society. They improve quality of life, promote economic growth, and protect people from hazards of natural and human origins.

Civil and Environmental engineers support the global economy, secure the health and security of diverse communities, and enhance environmental quality worldwide. They design, build and operate our nation’s infrastructure — highways, bridges, wharf and harbor structures, industrial facilities — and address the challenges of ground water and air pollution as well as industrial and hazardous waste management. They monitor the quality of the air, water and land, and enhance the protection of our environment.

**EMPHASES & OPTIONS**

The Bachelor’s degree in Civil Engineering provides a broad base of core Civil Engineering courses and prepares students for both engineering practice and graduate studies. Students explore structural engineering, geotechnical engineering, construction, transportation, environmental engineering, and water resources. The Structural Engineering emphasis focuses on the design of safe and efficient structural systems. Students will be prepared to design structures such as bridges, buildings, and offshore structures that can resist a variety of forces such as earthquakes and wind loadings. Building Science is a joint architecture/engineering program. Students will learn all aspects of building technology from site selection to building construction, in addition to gaining a holistic perspective of building design from architectural design to structural design, and from the artistic to the functional. The Bachelor’s degree in Environmental Engineering program covers engineering approaches required to provide safe drinking water, maintain air quality, and protect the environment.

**RESEARCH HIGHLIGHTS**

- **Sustainable Development:** Long-term viability of natural resources and engineered civil systems.
- **Water Quality, Access, and Distribution:** Providing an adequate supply of potable water, considering population growth and climate variability.
- **Disasters and Extreme Events:** Both natural (e.g. earthquakes, tsunamis, floods, climate change) and man-made (e.g. terrorist attacks, engineering failures, industrial accidents) disasters. Research and education in this area includes all aspects of an event, from a fundamental understanding of the physical processes controlling its evolution to the resulting environmental and social reaction.
- **Coupling of Complex Systems:** Most natural and engineered systems are known to be complex, defined as systems characterized by their display of patterns of structure or behavior at one level of system organization that are diagnostic of interactions among parts of the system at other levels.

**COMPANIES THAT HIRE CEE STUDENTS**

Campbell Concrete, CH2M Hill, Chevron, City/County of Los Angeles, Kiewit Pacific Company, Leighton Group, PPG Industries, Rudolph & Sletten, The Reynolds Group...

And many more!

**CAREER OPTIONS**

- Become a structural engineer and build sustainable buildings
- Develop land and mitigate risks of natural and manmade disasters
- Manage civil infrastructure
- Design and build roads, bridges, dams, tunnels and airports
- Develop environmental public policy
- Create waste removal systems and treatment processes
- Design transportation systems
# Civil Engineering

## 2018-19 Major Course Plan

### Mathematics (16 Units)

- **MATH 125:** Calculus I
- **MATH 126 or MATH 129:** Calculus II
- **MATH 226 or MATH 229:** Calculus III
- **MATH 245:** Mathematics of Phys. and Engr.

### Physics (8 Units)

- **PHYS 151L:** Mechanics and Thermodynamics
- **PHYS 152L:** Electricity and Magnetism

### Other Science (8 Units)

- **CHEM 105AL:** General Chemistry
- **GEOL 305AL:** Intro. to Engineering Geology

### General Education (32 Units)

- **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)
- **GE G,H:** Global Perspectives (2 Courses)*
- **GESM:** General Education Seminar (1 Course)*

### Writing (7 Units)

- **WRIT 150:** Writing and Critical Reasoning
- **WRIT 340:** Advanced Writing

### Engineering (70 Units)

- **CE 106L:** Design & Planning of CE Systems
- **CE 108:** Intro. to CE Computer Methods
- **CE 205:** Statics
- **CE 207L:** Intro. to Design of Structural Systems
- **CE 225:** Mechanics of Deformable Bodies
- **CE 245:** Dynamics
- **CE 309:** Fluid Mechanics
- **CE 334L:** Mechanical Behavior of Materials
- **CE 358:** Theory of Structures I
- **CE 402:** Computer Methods in Civil Engr.
- **CE 408:** Risk Analysis in Civil Engr.
- **CE 453:** Design of Steel Structures
- **CE 465:** Geotechnical Engineering
- **CE 471:** Principles of Transportation Engr.
- **CE 480:** Structural Systems Design
- **CE 495:** Water Supply & Sewage System Design
- **EE 202L:** Linear Circuits
- **ENGR 102:** Engineering Freshman Academy
- **ISE 460:** Engineering Economy
- **ISE 480:** Advanced Writing
- **ISE 485:** Mechanics and Thermodynamics
- **MATH 245:** Mathematics of Phys. and Engr.
- **MATH 226:** Calculus II

### Design Kernels

- **CE ELECTIVES:** Choose six units from CE 453, 457, or 465.
- **CE 465:** Essentials of Electrical Engr.
- **CE 482:** Design Kernel course must be either CE 466 or 476.
- **CE 484:** If CE 480 is chosen as senior capstone course, 1 Design Kernel course must be CE 482. If CE 485 is chosen as senior capstone course, 1 Design Kernel course must be either CE 466 or 476.

### Special Notes

- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your academic advisor for detailed assistance.
- **OPTIONAL ELECTIVES:** Consult with your academic advisor to explore optional elective courses. These courses are not required.
- **CE 205, 225, 309, and 235:** Minimum grade of "C" is required.
- **EE 326LX:** CE students are encouraged to take EE 326Lx in the spring term.
- **DESIGN KERNELS:** Choose six units from CE 453, 457, 465, 476, 478, 482, 484, or 485. If CE 480 is chosen as senior capstone course, 1 Design Kernel course must be CE 482. If CE 465 is chosen as senior capstone course, 1 Design Kernel course must be either CE 466 or 476.
- **CE ELECTIVES:** Choose six units of upper-division CE course that is not already required.
# 2018-19 MAJOR COURSE PLAN

## CIVIL TRACK: CONSTRUCTION

### FIRST YEAR

#### FALL SEMESTER
- **GE A**
- **WRIT 150**
- **MATH 125 (GE F)**
- **CE 106L**
- **ENGR 102**

#### SPRING SEMESTER
- **GE B**
- **CHEM 105aL (GE E)**
- **MATH 126 or MATH 129**
- **PHYS 151L (GE E)**
- **CE 108**

### SECOND YEAR

#### FALL SEMESTER
- **GE C**
- **GE D**
- **CE 207L**
- **MATH 226 or MATH 229**
- **CE 225**

#### SPRING SEMESTER
- **GEOL 305L**
- **CE 235**
- **OPTIONAL ELECTIVE**

### THIRD YEAR

#### FALL SEMESTER
- **CE 309**
- **CE 334L**
- **CE 358**
- **CE 456**
- **ISE 460**

#### SPRING SEMESTER
- **GE B**
- **DESIGN KERNEL**
- **EE 202L or EE 326Lx**
- **CE 451**
- **CE 467L**

### FOURTH YEAR

#### FALL SEMESTER
- **GE C**
- **CE 482**
- **CE 408**
- **CE 460**
- **CE 471**

#### SPRING SEMESTER
- **WRIT 340**
- **CE ELECTIVE**
- **CE 402**
- **CE ELECTIVE**
- **OPTIONAL ELECTIVE**

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### MATHEMATICS (16 UNITS)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 243: Mathematics of Phys. and Engr.

### PHYSICS (8 UNITS)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### OTHER SCIENCE (8 UNITS)
- CHEM 105AL: General Chemistry
- GEOL 305L: Intro. to Engineering Geology

### GENERAL EDUCATION (32 UNITS)
- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### ENGINEERING (70 UNITS)
- CE 106L: Design & Planning of CE Systems
- CE 108: Intro. to CE Computer Methods
- CE 205: Statics
- CE 207L: Intro. to Design of Structural Systems
- CE 225: Mechanics of Deformable Bodies
- CE 235: Fluid Mechanics
- CE 235: Dynamics
- CE 334L: Mechanical Behavior of Materials
- CE 358: Theory of Structures I
- CE 402L: Computer Methods in Civil Engr.
- CE 408: Risk Analysis in Civil Engr.
- CE 451: Water Resources Engineering
- CE 456: Design of Steel Structures
- CE 460: Construction Engineering
- CE 467L: Geotechnical Engineering
- CE 471: Principles of Transportation Engr.
- CE 480: Structural Systems Design
- CE 482: Foundation Design
- EE 202L: Linear Circuits or EE 326Lx: Essentials of Electrical Engr.
- ENGR 102: Engineering Freshman Academy
- ISE 460: Engineering Economy

### DESIGN KERNEL
- Choose one from CE 457, 465, 466, 476, 478, 484, or 485.

### CE ELECTIVE
- One course must be CE 462, CE 469, CE 470, or ARCH 418.

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### SPECIAL NOTES
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

- **OPTIONAL ELECTIVES:** Consult with your academic advisor to explore optional elective courses. These courses are not required.

- **CE 205, 225, 309, AND 235:** Minimum grade of “C” is required.

- **EE 326Lx:** CE students are encouraged to take EE 326L in the spring.

- **DESIGN KERNEL:** Choose one from CE 457, 465, 466, 476, 478, 484, or 485.

- **CE ELECTIVE:** One course must be CE 462, CE 469, CE 470, or ARCH 418. The other course can be any upper-division CE course that is not already required.
## 2018-19 MAJOR COURSE PLAN

### CIVIL TRACK: WATER RESOURCES

#### FIRST YEAR

**FALL SEMESTER**
- **GE A**
- WRIT 150
- MATH 125 (GE F)
- CE 106L
- ENGR 102

**SPRING SEMESTER**
- CHEM 105aL (GE E)
- MATH 126 or MATH 129
- PHYS 151L (GE E)
- CE 108

#### SECOND YEAR

**FALL SEMESTER**
- **GE C**
- GED
- MATH 226 or MATH 229
- PHYS 152L
- CE 205

**SPRING SEMESTER**
- GEOL 305L
- CE 207L
- MATH 245
- CE 225
- CE 235

**OPTIONAL ELECTIVE**

#### THIRD YEAR

**FALL SEMESTER**
- CE 309
- CE 334L
- CE 358
- CE 456
- ISE 460

**SPRING SEMESTER**
- GE B
- DESIGN KERNEL
- EE 202L or EE 326Lx
- CE 451
- CE 467L

**OPTIONAL ELECTIVE**

#### FOURTH YEAR

**FALL SEMESTER**
- **CE ELECTIVE**
- DESIGN KERNEL
- CE 408
- CE 453
- CE 471

**SPRING SEMESTER**
- WRIT 340
- GE C
- CE 402
- CE ELECTIVE
- CE 465

**OPTIONAL ELECTIVE**

### MATHEMATICS (16 UNITS)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

### PHYSICS (8 UNITS)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### OTHER SCIENCE (6 UNITS)
- CHEM 105AL: General Chemistry
- GEOL 305L: Intro. to Engineering Geology

### GENERAL EDUCATION (32 UNITS)
- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### ENGINEERING (70 UNITS)
- **CE 106L:** Design & Planning of CE Systems
- **CE 108:** Intro. to CE Computer Methods
- **CE 205:** Statics
- **CE 207L:** Intro. to Design of Structural Systems
- **CE 225:** Mechanics of Deformable Bodies
- **CE 309:** Fluid Mechanics
- **CE 235:** Dynamics
- **CE 334L:** Mechanical Behavior of Materials
- **CE 358:** Theory of Structures I
- **CE 402:** Computer Methods in Civil Engr.
- **CE 408:** Risk Analysis in Civil Engr.
- **CE 451:** Water Resources Engineering
- **CE 453:** Water Quality Control
- **CE 456:** Design of Steel Structures
- **CE 467L:** Geotechnical Engineering
- **CE 471:** Principles of Transportation Engr.
- **CE 465:** Water Supply & Sewage System Design
- **EE 326LX:** Essentials of Electrical Engr.
- **ENGR 102:** Engineering Freshman Academy
- **ISE 460:** Engineering Economy
- **DESIGN KERNELS**
- **CE ELECTIVES**

### SPECIAL NOTES

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.

**CE 205, 225, 309, AND 235:** Minimum grade of “C” is required.

**EE 326LX:** CE students are encouraged to take EE 326Lx in the spring.

**DESIGN KERNELS:** One must be CE 466 or 476. The other course can be CE 457, 465, 466, 476, 478, 482, 484, or 485.

**CE ELECTIVES:** Take six units from CE 466, 476, 477, or 490.
# CIVIL (BUILDING SCIENCE)

## FIRST YEAR
### FALL SEMESTER
- **CE 106L**: 3 units
- **WRIT 150**: 4 units

### SPRING SEMESTER
- **CHEM 105aL (GE E)**: 4 units
- **MATH 126 or MATH 129**: 4 units

## SECOND YEAR
### FALL SEMESTER
- **ARCH 205aL**: 4 units
- **MATH 226 or MATH 229**: 4 units

### SPRING SEMESTER
- **CE 207L (CE 106L, CE 225)**: 2 units
- **MATH 245**: 4 units

## THIRD YEAR
### FALL SEMESTER
- **CE 309**: 3 units
- **ARCH 305bL**: 4 units

### SPRING SEMESTER
- **ARCH 405aL**: 4 units
- **CE 408**: 3 units
- **CE 456**: 3 units

## FOURTH YEAR
### FALL SEMESTER
- **WRIT 340**: 3 units
- **ARCH 405bL**: 4 units

### SPRING SEMESTER
- **ARCH 214b**: 3 units
- **ENGR 214b**: 1 unit

## MATHEMATICS (16 UNITS)
- **MATH 125**: Calculus I
- **MATH 126** or **MATH 129**: Calculus II
- **MATH 226** or **MATH 229**: Calculus III
- **MATH 245**: Mathematics of Phys. and Engr.

## SCIENCE (16 UNITS)
- **CHEM 105AL**: General Chemistry
- **GEOL 305L**: Intro. to Engineering Geology
- **PHYS 151L**: Mechanics and Thermodynamics
- **PHYS 152L**: Electricity and Magnetism

## GENERAL EDUCATION (82 UNITS)
- **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)
- **GE G, H**: Global Perspectives (2 Courses)*
- **GESM**: General Education Seminar (1 Course)*

## WRITING (7 UNITS)
- **WRIT 150**: Writing and Critical Reasoning
- **WRIT 340**: Advanced Writing

## ARCHITECTURE (29 UNITS)
- **ARCH 114**: Architecture: Culture and Comm.
- **ARCH 214A**: History of Architecture

## ENGINEERING (45 UNITS)
- **CE 106L**: Design & Planning of CE Systems
- **CE 108**: Intro. to CE Computer Methods
- **CE 205**: Statics
- **CE 207L**: Intro. to Design of Structural Systems
- **CE 225**: Mechanics of Deformable Bodies
- **CE 309**: Fluid Mechanics
- **CE 235**: Dynamics
- **CE 334L**: Mechanical Behavior of Materials
- **CE 358**: Theory of Structures
- **CE 408**: Risk Analysis in Civil Engr.
- **CE 456**: Design of Steel Structures
- **CE 457**: Reinforced Concrete Design
- **CE 458**: Theory of Structures II
- **CE 467L**: Geotechnical Engineering
- **ENGR 102**: Engineering Freshman Academy

## ENGR ELECTIVE

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### SPECIAL NOTES
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.
- **OPTIONAL ELECTIVES**: Consult with your academic advisor to explore optional elective courses. These courses are not required.
- **CE 205, 225, 309, AND 235**: Minimum grade of “C” is required.
- **ARCH 205ABL, ARCH 305ABL, AND ARCH 405ABL**: Minimum grade of “C” is required in order to continue in the Building Science sequence.
- **CE ELECTIVE**: Choose one from CE 451, 453, 460, or 471.
# Civil (Environmental) Engineering 2018-19 Major Course Plan

## First Year

### Fall Semester

<table>
<thead>
<tr>
<th>GE A</th>
<th>WRIT 150</th>
<th>MATH 125 (GE F)</th>
<th>CE 106L</th>
<th>ENGR 102</th>
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### Spring Semester

<table>
<thead>
<tr>
<th>GE B</th>
<th>CHEM 105aL (GE E)</th>
<th>MATH 126 or MATH 129</th>
<th>PHYS 151L (GE E)</th>
<th>CE 108</th>
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## Second Year

### Fall Semester

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<th>CE 210L</th>
<th>CHEM 105bL</th>
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<th>CE 205</th>
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### Spring Semester

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## Third Year

### Fall Semester

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### Spring Semester

<table>
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<tr>
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<th>DESIGN KERNEL</th>
<th>BISC 220L (GE D)</th>
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<th>CE 463L</th>
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## Fourth Year

### Fall Semester

<table>
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<th>GE C</th>
<th>DESIGN KERNEL</th>
<th>WRIT 340</th>
<th>CE 334L</th>
<th>OPTIONAL ELECTIVE</th>
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### Spring Semester

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<th>CE 467L</th>
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</table>

### Special Notes

#### Mathematics (16 Units)
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

#### Physics (8 Units)
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

#### Other Science (12 Units)
- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- BISC 250L: Cell Biology and Physiology

#### General Education (32 Units)
- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

#### Writing (7 Units)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

#### Engineering (67 Units)
- AME 310: Engineering Thermodynamics I
- CE 106L: Design & Planning of CE Systems
- CE 108: Intro. to CE Computer Methods
- CE 205: Statics
- CE 210L: Intro to Env. Engr. Microbiology
- CE 225: Mechanics of Deformable Bodies
- CE 309: Fluid Mechanics
- CE 335: Dynamics
- CE 334L: Mechanical Behavior of Materials
- CE 358: Theory of Structures I
- CE 408: Risk Analysis in Civil Engr.
- CE 451: Water Resources Engineering
- CE 453: Water Quality Control
- CE 463L: Water Chemistry and Analysis
- CE 467L: Geotechnical Engineering
- CE 485: Wastewater Treatment Design
- ENE 200: Environmental Engr. Principles
- ENE 426: Particulate Air Pollutants: Properties/ Behavior/ Measurement
- ENE 428: Air Pollution Fundamentals

#### Design Kernel: Choose two from CE 465, 486, 478, 482, 484, or ENE 486.
## FIRST YEAR
### FALL SEMESTER
| GE A | WRIT 150 | 4 |
| GE B | CHEM 105aL (GE E) | 4 |

### SPRING SEMESTER
| GE B | CHEM 105aL (GE E) | 4 |
| MATH 125 (GE F) | 4 |
| ENGR 102 | 3 |

## SECOND YEAR
### FALL SEMESTER
| GE C | MATH 126 or MATH 129 | 4 |
| GE D | PHYS 151L (GE E) | 4 |
| MATH 126 or MATH 129 | 4 |
| CE 205 | 2 |

### SPRING SEMESTER
| GEOL 305L | 4 |
| CE 207L | 2 |
| MATH 245 | 4 |
| CE 225 | 3 |
| OPTIONAL ELECTIVE | 3 |

## THIRD YEAR
### FALL SEMESTER
| CE 309 | MATH 126 or MATH 129 | 4 |
| CE 334L | MATH 226 or MATH 229 | 4 |
| PHYS 152L | 4 |
| CE 457 | 3 |
| OPTIONAL ELECTIVE | 3 |

### SPRING SEMESTER
| CE 458 | 3 |
| CE 467L | 4 |

## FOURTH YEAR
### FALL SEMESTER
| CE 478 | 3 |
| CE 408 | 3 |
| WRIT 340 | 3 |

### SPRING SEMESTER
| CE 402 | 3 |
| GE C | 4 |
| MATH 245 | 4 |
| CE 225 | 3 |
| CE 458 | 3 |
| CE 480 | 3 |
| OPTIONAL ELECTIVE | 3 |

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**MATHEMATICS (16 UNITS)**
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

**PHYSICS (8 UNITS)**
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

**OTHER SCIENCE (8 UNITS)**
- CHEM 105AL: General Chemistry
- GEOL 305L: Intro. to Engineering Geology

**GENERAL EDUCATION (32 UNITS)**
- 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)
- GE G: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

**WRITING (7 UNITS)**
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

---

**ENGINEERING (70 UNITS)**
- CE 106L: Design & Planning of CE Systems
- CE 108: Intro. to CE Computer Methods
- CE 205: Statics
- CE 207L: Intro. to Design of Structural Systems
- CE 225: Mechanics of Deformable Bodies
- CE 309: Fluid Mechanics
- CE 235: Dynamics
- CE 334L: Mechanical Behavior of Materials
- CE 358: Theory of Structures II
- CE 402: Computer Methods in Civil Engr.
- CE 408: Risk Analysis in Civil Engr.
- CE 451: Water Resources Engineering
- CE 456: Design of Steel Structures
- CE 457: Reinforced Concrete Design
- CE 458: Theory of Structures II
- CE 459: Intro. to Structural Dynamics
- CE 460: Construction Engineering
- CE 467L: Geotechnical Engineering
- CE 478: Timber & Masonry Design
- CE 480: Structural Systems Design
- CE 482: Foundation Design
- EE 202L: Linear Circuits
- EE 326LX: Essentials of Electrical Engr
- ENGR 102: Engineering Freshman Academy
- ISE 460: Engineering Economy

---

**SPECIAL NOTES**
Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.

CE 205, 225, 309, AND 235: Minimum grade of “C” is required.

EE 326LX: CE students are encouraged to take EE 326Lx in the spring.
# Environmental Engineering

## First Year

### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tr>
<td>WRIT 150</td>
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<td>MATH 125 (GE F)</td>
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<td>CE 110</td>
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<td>ENGR 102</td>
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### Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>GE B</td>
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<tr>
<td>CHEM 105aL (GE E)</td>
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<td>MATH 126 or MATH 129</td>
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<td>PHYS 151L (GE E)</td>
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## Second Year

### Fall Semester

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<td>PHYS 152L</td>
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<td>CE 210L</td>
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### Spring Semester

<table>
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<th>Course</th>
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<td>GE C</td>
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<td>MATH 245</td>
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## Third Year

### Fall Semester

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<td>CE 309</td>
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<td>WRIT 340</td>
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<td>ISE 460</td>
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### Spring Semester

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<td>CHEM 322aL (GE D)</td>
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<td>CE 463L</td>
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## Fourth Year

### Fall Semester

<table>
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<td>GE B</td>
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<td>CE 484</td>
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### Spring Semester

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<td>GE C</td>
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<td>GEOL 305L</td>
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<td>ENE 426</td>
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<td>GE 485</td>
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### Notes

**Mathematics (16 Units)**
- MATH 125: Calculus I
- MATH 126 or MATH 129: Calculus II
- MATH 226 or MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr.

**Physics (8 Units)**
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

**Chemistry (10 Units)**
- CHEM 105AL: General Chemistry
- CHEM 105BL: General Chemistry
- CHEM 322AL: Organic Chemistry

**Other Science (8 Units)**
- BISC 220L: Cell Biology and Physiology
- GEOL 305L: Intro to Engr. Geology

**General Education (32 Units)**
- GE A: The Arts (1 Course)
- GE B: Humane 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)
- GE G, H: Global Perspectives (2 Courses)
- GESM: General Education Seminar (1 Course)

**Writing (7 Units)**
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

**Engineering (62 Units)**
- CE 110: Intro. to Environmental Engr.
- CE 108: Intro. to CE Computer Methods
- CE 205: Statics
- CE 210L: Intro. to Env. Engr. Microbiology
- CE 309: Fluid Mechanics
- CE 408: Risk Analysis in Civil Engr.
- CE 451: Water Resources Engineering
- CE 453: Water Quality Control
- CE 463L: Water Chemistry and Analysis
- CE 484: Water Treatment Design
- CE 485: Wastewater Treatment Design
- CHE 330: Chemical Engr. Thermodynamics
- ENGR 102: Engineering Freshman Academy
- ISE 460: Engineering Economy
- PTE 463L: Intro. to Transport Processes

**Design Kernel:** Choose from CE 443, 466, 476, or CHE 442.

*Special Notes*

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.

ENE 200, 426, 428, 416, and CE 309: Minimum grade of “C” is required.

**Design Kernel:** Choose from CE 443, 466, 476, or CHE 442.
MAJORS & AREAS OF EMPHASIS

» Computer Science
» Computer Science (Games)
» Computer Science / Business Administration
» Computer Engineering & Computer Science

LEARN MORE: viterbi.usc.edu/cs
Computer scientists and computer engineers design and implement efficient software and hardware solutions to computer-solvable problems. They are involved in the development of areas such as high-speed networks, multimedia and creative technologies, systems design, virtual reality and robotics.

The Computer Science (CSCI) program prepares students to work in the areas of software design, development, application and maintenance. It provides intensive study in algorithmic design and analysis as well as the theory of computing.

The Computer Science (Games) degree (CSGM) offers technical and creative training for the Video Game industry. The curriculum brings numerous core areas of advanced computer science - including artificial intelligence, graphic interfaces, modeling, algorithm design - together with creative and artistic training from the School of Cinematic Arts and the Roski School of Fine Arts. The combination of the creative and technical training along with industry exposure prepares students for key leadership positions in this dynamic field.

The Computer Science / Business Administration program (CSBA) is a combined degree program that allows students to study both Computer Science and Business in four years. In addition to the core computer science courses, students will take courses from the Marshall School of Business such as Organizational Behavior, Marketing Fundamentals, Business Finance, and Strategic Management.

The Computer Engineering & Computer Science program (CECS) trains students to integrate hardware and software processes to form solutions to problems arising from complex systems such as atomic reactors, guidance systems and manufacturing systems. These students graduate ready to design and build computers and computer networks.

**RESEARCH HIGHLIGHTS**

- Artificial intelligence
- Robotics
- Mobile and cloud computing
- Multimedia and immersive technology
- Networks and distributed systems
- Security, data science and analytics
- Theoretical computer science
- Software engineering and applications

**COMPANIES THAT HIRE CSCI STUDENTS**

Amazon, Apple, Blizzard, Cisco, Conexant, DIRECTV, Disney Interactive, eBay, Electronic Arts, Facebook, Garmin, Google, Heavy Iron Studios, Hewlett-Packard, IBM, Intel Corporation, Lockheed Martin, Microsoft, NASA-JPL, NBCUniversal, Raytheon, Samsung, Sony Online Entertainment, SpaceX, Square, Yahoo!, Zynga...

And many more!

**CAREER OPTIONS**

- Build new computer circuits, microchips, and other electronic components
- Conduct research on artificial intelligence capabilities
- Create new computer and operating systems
- Design logic devices for everyday appliances
- Improve video game consoles and devices
- Integrate hardware and software processes
- Launch high tech entrepreneurial projects and ventures
- Invent intelligent robots
- Develop advanced data analytics
## 2018-19 MAJOR COURSE PLAN

### COMPUTER SCIENCE

#### FIRST YEAR

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<tr>
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<td>MATH 125 (GE F)</td>
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### MATHEMATICS (20 UNITS)

- MATH 125: Calculus I
- MATH 126 or 129: Calculus II
- MATH 226 or 229: Calculus III
- MATH 225: Linear Algebra & Diff. Equations
- EE 364: Intro to Probability & Statistics or MATH 407: Probability Theory

### SCIENCE COURSES (8 UNITS)

- BASIC SCIENCE I
- BASIC SCIENCE II

### GENERAL EDUCATION (32 UNITS)

- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)

- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### ENGINEERING (62 UNITS)

- CSCI 103L: Introduction to Programming
- CSCI 104L: Data Structures & Object Oriented Design
- CSCI 109: Introduction to Computing
- CSCI 170: Discrete Methods in Comp. Science
- CSCI 201L: Princ. of Software Development
- CSCI 270: Intro. to Algorithms & Theory of Computing
- CSCI 310L: Intro. to Software Engineering
- CSCI 350L: Introduction to Operating Systems
- CSCI 356: Introduction to Computer Systems
- CSCI 360L: Introduction to Artificial Intelligence
- CSCI 401: Capstone: Design and Construction of Large Software Systems
- CSCI 404: Capstone: Creating Your High-Tech Startup
- EE 109: Introduction to Embedded Systems
- ENGR 102: Engineering Freshmen Academy
- Technical Electives

### OTHER COURSES (7 UNITS)

- REQUIRED ELECTIVES

### SPECIAL NOTES

- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

- GRADE QUALIFIER: A grade of a C (2.0) or better is required for each of the core courses (CSCI 103, 170, 104 & 201). Courses with a grade of C- or below must be repeated; courses may only be retaken once with department approval.

- BASIC SCIENCE: PHYS 151L and 152L; CHEM 105aL and CHEM 105bL; or BISC 120L and 220L

- TECHNICAL ELECTIVES: See approved tech elective list on CS webpage.
## COMPUTER SCIENCE (GAMES)

### FIRST YEAR

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<td>REQUIRED ELECTIVE</td>
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### MATHEMATICS (12 UNITS)

- MATH 125: Calculus I
- MATH 126 or 129: Calculus II
- MATH 225: Linear Algebra & Diff. Equations or EE 141L: Applied Linear Algebra for Engineering

### PHYSICS (4 UNITS)

- PHYS 151L: Mechanics and Thermodynamics

### GENERAL EDUCATION (32 UNITS)

- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)

- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### COMPUTER SCIENCE (50 UNITS)

- CSCI 103L: Introduction to Programming
- CSCI 104L: Data Structures & Object Oriented Design
- CSCI 109: Introduction to Computing
- CSCI 170: Discrete Methods in Comp. Science
- CSCI 201L: Princ. of Software Development
- CSCI 270: Intro. to Algorithms & Theory of Computing
- CSCI 350: Introduction to Operating Systems
- CSCI 355: Introduction to Internetworking
- CSCI 356: Intro. to Computer Systems
- CSCI 357: Intro. to Computer Systems
- CSCI 360: Intro. to Artificial Intelligence
- CSCI 420: Computer Graphics
- CSCI 491A: Final Game Project
- CSCI 491B: Final Game Project
- ENGR 102: Engineering Freshmen Academy

### GAMES DEVELOPMENT (30 UNITS OUT OF 34)

- CSCI 281: Pipelines for Games & Interactives
- CSCI 423: Native Console Multiplayer Game Development
- CSCI 426: Game Prototyping
- CTIN 190: Intro to Interactive Entertainment
- CTIN 483: Intermediate Game Development
- CTIN 489: Intermediate Game Design Workshop
- CTAN 452: Intro to Computer Animation
- ITP 380: Video Game Programming
- ITP 485: Programming Game Engines

### SPECIAL NOTES

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

### GRADUATE ELECTIVES:

- Ge: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

### REQUIRED PREP:

- PHYS 151 with or before ITP 380
- CSCI 353 before CSCI 423
- ITP 485 before CSCI 423, 426

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*RECOMMENDED PREP: It is recommended that students complete:

- PHYS 151 with or before ITP 380
- CSCI 353 before CSCI 423
- ITP 485 before CSCI 423, 426
### COMPUTER SCI. / BUSINESS ADMIN.

#### FIRST YEAR

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<tbody>
<tr>
<td><strong>GE B</strong></td>
<td><strong>MATH 125 (GE F)</strong></td>
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#### SECOND YEAR

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<td><strong>CSCI 201L (CSCI 109)</strong></td>
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#### THIRD YEAR

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<td><strong>GE E or D</strong></td>
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### MATHEMATICS (16 UNITS)

- **MATH 125**: Calculus I
- **MATH 126** or **MATH 129**: Calculus II
- **MATH 225**: Linear Algebra & Diff. Equations

### SCIENCE COURSES (4 UNITS)

- **BASIC SCIENCE**: PHYS 151L, CHEM 105AL or BISC 120L
- **CSCI ELECTIVE**

### GENERAL EDUCATION (22 UNITS)

- **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)
- **GE G,H**: Global Perspectives (2 Courses)*
- **GESM** General Education Seminar (1 Course)*

### WRITING (7 UNITS)

- **WRIT 150**: Writing and Critical Reasoning
- **WRIT 340**: Advanced Writing

### BUSINESS & ECONOMICS (36 UNITS)

- **ACCT 410X**: Accounting for Non-Business Majors
- **BISC 120L**: Quantative Reasoning (1 Course)
- **Physical Sciences (1 Course)
- **Humanistic Inquiry (2 Courses)
- **The Arts (1 Course)
- **Social Analysis (2 Courses)
- **Life Sciences (1 Course)
- **General Education Seminar (1 Course)*
- **Global Perspectives (2 Courses)*

### SPECIAL NOTES

- Courses with this symbol may be satisfied with AP, IB, or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 23 for more information and consult your advisor for detailed assistance.
- **GRADE QUALIFIER**: A grade of a C (2.0) or better is required for each of the core courses (CSCI 103, 170, 104 & 201). Courses with a grade of C- or below must be repeated; courses may only be retaken once with department approval.
- **CSCI/BUAD ELECTIVES**: Students must take one course from the Computer Science selection and one from the Business selection and a third course from either one.

### BUSINESS ELECTIVES (8-12 UNITS)

- **CSCI 360L**: Introduction to Artificial Intelligence
- **CSCI 430**: Security Systems
- **CSCI 485**: File and Database Management
- **BAEP 452**: Feasibility Analysis

### ENGINEERING ELECTIVES (32 UNITS)

- **CSCI 103L**: Introduction to Programming
- **CSCI 104L**: Data Structures & Obj. Orient. Design
- **CSCI 109**: Introduction to Computing
- **CSCI 170**: Discrete Methods in Comp. Science
- **CSCI 201L**: Princ. of Software Development
- **CSCI 270**: Intro. to Algorithms & Theory of Comp.
- **CSCI 310L**: Intro. to Software Engineering
- **CSCI 401**: Capstone: Design & Construction of Large Software Systems or **CSCI 404**: Capstone: Creating Your High-Tech Startup
- **ENGR 102**: Engineering Freshmen Academy
- **BAEP 453**: Venture Management
- **BUAD 301**: Technology Entrepreneurship
- **DSO 431**: Managing the Digital Revolution for Your Business
- **DSO 433**: Business Info. Sys. Analysis & Design
- **DSO 443**: The Bus. of Interactive Digital Media
- **DSO 462**: Managing Small Bus. on the Internet
- **MKT 425**: Marketing on the Internet

**2018-19 MAJOR COURSE PLAN**
# COMPUTER ENGR. & COMPUTER SCI.

## FIRST YEAR

### FALL SEMESTER

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## THIRD YEAR

### FALL SEMESTER

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### SPRING SEMESTER

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>GE B</td>
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<tr>
<td>TECH. ELECTIVE I</td>
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<tr>
<td>CSCI 350 or CSCI 356</td>
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<tr>
<td>GE D</td>
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<td>OPTIONAL ELECTIVE</td>
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## FOURTH YEAR

### FALL SEMESTER

<table>
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<tr>
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<td>GE B</td>
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<tr>
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<tr>
<td>CSCI 353 or CSCI 401</td>
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<tr>
<td>EE 451L or EE 454L or EE 457L</td>
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<tr>
<td>REQUIRED ELECTIVE</td>
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### SPRING SEMESTER

<table>
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<td>CSCI401L or CSCI 404 or ITP 466L or EE 459</td>
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<tr>
<td>OPTIONAL ELECTIVE</td>
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## MATHEMATICS (20 UNITS)

- MATH 125: Calculus I
- MATH 126 or 129: Calculus II
- MATH 226 or 229: Calculus III
- MATH 223: Linear Algebra & Diff. Equations
- EE 364: Intro to Probability & Statistics
- MATH 407: Probability Theory

## PHYSICS (8 UNITS)

- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

## GENERAL EDUCATION (12 UNITS)

- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

## WRITING (12 UNITS)

- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

## ENGINEERING (65-66 UNITS)

- CSCI 103L: Introduction to Programming
- CSCI 104L: Data Structures & Object Oriented Design
- CSCI 170: Discrete Methods in Comp. Science
- CSCI 201L: Princ. of Software Development
- CSCI 270: Intro. to Algorithms & Theory of Computing
- CSCI 350: Introduction to Operating Systems
- CSCI 353: Introduction to Internetworking
- CSCI 401: Capstone: Design of Large Software Systems or 404: Capstone: Creating Your High-Tech Startup or EE 459L: Senior Design Project
- EE 109: Introduction to Embedded Systems
- EE 250: Distributed Systems for the Internet of Things
- EE 354L: Introduction to Digital Circuits
- EE 457: Computer Systems Organization
- EE 451: Parallel and Distributed Computation or EE 454L: Intro. to Sys. Using Microprocessors or EE 477L: MOS VLSI Circuit Design
- ENGR 102: Engineering Freshman Academy

## SPECIAL NOTES

- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.
- GRADE QUALIFIER: A grade of a C (2.0) or better is required for each of the core courses (CSCI 103, 170, 104 & 201). Courses with a grade of C- or below must be repeated; courses may only be retaken once with department approval.
- SENIOR DESIGN PROJECT: CSCI 401 or EE 459L.
- TECHNICAL ELECTIVES: See approved tech elective list on CS webpage.
ELECTRICAL

MAJORS & AREAS OF SPECIALIZATION

» Electrical Engineering
  Specializations:
  Computer Engineering
  Circuits, Signals & Systems
  Electrical Sciences

LEARN MORE: viterbi.usc.edu/ee
Electrical Engineering (EE) is the enabling technology driving many of today’s most crucial industries and a critical field in advancing the future. It is a diverse discipline encompassing computer and information systems, digital media, telecommunications and wireless technologies, nanoelectronics, lasers, robotics, display technologies, circuit design, and more.

Electrical Engineering is a vital part of every industry, from biomedical engineering and health applications to telecommunications, aerospace, and information technology.

The department offers an exciting, diverse curriculum that prepares students with significant breadth and depth. Core sets of classes prepare students for one of three areas of emphasis: circuit, signals and systems, computer engineering and energy and electrical sciences. As freshmen and sophomores, students are introduced to the concepts of digital and analog electronics and computer programming, as well as core courses in math and physics. Students then choose courses that pertain to their chosen area of specialization. Computer Engineering contains courses that focus on software engineering, digital hardware, embedded systems, and VLSI design. Circuits, Signals, and Systems covers areas in VLSI design, media and audio systems, wireless communications, adaptive control, and mixed-signal integrated circuits. Courses in the Electrical Sciences area cover communications hardware, integrated-circuit technology, energy sources and management, and mixed-signal integrated circuits.

Design courses permeate the class schedule allowing students to apply the knowledge they have gained as well as prepare them to address the specific needs of industry when they graduate. One EE senior design course recently challenged students to design “smart” surfing equipment. Design options included a new “sustainable surfboard,” a “wireless lifejacket” and a programmable “interactive surfboard.”

EE RESEARCH
Research in the Ming Hsieh department is revolutionizing information processing, telecommunications, medical diagnosis and treatment, energy and green initiatives, computer systems, and new media, among other areas. Partnerships with off-campus research institutes like the Information Sciences Institute (ISI) and the Institute for Creative Technologies (ICT) create unparalleled opportunities for students to work at the cutting-edge of technology.

RESEARCH HIGHLIGHTS
- Nanoelectronics and nanobiology
- Wireless communication & sensor networks
- Biological interface circuits and devices
- Laser interactions with materials
- Speech and image recognition & compression
- Computer architecture and parallel processing
- Photonics and integrated optics
- Plasma science and technology
- Quantum computing and communication
- Robust, adaptive learning control
- Communications theory and coding

COMPANIES THAT HIRE EE STUDENTS
3Com Corporation, Accenture, Apple, BAE Systems, The Boeing Co., Cap Gemini, Disney, Edwards Lifesciences, Garmin, General Electric, Google, IBM, Intel Corporation, Microsoft, Northrop Grumman, Nvidia, Qualcomm, Raytheon, Space X, Teradata, Teradyne, Verizon...

And many more!

CAREER OPTIONS
- Develop alternative energy and green power sources
- Develop semiconductors and consumer electronics
- Develop wireless communication systems
- Design new media and imaging systems (HDTV, satellite radio, etc.)
- Design robots and other embedded systems
- Architect novel computer processors and networking systems
- Build lasers used for medical, manufacturing and military purposes
- Develop airborne and satellite electronic systems
- Develop new biomedical imaging devices
Electrical Engineering provides a broad curriculum that covers topics from a variety of areas. Through the Core Curriculum taken during the first two years, students will gain exposure to broader topics and the areas of specialization. Within an area of specialization, students will choose Entry-Level Electives as well as Advanced Electives based on their interests.

The EE degree offers three areas of specialization: Computer Engineering; Circuits, Signals, and Systems; and Electrical Sciences.

Computer Engineering contains courses that focus on software engineering, digital hardware, embedded systems, and VLSI design.

Circuits, Signals, and Systems covers areas in VLSI design, media and audio systems, wireless communications, adaptive control, and mixed-signal integrated circuits.

Courses in the Electrical Sciences area cover communications hardware, integrated-circuit technology, energy sources and management, and mixed-signal integrated circuits.

The diagram below shows the paths for each area of specialization. You should use the diagram and the suggested course plan on the following page to develop your individual course plan.

### CORE CURRICULUM
All courses are required for an electrical engineering degree.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>EE 105</td>
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<td>EE 109</td>
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<tr>
<td>EE 141</td>
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<td>EE 330</td>
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<tr>
<td>EE 355</td>
<td>4</td>
</tr>
<tr>
<td>EE 364</td>
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### EE ELECTIVES:
Take minimum 16.0 units of Advisor approved, upper-division EE electives

#### COMPUTER ENGINEERING

<table>
<thead>
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<tr>
<td>CSCI 360</td>
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<td>EE 477</td>
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<td>CSCI 460</td>
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<tr>
<td>EE 454</td>
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<tr>
<td>CSCI 445</td>
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#### CIRCUITS, SIGNALS & SYSTEMS

<table>
<thead>
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<tbody>
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<td>EE 348</td>
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<td>EE 448</td>
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<td>EE 482</td>
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<td>EE 467</td>
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<tr>
<td>EE 483</td>
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<tr>
<td>EE 479</td>
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#### ELECTRICAL SCIENCES

<table>
<thead>
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<th>Course</th>
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<td>EE 338</td>
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<td>EE 438</td>
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<td>EE 471</td>
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<td>EE 480</td>
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<tr>
<td>AME 415</td>
<td>3</td>
</tr>
<tr>
<td>EE 422</td>
<td>4</td>
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</tbody>
</table>

### CAPSTONE:
Take 1 course from your chosen specialization or Thesis (EE 494ab)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
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<tr>
<td>EE 459</td>
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<td>EE 434</td>
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<tr>
<td>EE 447</td>
<td>4</td>
</tr>
<tr>
<td>EE 484</td>
<td>3</td>
</tr>
</tbody>
</table>
**ELECTRICAL ENGINEERING**

**FIRST YEAR**

**FALL SEMESTER**
- EE 141: 4
- EE 155: 4
- EE 105: 3
- WRIT 150: 4
- ENGR 102: 2

**SPRING SEMESTER**
- MATH 129: 4
- PHYS 171L (GE E): 4
- EE 109: 4
- GE A: 4
- OPTIONAL ELECTIVE: 2

**SECOND YEAR**

**FALL SEMESTER**
- MATH 229: 4
- PHYS 172L: 4
- EE 250L: 4
- GE B: 4
- OPTIONAL ELECTIVE: 2

**SPRING SEMESTER**
- MATH 245: 4
- EE 330: 3
- EE 202L: 4
- GE C: 4
- OPTIONAL ELECTIVE: 3

**THIRD YEAR**

**FALL SEMESTER**
- EE 364: 4
- PHYS 173L: 4
- EE 301L: 4
- WRIT 340: 3
- OPTIONAL ELECTIVE: 4

**SPRING SEMESTER**
- EE ELECTIVE: 4
- EE ELECTIVE: 4
- GE D: LIFE SCIENCES: 4
- OPTIONAL ELECTIVE: 4

**FOURTH YEAR**

**FALL SEMESTER**
- EE ELECTIVE: 3-4
- GE B: 4
- REQUIRED ELECTIVE: 4
- REQUIRED ELECTIVE: 4
- OPTIONAL ELECTIVE: 2

**SPRING SEMESTER**
- CAPSTONE DESIGN: 4
- GE C: 4
- REQUIRED ELECTIVE: 4
- OPTIONAL ELECTIVE: 2
- OPTIONAL ELECTIVE: 4

**MATHEMATICS (12 UNITS)**
- EE 141: Applied Linear Algebra for Engineering
- MATH 129: Calculus II
- MATH 229: Calculus III
- MATH 245: Mathematics of Phys. and Engr. I

**PHYSICS (12 UNITS)**
- PHYS 171: Applied Physics I: Mechanics
- PHYS 172L: Applied Physics II: Electricity, Magnetism and Optics
- PHYS 173L: Applied Physics III: Topics in Modern Physics

**BIOLOGICAL SCIENCE (4 UNITS)**
- BISC 120LG: General Biology: Organizmal Biology and Evolution
- BISC 120LG: Advanced General Biology
- BISC 220LG: General Biology: Cell Biology and Physiology
- BISC 221LG: Advanced General Biology: Cell Biology and Physiology
- CHE 30LG: Introduction to Engineering Biology
- CHEM 203LGX: AIDS Drug Discovery and Development
- CHEM 350G: Molecular Principles of Biochemistry

**ENGINEERING (55 UNITS)**
- EE 105: Intro. to Electrical Engineering
- EE 109: Intro. to Embedded Systems
- EE 155: Intro. to Comp. Programming for EE
- EE 202L: Linear Circuits
- EE 250L: TBA
- EE 301L: Linear Systems
- EE 330: Electromagnetics I
- EE 355: Software Design for Engineers
- EE 364: Intro to Probability & Statistics
- ENGR 102: Engineering Freshman Academy
- EE ELECTIVES

**GENERAL EDUCATION (32 UNITS)**
- 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)
- GE GH: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

**WRITING (7 UNITS)**
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

**OTHER COURSES (7 UNITS)**
- REQUIRED ELECTIVE
- CAPSTONE

**SPECIAL NOTES**
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

- REQUIRED ELECTIVE: Required electives are needed to meet minimum unit requirement and can be met with AP/IB and transfer credit.

- OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.

- EE ELECTIVES: Minimum 16 units of advisor approved, upper-division EE Electives. Refer to the diagram on the facing page.

- CAPSTONE: Take one Capstone Course. Refer to the diagram on the facing page.
INDUSTRIAL & SYSTEMS

INDUSTRIAL & SYSTEMS

MAJORS & AREAS OF EMPHASIS

» Industrial & Systems Engineering
  Track: Information Systems
  Track: Operations

LEARN MORE: viterbi.usc.edu/epstein
Industrial and Systems Engineers (ISE) use engineering and business principles to formulate rigorous approaches to problem solving and the management of complex systems. They are productivity catalysts, managing innovation and the combination of physical, capital, and human resources needed to produce and deliver valuable goods and services.

Industrial and Systems engineers are consummate economic competitors who focus on developing and controlling manufacturing, production, inventory, distribution, service, and management information systems to ensure their companies’ success in the global marketplace.

On the job, these engineering professionals optimize the use of scarce resources by integrating people and technology to maximize productivity, minimize cost, improve processes, and maintain high standards of quality.

The Epstein Department’s Information Systems Engineering option gives extra emphasis to enterprise resource planning, software, and data mining techniques. USC’s undergraduate ISE curricula prepare students for careers in a wide-range of industries, consulting, or professional engineering practice, and are also an excellent intellectual foundation for advanced degrees in fields as diverse as Engineering, Logistics, Business Administration, Finance, Medicine, Law, or Public Policy.

**RESEARCH HIGHLIGHTS**

- Rapid prototyping and automated construction
- Agile, flexible manufacturing and production systems
- Human-computer interaction
- Management of technology
- Economic impacts of terrorism
- Port operations and the supply chain
- Green logistics and industrial ecology
- Renewable energy systems
- Transportation and logistics
- Optimization and logistics
- Collaborative engineering design
- Rapid prototyping and automated construction
- Health systems improvement

**COMPANIES THAT HIRE ISE STUDENTS**


And many more!

**CAREER OPTIONS**

- Implement enterprise resource planning systems
- Consult on business practices
- Design efficient manufacturing and service systems
- Optimize assembly and distribution systems
- Develop ergonomically correct systems and interfaces
- Improve hospital operations and schedules
- Make systems safe by reducing errors and accidents
- Manage business operations
- Develop quality control and assurance systems
### INDUSTRIAL & SYSTEMS (INFO SYSTEMS)

#### FIRST YEAR

**FALL SEMESTER**
- **GE A**
- **ISE 105**
- **MATH 125 (GE F)**
- **WRIT 150**
- **ENGR 102**

**SPRING SEMESTER**
- **GE B**
- **CHEM 105AL or MASC 110L**
- **MATH 126 or MATH 129**
- **ISE 150**
- **OPTIONAL ELECTIVE**

#### SECOND YEAR

**FALL SEMESTER**
- **ISE 220**
- **ITP 320**
- **MATH 226 or MATH 229**
- **PHYS 151L (GE E)**
- **OPTIONAL ELECTIVE**

**SPRING SEMESTER**
- **GE C**
- **ISE 225**
- **ISE 331**
- **ISE 460**
- **MATH 225**

#### THIRD YEAR

**FALL SEMESTER**
- **ISE 330**
- **ISE 435**
- **DSO 435**
- **PHYS 152L**
- **OPTIONAL ELECTIVE**

**SPRING SEMESTER**
- **GE D**
- **ISE 315L**
- **ISE 470**
- **ISE 495ax or DSO 431 or PHYS 152L**
- **INFO SYSTEMS COURSE**

#### FOURTH YEAR

**FALL SEMESTER**
- **ISE 410**
- **ISE 495bx or DSO 431 or PHYS 152L**
- **WRIT 340**
- **INFO SYSTEMS COURSE**
- **INFO SYSTEMS COURSE**

**SPRING SEMESTER**
- **OPTIONAL ELECTIVE**
- **OPTIONAL ELECTIVE**

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**MATHEMATICS (16 UNITS)**
- **MATH 125:** Calculus I
- **MATH 126 or 129:** Calculus II
- **MATH 226 or 229:** Calculus III
- **MATH 225:** Linear Algebra and Diff. Equations

**SCIENCE (12 UNITS)**
- **CHEM 105AL:** General Chemistry
- **CHEM 115AL:** Advanced General Chemistry
- **MASC 110L:** Materials Science
- **PHYS 151L:** Mechanics and Thermodynamics
- **PHYS 152L:** Electricity and Magnetism

**GENERAL EDUCATION (32 UNITS)**
- **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)
- **GE G, H:** Global Perspectives (2 Courses)*
- **GESM:** General Education Seminar (1 Course)*

**WRITING (7 UNITS)**
- **WRIT 150:** Writing and Critical Reasoning
- **WRIT 340:** Advanced Writing

**ENGINEERING (54 UNITS)**
- **DSO 435:** Enterprise Data Architecture
- **ENGR 102:** Engineering Freshman Academy
- **ISE 105:** Intro. to Industrial Engineering
- **ISE 150:** Solving Engr. Problems via Computer Programming
- **ISE 220:** Probability Concepts in Engr.
- **ISE 225:** Engineering Statistics I
- **ISE 330:** Intro. to Operations Research: Stochastic Models
- **ISE 410:** Prod. Planning and Scheduling
- **ISE 435:** Discrete Systems Simulation
- **ISE 440:** Work, Technology and Organization
- **ISE 460:** Engineering Economy
- **ISE 470:** Human/Computer Interface Design
- **ISE 495A:** Senior Design Project
- **ISE 495B:** Senior Design Project
- **ITP 320:** Enterprise Information Systems

**OTHER COURSES (6 UNITS)**
- **INFO SYSTEMS COURSES:**
  - **DSO 431:** Foundations of Digital Business Invn. and DSO 433: Business Process Design or ITP 482:** Engineering Database Applications and ITP 487:** Data Warehouse and Business Intel.
  - **ISE 350:** Principles of Systems Engineering
  - **Approved Engineering Electives**

**GENERAL NOTES**
- Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.
- GE: Engineering students are encouraged to satisfy GE A and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your academic advisor for detailed assistance.

**OPTIONAL ELECTIVES:** Consult with your academic advisor to explore optional elective courses. These courses are not required.

**INFO SYSTEMS COURSES:** Select at least 8 units among the following courses: DSO 431 (4), DSO 433 (4), ISE 350* (3), ITP 487* (3).

Also select at least 5 units among the following classes: AME 341a, AME 341b, CE 401, CE 460, CE 471, ENGR 427, CE 329, ENGR 345, ENGR 401, ISE 232, ISE 301L, ISE 327, ISE 335L, ISE 444, ISE 350, ISE 375L, ISE 426, ITP 215Lx, ITP 320x, ITP 325x, ITP 421x, ITP 422L, ITP 454x, ITP 457, ITP 466, ITP 482x, ITP 482*, ITP 486, ITP 487*, ITP 488x, NSC 335, NSC 337.

Classes noted with a * will count for Info Systems course requirement and Approved Engineering Electives.
# INDUSTRIAL & SYSTEMS (OPERATIONS) MAJOR COURSE PLAN

## FIRST YEAR

### FALL SEMESTER
- **GE A**
  - ISE 105 4
  - MATH 125 (GE F) 4
  - WRIT 150 4
  - ENGR 102 2

### SPRING SEMESTER
- **GE B**
  - CHEM 105aL or MASC 110L 4
  - MATH 126 or MATH 129 4
  - ISE 150 3
  - OPTIONAL ELECTIVE 3

## SECOND YEAR

### FALL SEMESTER
- **GE C**
  - ISE 220 3
  - MATH 226 or MATH 229 4
  - PHYS 151L (GE E) 4
  - OPTIONAL ELECTIVE 3

### SPRING SEMESTER
- **ISE 225** 3
  - ISE 331 3
  - ISE 460 3
  - MATH 225 4

## THIRD YEAR

### FALL SEMESTER
- **ISE 330**
  - ISE 435 3
  - ISE 382 4
  - OPERATIONS COURSE 3
  - WRIT 340 3

### SPRING SEMESTER
- **BIOLOGY ELECTIVE (GE D)**
  - ISE 315L 3
  - ISE 335 3
  - ISE 370L 4
  - ISE 495ax 2

## FOURTH YEAR

### FALL SEMESTER
- **ISE 410**
  - ISE 495bx 3
  - PHYS 152L 4
  - ISE 375L 3
  - OPERATIONS COURSE 4

### SPRING SEMESTER
- **GE C**
  - ISE 426 SE225 3
  - ISE 440 3

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### MATHEMATICS (16 UNITS)
- MATH 125: Calculus I
- MATH 126 or 129: Calculus II
- MATH 226 or 229: Calculus III
- MATH 225: Linear Algebra and Diff. Equations

### SCIENCE (12 UNITS)
- CHEM 105AL: General Chemistry
- or MASC 110L: Materials Science
- PHYS 151L: Mechanics and Thermodynamics
- PHYS 152L: Electricity and Magnetism

### GENERAL EDUCATION (12 UNITS)
- 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)
- GE G, H: Global Perspectives (2 Courses)*
- GESM: General Education Seminar (1 Course)*

### WRITING (7 UNITS)
- WRIT 150: Writing and Critical Reasoning
- WRIT 340: Advanced Writing

### ENGINEERING (58 UNITS)
- ENGR 102: Engineering Freshman Academy
- ISE 105: Intro. to Industrial Engineering
- ISE 150: Solving Engr. Problems via Computer Programming
- ISE 225: Engineering Statistics I
- ISE 315L: Engineering Project Management
- ISE 370: Human Factors in Work Design
- ISE 375L: Facilities Design
- ISE 382: Database Systems: Concept, Design and Implementation
- ISE 410: Prod. Planning and Scheduling
- ISE 426: Statistical Quality Control
- ISE 435: Discrete Systems Simulation
- ISE 440: Work, Technology and Organization
- ISE 460: Engineering Economy
- ISE 495A: Senior Design Project
- ISE 495B: Senior Design Project

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### SPECIAL NOTES

Courses with this symbol may be satisfied with AP, IB or A-Level exams. See page 22 for more information.

GE: Engineering students are encouraged to satisfy GE G and GE H with a course that also satisfies a Core Literacy. GE H may be satisfied by exam. Additionally, your GESM course should be taken in categories A, B, C, or D only. See page 21 for more information and consult your advisor for detailed assistance.

OPTIONAL ELECTIVES: Consult with your academic advisor to explore optional elective courses. These courses are not required.

OPERATIONS ELECTIVES: Select at least one among ISE 232L, ISE 327, ISE 350, or ACCT 410.

BIOLOGY ELECTIVE: Select one among BISC 103, BISC 104, BISC 290, or HBIO 205.

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2018-19 MAJOR COURSE PLAN