

Business and Management Track (including MBA)

With the electives available in the curriculum, students that wish to prepare for entering an MBA program may want to consider a minor in Business to complement their engineering degree. Courses in economics, finance, management, and accounting will be useful in preparing for a career in business management. Several of these classes can be used for HI/SB or Career Electives. The STEM-MBA path is popular among engineering students at UA (see <https://manderson.culverhouse.ua.edu/programs/mba-programs/stem-path-to-the-mba/> for more information).

Traditional Engineering (FE) Track

Electrical engineering, materials engineering, and statics and dynamics can complement your CHE degree and prepare you for work in a traditional engineering job, where you will interact with engineers with different backgrounds. These classes can also be helpful in passing the Fundamentals of Engineering (FE) exam in your senior year. While this exam is not required for obtaining a degree in the chemical and biological engineering program, it is required if you want to eventually be licensed as a professional engineer (a second exam, the Professional Engineer (PE) exam, is required after several years of work experience beyond the BS degree). The FE and PE are generally most important to those who seek careers in consulting or government positions.

Biological Engineering Concentration

Students interested in biotechnology-related careers should consider the Biological Engineering Concentration, which will be listed on their academic transcript. Students must be chemical engineering majors and must complete a minimum of 15 credit hours in biochemistry- or biology-related topics (see list to follow). To satisfy the biochemistry requirement, students must take 3 hours of CHE 445/446, CH 461, or BSC 450. The student must complete an additional 12 hours from the following list: CHE 418/419, CHE 416/417, CHE 492 (Microbial Engineering), BSC 300, 310, 312, 315, 385, 424, 425, 435, 441, 442, 444, 449, 451, 165, 496, CHS 425, or PH 411. If a student selects CH 461 or BSC 450 for the biochemistry requirement, they cannot count the other course, but may count CHE 445/446 as an elective course.

Research and Development Track/Engineering Graduate School

A graduate degree is the springboard to a career in R&D. While some may enter industrial R&D with a B.S. degree, research is the main theme of a graduate education in chemical and biological engineering and other engineering fields. To prepare for graduate school, consider opportunities working in research labs at UA. Many faculty in ChBE, as well as other related departments (such as Chemistry, Biology, Metallurgical and Materials Engineering, Mechanical Engineering, Physics, etc.), have openings for undergraduate researchers. The research can be done for credit (using CHE 491 or 498, or equivalent courses in other disciplines), as a part-time job, or as part of a fellowship. Talk with professors or the ChBE Undergraduate Research Coordinator to find out about opportunities. REU (Research Experiences for Undergraduates) programs sponsored by the National Science Foundation (NSF) are available during the summer at a number of universities across the US. There are many advertisements that usually come out around January each year, or check <https://www.nsf.gov/crssprgm/reu/> and look for REU programs. Advanced math courses beyond differential equations are also helpful in preparing for graduate-level classes. In most cases, students will be required to take the GRE (Graduate Record Exam) during their senior year while applying to graduate school. Unlike other advanced degree programs (law, medicine, business), attending graduate school in chemical and biological engineering (or related fields) will usually include a tuition waiver as well as a monthly stipend to cover living expenses while earning an MS or PhD. Some CHE graduate programs will allow students to start in the spring or summer, though most programs begin with a new class of graduate students in the fall semester. You may also opt to switch majors when entering graduate school- many students earn a BS degree in chemical engineering before entering a biomedical engineering graduate program. Check with the graduate program of schools you wish to apply to on requirements for acceptance. For additional guidance about graduate school, talk to your research mentor or the ChBE Graduate Program Director.

4. CO-OPERATIVE EDUCATION AND INTERNSHIPS

There are opportunities for students to gain valuable industrial or other work experience by participating as a co-op or intern student. Both programs are strong assets to career development and successful job placement upon graduation. In some cases, University credits can be earned through honors special problems courses in conjunction with advanced work projects (see the ChBE Honors Program Coordinator for more information).

Co-operative Education Program

The Cooperative Education program is an alternating study/work program that can begin as early as the summer following your freshman year. Three work periods are generally expected, with the student following an alternating schedule of work/school/work/school, etc. over the spring, summer and fall semesters. Three work periods generally add one year to the time required to complete the B.S. degree, but the salaries can be used to help with tuition costs, and the experience gained is a strong addition to your resume and is helpful in finding full-time employment upon graduation. The UA Co-Op office coordinates interviews for Co-Op positions. See <https://coop.sa.ua.edu/> for more information on the Co-Op program.

Internships

Internships usually involve summer work programs that are arranged by the student with targeted companies. Check with the Engineering Career Development Center (<https://coop.sa.ua.edu/>) in 2004 HM Comer for more information about open positions. REU programs offer an alternative for internships for students interested in pursuing research-related careers. See the Research Track/Graduate School section for info on REUs.

5. PROFESSIONAL STUDENT ORGANIZATIONS

Within the ChBE department, the **AICHE (American Institute for Chemical Engineers)** student chapter hosts industrial speakers, fields intramural sports teams, offers department tours (E-Day), and organizes regular meetings and plant trips, among other activities. AIChE is a great way to find out what chemical engineers do after graduation, network with your peers in the major, and build your resume. The Chem-E-Car team focuses on development of a small car that runs on a chemical reaction with competition between AIChE student chapters at other universities.

Omega Chi Epsilon is the national honor society for chemical engineering. Eligible students are invited to join in their junior or senior year, with membership based on academics.

Other engineering and science-related organizations that can help with career planning include:

- Ambassadors to the College of Engineering (ACEs)
- Biomedical Engineering Society (BMES)
- National Society of Black Engineers (NSBE)
- Pre-Health Advising Office (located in 200 Clark Hall)
- Pre-Law Advising Office (located in 200 Clark Hall)
- Pre-Med (Alpha Epsilon Delta, AED)
- Society of Women Engineers (SWE)
- Student Engineers in Action (SEA)
- Tau Beta Pi (Engineering Honor Society)
- Theta Tau Co-ed Professional Engineering Fraternity
- Tri-Beta Biology

6. PROGRAMS

Honors Programs

The University Honors Program (UHP), International Honors Program and Randall Research Scholars Program (RRSP; formally called Computer-Based Honors Program) are administered by the Honors College (<https://honors.ua.edu/>), located in Honors Hall.

ChBE Honors

<http://che.eng.ua.edu/undergraduate/honors-program/> (Contact: ChBE Honors Coordinator)

The ChBE department offers an undergraduate honors program for students who seek to be challenged by both independent and team projects and receive additional distinction with their undergraduate degrees. This individually tailored program culminates with the awarding of an Honors Certificate and recognition at the Honors Day Ceremony in the student's senior year. The requirements to graduate with ChBE honors are:

- maintain overall UA GPA of 3.3
- complete at least one 1-hour ChBE honors forum class (CHE 225, 325 or 425)
- complete at least one 3-hour experiential (hands-on) course (Co-Op, Internship, Independent research or design)
- complete a minimum of 6 hours of CHE honors courses (including any 300-level or higher course as honors by contract); this can include honors forum hours or research hours in chemical engineering
- complete an additional 6 hours of honors courses in the chemical engineering curriculum (CHE, CH, BSC, MA, PH, EN, HI/SB, etc.)
- complete an additional 6 hours of any honors courses at UA (even if not on the CHE flowchart)

Total of 18 hours of UA honors credits.

CHE honors classes include: 225/325/425 honors forum, 413, 419, 441, 446, 498 and 499. They require a 3.3 GPA to enroll.

Accelerated Masters Program (B.S./M.S.) / Ph.D. Scholars Program (B.S./Ph.D.)

<http://che.eng.ua.edu/undergraduate/accelerated-masters/> (Contact: ChBE Graduate Program Director)

Eligible undergraduate students can elect one of two advanced Scholars programs: one earns both the B.S. and M.S. CHE degrees in five years, while the B.S./Ph.D. Scholars Program allows undergraduates to begin work on their Ph.D. degree in their senior year. The Ph.D. Scholars program started in 2015 and is the first of its kind at UA. Both programs allow students to count some courses toward both the B.S. and graduate degree, reducing the course load needed to complete the graduate degree. A plan of study should be developed with the help of an advisor. The stipends associated with graduate school generally don't apply for the B.S./M.S. Scholars program, as the stipends are given to students pursuing a thesis- or dissertation-based (research-based) graduate degree. The B.S./Ph.D. Scholars program involves hands-on research with a professor/advisor and students in this program are eligible for receiving fellowships and stipends once they begin graduate courses full-time. For more information, see the undergraduate catalog, or consult the ChBE Graduate Program Director.

7. MY DEGREE IS IN CHEMICAL ENGINEERING, BUT THE DEPARTMENT IS CHEMICAL AND BIOLOGICAL ENGINEERING. WHY?

The Alabama Commission on Higher Education has approved the degree plan and regulates our offering an official degree in chemical engineering. The department's official name includes biological engineering and reflects the importance of biology and the life sciences for all students.

8. I WANT TO STUDY BIOMEDICAL ENGINEERING. WHAT SHOULD I CHOOSE AT UA?

UA does not offer a degree in biomedical engineering (BME), but we do offer a **concentration** in Biological Engineering (see p.7). Most universities offering BME degrees are located alongside major medical schools, such as at the University of Alabama at Birmingham (UAB). If your career goal is to work as a biomedical engineer, be prepared to continue studies toward a Ph.D. in biomedical engineering- there are fewer job opportunities at the B.S. level for biomedical engineering than most traditional engineering disciplines. BME programs usually have three areas where research is conducted, all coming out of traditional engineering disciplines: mechanical engineering (for prostheses and devices to aid with movement or structure), electrical engineering (for medical equipment, imaging, signaling/biosensing) and chemical engineering (for materials used in tissue engineering, wound healing or drug delivery). At UA, you can select one of these areas to earn a B.S. degree, then apply to a BME program to continue graduate study. It is common for students to shift majors from B.S. to M.S. or Ph.D., although you may need to take an additional class or two at the beginning of graduate school to cover the breadth of classes needed for a BME program. The ChBE department at UA offers three degrees: B.S., M.S. and Ph.D. in chemical engineering.

9. COMPUTER SPECIFICATIONS

Using computers and advanced software is essential to a chemical engineering education. Beginning fall 2020 and beyond, laptops are required for all undergraduate students in the College of Engineering. Recommended computing and software requirements are listed on the <https://ites.eng.ua.edu/laptop> website. To be compatible with software programs used in upper level chemical engineering courses, PC-based computers are strongly preferred over Macintosh/Apple computers.

10. DEGREEWORKS <https://degreeworks.ua.edu>

Students should monitor their progress to degree using DegreeWorks, accessed through mybama.ua.edu. The courses listed on DegreeWorks will match those required for the B.S. degree in Chemical Engineering in the undergraduate catalog in effect when you first took a class at UA. This is a useful tool for advising, but **please consult the CHE flowchart(s)** in addition to DegreeWorks to make sure that pre-requisite courses are taken in a timely fashion.

Q. I took CHE 445/446 to fill in the BIOCHEM elective class in the CHE flowchart, but on DegreeWorks it shows up as a CHE Elective. Does that mean that I need to take CH461 to finish the BIOCHEM elective?

A. No. CHE 445/446 can fill into three different slots in the CHE curriculum (CHE Elective, BIOCHEM elective or ADV SCI elective). You can use it in any of these slots, but after you complete the class DegreeWorks will slot it into one of these places, nearly randomly. If you later take a class that will count for the CHE elective, then CHE 445/446 will automatically be bumped to the BIOCHEM or ADV SCI slot. Similar situations occur with DegreeWorks and will resolve themselves once all the electives are taken. Check with your advisor if unsure.

11. PRE-REQUISITES, CO-REQUISITES and the C- RULE

There are numerous classes that are pre-requisites for other classes. All courses that serve as pre-requisites to courses, required in the CHE curriculum must be completed with a grade of C- or higher before you are allowed to enroll in the next class in the sequence. On the CHE flowcharts, pre-requisites are noted by solid arrows. Co-requisite classes are indicated by dashed arrows on the flowchart. A dashed arrow indicates that the class where the arrow points can only be taken if the preceding (co-requisite) class has already been completed or is enrolled during the same semester.

12. CHE 125

CHE 125 Introduction to Chemical Engineering is a 1-hour course aimed at students new to the ChBE program at UA. It is a required class, and a pre-requisite to CHE 254. If a student has taken the

introductory course to any of the branches of engineering at UA (ME, MTE, CS, CE, ECE or AEM), that 1-hour class can automatically satisfy the requirement for CHE 125. ENGR 111 or any 1 hour "Intro to XXX Engineering" is acceptable in place of CHE 125.

13. STUDY ABROAD (Contact: International Program Coordinator)

Studying abroad is a great way to enhance your degree. There are many programs that involve humanities or histories. Occasionally, there are engineering-related international programs that are available, including CHE 323 summer lab experiences in **Denmark** and other lecture courses in **Ireland**. To find out more about study abroad, visit the Capstone International offices in BB Comer Hall or contact the department's International Program coordinator. Check with your advisor to determine which engineering credits will transfer to UA. For international courses not led by UA faculty, it is important to investigate the course transfer issues well in advance. For answers to frequently asked questions about the international program offered by ChBE, visit <https://students.eng.ua.edu/chemical-engineering-international-courses-faq/>.

14. DEGREE ACCREDITATION (ABET)

ABET is the Accrediting Board for Engineering and Technology and certifies engineering programs at universities in the USA. This certification ensures that our program meets rigorous education goals. The accreditation process involves periodic independent reviews of our curriculum and departmental objectives. The University of Alabama's chemical engineering degree is fully accredited by ABET.

15. FLOWCHARTS & SEMESTERS TO GRADUATE

The flowcharts are designed as suggested paths to complete the CHE curriculum. They do not have to be followed exactly, but pre-requisites should be noted when selecting classes. As long as the prerequisites are met, many student schedules can be adjusted to complete the program in 8 semesters, although it is not uncommon for students to take additional time to earn the B.S. degree, particularly if the student participates in co-op programs.

16. WRITING (W) COURSE REQUIREMENTS

Six semester hours in 300- and 400-level courses, preferably in the student's major, approved for the writing (W) designation are required in the College of Engineering in order to graduate. The (W) designation indicates that one of the conditions for a passing grade is that students write coherent, logical, and carefully edited prose in a minimum of two papers, at least one of which will be graded and returned before mid-semester. All (W) designated courses are taught and graded by instructors who have at least a master's degree and are limited to an enrollment of no more than 35 students. **The (W) requirement must be satisfied with a UA faculty-led course (i.e., NOT a transfer course).**

STUDENT ORGANIZATIONS AND FACULTY ADVISORS

AICHE (American Institute of Chemical Engineers) & AIChE's Chem-E-Car Team

Dr. Steve Ritchie sritchie@eng.ua.edu

Dr. Ryan Summers rsummers@eng.ua.edu

<http://aiche.eng.ua.edu/>

Biomedical Engineering Society

Dr. Chao Zhao czhao15@eng.ua.edu

Omega Chi Epsilon (Chemical Engineering Honor Society)

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Student Engineers in Action

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Society of Women Engineers

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Theta Tau, Professional Engineering Fraternity

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Alpha Epsilon Delta, Pre-Health Professions Society

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