

Chemical, Biological and Environmental Engineering

<http://www.cbee.oregonstate.edu/>

Preface

This advising guide provides basic information on the B.S. programs in chemical engineering (CHE), bioengineering (BIOE), and environmental engineering (ENVE), as well as information about internships and career opportunities. In addition, the guide provides a list of requirements specific to the bioengineering program, serving to supplement the information provided in the advising guide for the College of Engineering. While some essential information is repeated in our guide, you should take the time to read the sections entitled “Advising” and “Academic Policy” in the College of Engineering’s guide. Important dates, deadlines, etc. relevant to a given academic year, as well as more rules and regulations, can be found in OSU’s *General Catalog* and *Schedule of Classes*.

Important Contacts

CHE BIOE and ENVE Head Advisor:

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Mission

The College of Engineering

As one of the largest colleges on the OSU campus, the College of Engineering is committed through its mission to provide teaching, research, service, and outreach to the people and industries of the State, the Pacific Northwest, the nation, and the world as stated in its mission statement:

The mission of the College of Engineering is to enable learning of engineering practice, Discovery of new knowledge of engineering science and technology and engagement with the citizens of Oregon, the Northwest region, the nation, and the world in application of engineering knowledge.

The School’s mission is consistent with the mission of the University and the College of Engineering through our commitment to excellent academic programs, educational experiences, and creative scholarship. The department’s mission has a strong focus upon enabling students to become professional engineers and to have the skills that will support successful, ethical, and socially responsible careers.

History and Facts

The roots of the School of Chemical, Biological and Environmental Engineering at Oregon State University trace back to 1917, with the establishment of the Department of Chemical Engineering. In 2002, the bioengineering undergraduate program was moved into the Department’s administration, followed in 2005 by the environmental engineering undergraduate program. The department was subsequently renamed to better reflect its activities across the three disciplines. The undergraduate programs in Chemical Engineering and Environmental Engineering are accredited by the Accreditation Board for Engineering and Technology (ABET) and Engineering Accreditation Commission (EAC), and the Bioengineering undergraduate program will be going through review for accreditation during the 2005-2006 academic year. The department currently has eighteen full-time faculty members, one endowed professor from industry and three emeritus professors. These faculty members pursue a variety of research and teaching activities.

CoaChEs

The faculty members of the Department of Chemical Engineering are implementing their mission and objectives through intensive, high quality teaching. The acronym “CoaChEs” stands for “Communication, organization, and analysis skills for Chemical Engineering students”. The philosophy is that learning best occurs when students receive immediate feedback on their performance through classroom interaction and small group teaching. The senior laboratory courses involve 6 hours/week of project management coaching with a high faculty/student ratio.

Preparing students for professional practice implies the formal teaching of many soft skills in addition to technical skills. Our endowed Linus Pauling Chair was created for the purpose of bringing seasoned engineering professionals into the classroom as full time teachers. Beginning in the freshman year, students are formally taught and coached in soft skills as they perform their technical laboratories and team projects. By the end of senior year, students are expected to be fully competent in project planning and management, formal meeting procedures, proposal writing and presentation, technical and non-technical presentations, and report writing. Writing exercises include memos, proposals, safety documentation, technical paper writing, and formal lab books. Students are coached through their work, having them repeat it until the mistakes are corrected. Additionally, all students receive formal team building and conflict resolution based on the Thomas-Kilman Conflict Mode Instrument and Self Awareness based on the Myers-Briggs Type Indicator (MBTI).

Program Objectives

The objectives of the Chemical Engineering Program are to provide high quality engineering programs that prepare students for successful careers, lifelong learning, and service to their profession and society. OSU chemical engineering graduates will know for their technical competence and creativity; for their ability to apply, adapt, and extend their knowledge to solve a wide variety of problems; and for their effective communication skills. Their education will provide them with an understanding of the ways in which the humanities, social sciences, basic sciences, and technology interact to affect society. These programs will foster an environment that stimulates learning and promotes diversity.

Scholarships

Several scholarships are available specifically for undergraduates in the department. There are three basic categories of scholarships targeted towards differing types of students: first-year students, transfer students and continuing students. Information with respect to other College and University scholarships is available in the office of the Undergraduate Dean of Engineering, 151 Batcheller.

The Johnson Scholar/Intern program targets entering first-year students. The \$10,000 award is distributed over four years and pays for a summer research position upon completion of the freshman year. These students are required to work in professional practice when not in school. Six to ten awards are given every year. Selection is based upon a combination of demonstrated leadership, work activities, grades and entrance exam scores.

Transfer students with a strong grade point average and work record can qualify for scholarships of up to \$2,000/year. Some transfer students qualify for the above Johnson Scholar/Intern program if they are entering their first year in one of the three engineering curriculums.

For continuing OSU students, scholarship applications are collected in late spring and given for the following fall. Application forms become available on the department web site around the middle of winter term. Awardees are chosen based upon a minimum GPA of 3.0 (or very close), leadership in the department, outreach activities, participation in activities targeting continuous improvement for accreditation, and financial need. Seniors are given opportunities to earn money through grading and helping with instruction.

- University Honors College students work with the Honors College Faculty, a group of OSU's finest professors, selected on the basis of demonstrated excellence in undergraduate instruction.
- Graduates from the University Honors College -- both those who enter in their first year and those who transfer and enter as juniors -- receive an Honors Baccalaureate Degree in their major jointly awarded by the University Honors College and the College in which their major is located.

Many CHE, BIOE and ENVE students participate in the Honors College, and we fully encourage participation of interested and qualified students. This program requires separate application for admission, and is described in more detail in the *OSU General Catalog*.

OSU International Degree Program

Students majoring in any undergraduate discipline at OSU may take advantage of the unique opportunity to earn the International Degree, a B.A. degree obtainable in conjunction with your engineering degree. That is, if you are interested in adding an international component to your credentials, involving some additional coursework with an international content, foreign language study and an experience outside of the U.S., you have the opportunity to graduate with a B.A. in International Studies, in addition to your engineering B.S. degree.

Several CHE, BIOE, and ENVE students participate in the International Degree Program, and we fully encourage participation of interested and qualified students. This program requires separate application for admission, and is described in more detail in the *OSU General Catalog*.

The University Honors College

The University Honors College is a degree-granting authority at Oregon State University providing many opportunities:

- The University Honors College (UHC) provides challenging curricula and honors-level instruction to students pursuing any OSU major. UHC requirements are designed to support rather than complicate completion of other baccalaureate degree requirements.
- Students in the University Honors College take unique, smaller honors sections of selected courses, University Honors College seminars, and work one-on-one with a faculty mentor in preparing an Honors Thesis.

Advising

Student orientation and retention programs. All students should attend an orientation program before the start of their first term. These sessions are designed to provide information necessary for a smooth transition to OSU, to the College of Engineering, and to our department. During these orientation sessions, students meet with an engineering adviser and register for classes for their first term. We encourage all entering students to attend one of the orientation sessions that are offered throughout the summer. The Office of New Student Programs notifies newly admitted students of orientation dates. Students are expected to assume an active role in the advising process by preparing for the sessions.

Continuing students. First year students are assigned advisors during spring term and transfer students after an initial meeting with the appropriate Head Advisor (at which time articulation of transferable credits is completed). You will keep the same advisor until graduation. Students may meet with their advisors at any time during the term by stopping by his or her office, during posted office hours, or by calling or e-mailing to make an appointment. The School of Chemical, Biological and Environmental Engineering *requires* that students obtain advising before registration for the next term, which typically occurs about the 6th week of the current term. It is important to understand that **it is the student's responsibility to make sure she or he satisfies all curriculum requirements**. Advising sessions generally focus on planning the sequence in which you take courses rather than the selection of courses to be taken. The sequence is generally governed by prerequisites, but meeting with an advisor is important as discussion goes well beyond

curriculum. With information included in this advising guide, students should track their progress and plan their course work before the advising session. Advisors help by clarifying academic policies and procedures and offering suggestions when academic difficulties are encountered. A list of assigned advisors can be found at: <http://che.oregonstate.edu/students/advising/advising.htm>. Each advisor will provide a web-based schedule that students may access to sign up for appointments. Schedules may be found at: <http://che.oregonstate.edu/advising/>. The School's advising procedures are as follows:

1. Update your personal copy of the Curriculum Check Sheet (see appendix).
2. Consult the OSU Schedule of Classes for the new quarter to see when registration will begin. Access your advisor's web-based schedule and sign up for an advising appointment.
3. Prepare a tentative list of courses to take for the next term and any questions you may have. In addition to this Advising Guide, you will find the following resources helpful. They are also available on the WEB, as listed.
 - *Oregon State University Bulletin (General Catalog)* - <http://oregonstate.edu/dept/catalogs>
 - *OSU Schedule of Classes* - availability and times of classes - <http://oregonstate.edu/dept/catalogs>
 - *College of Engineering Advising Guide* - contains Academic policies, including ethics, academic honesty, professional admissions, and academic deficiencies (warning, probation, suspension and reinstatement) - <http://www.engr.oregonstate.edu/advising>.
4. Your advisor will have your file during the week of advising. At other times when you need to meet with your advisor, pick-up your student folder containing your academic records from the main office, you will need your student ID card to do this. Your advisor will need this file to help you prepare for registration. Feel free to review your records, but do not alter them in any way. If your local address has changed since the last registration, you will need to update your file with the new address. You should also change your address on the WEB at <http://www.oregonstate.edu/students/oneservices/>.
5. Report to your advisor's office at the time of your appointment. **If you are unable to keep the appointment, you will need to access your advisor's web-based advising schedule, cancel your current appointment and formal reschedule for another time.** Your advisor will help you finalize the list of courses to be taken next term and you will fill out a Study List (see appendix). Your advisor will review your Yearly Planner and update the Department's file copy of your Curriculum Check Sheet. Your advisor will then sign the Study List, and will issue your Personal Identification Number (PIN) for registration. This number will only be needed the first time you log-on to the Web for registration each term (the system remembers this for the remainder of the term). The original Study List will be placed in your folder, and a copy will be given to you for your records.
6. At this point you can complete your Web registration following OSU procedures.

Before spring term advising, consult the OSU General Catalog and this Advising Guide to fill in your Curriculum Planning Sheet for the next year (they are located in 103 and are pumpkin colored). You will need to take this with you to your advising appointment so that you and your advisor can verify the planned coursework is appropriate. Note that if you intend to take any courses S/U, you must fill out a special form, available in the Registrar's office, and have your advisor approve and sign it. If you take a course other than DPD, Perspective, Synthesis, Lifetime fitness and activity, or Free elective on an S/U basis, the credit will NOT be accepted towards graduation. In addition, those pursuing a BIOE degree may not take the DPD selection on an S/U basis. If your advisor agrees to recommend that you substitute a course for a required course, you must obtain pre-approval from the Head Advisor in writing. See the Student Petition for Curriculum Change form on page 31. Verbal agreements are not recognized as official agreements. Substitutions will not be allowed at graduation unless a written record of pre-approval is in your file.

Remember that the WEB is the most up to date source for information on classes as the printed version is compiled many weeks in advance.

Admission to the Professional Program and Applying for Graduation

Like all undergraduate programs in the College of Engineering, the School's CHE, BIOE and ENVE programs consists of pre-engineering and professional-engineering components. The major difference between the two components is that students in the pre-engineering portion of the program may take upper division courses offered within the College of Engineering only by petition. Admission to the pre-engineering program (first and second years) requires no separate application beyond that for admission to OSU. Admission to the professional program (beginning of the third year) is competitive. To be eligible, you must have completed 80 credit hours with a cumulative GPA of 2.25 or better. Moreover, all required pre-engineering courses must have been completed with a "C-" or better, with a cumulative GPA of 2.25 or better for the required pre-engineering courses.

The deadline for application to the professional program, submitted directly to the College of Engineering, is in spring term each year (generally the first week of April). It is the policy of the College of Engineering that selection of successful applicants will be based on their GPA in required pre-engineering courses. Upon application, students who meet the minimum qualifications are rank-ordered based on this GPA. Each department then admits students from this list, beginning with the highest GPA, until the number of students admitted equals the program's quota. Thus, the cumulative 2.25 GPA may not guarantee admission to the professional program. The number of eligible students admitted will depend on the availability of sufficient resources for offering a high quality program.

A second round of applications is considered during the fall. This is designed for students who were not qualified for consideration in the spring or who missed the application deadline. During this application round, students are only admitted if the quota was not met during the spring round. Applications submitted during this round are generally due the first week of November.

Once a student is admitted to the professional program, his or her progress is monitored each quarter. Procedures for academic warnings, probation and suspension by the College are described in the COE Advising Guide. In addition to university and departmental requirements, completion of a degree offered within the College of Engineering requires:

- a cumulative OSU GPA of 2.25;
- a cumulative GPA of 2.25 in professional program courses; and professional program
- professional program admission at least three terms and 45 credits before graduation, and completion of at least 30 approved credits in the College of Engineering.

It is the responsibility of the student to APPLY FOR GRADUATION (and any option in CHE). This is usually done two terms in advance of expected completion of required coursework. For example, if you are planning a June graduation date, you should apply for graduation during Winter term..

Internships

Many opportunities for internships exist in industry, as well as university laboratories and other research centers. Students have been successful in securing these kinds of positions both locally and nationally. Internships are a valuable part of the undergraduate experience, and the faculty have met with success in establishing formal arrangements with companies guaranteeing positions for our students each year.

Internships: The Multiple Engineering Co-op Program

The Multiple Engineering Co-op Program (MECOP) is a five-year undergraduate program which is intended to give engineering students "hands on" experience to compliment classroom study. The program offers students a high quality, paid industrial experience and related academic activities while pursuing a degree at OSU. MECOP is an industrial program with sponsorship and support from the College of Engineering. Each student is provided with two internships at different companies so that the student gets exposure to contrasting industrial environments.

Selection into the MECOP program is competitive. Applications are available on-line in early March and are due April 10th of the second year with professional school applications. Those students who qualify will be invited to the Selection Interview in May. In this process, the student participates in a 20 minute group interview with Industrial Board Members and the School's MECOP Advisor. The basis for selection is academic performance, written and oral communication, and motivation.

Placement with a company occurs in a separate interview process in the winter before the corresponding internship. Internships are in the Spring Term of the third year and the Fall Term of the Fifth year. Each student's curriculum must be adjusted appropriately.

Questions and additional information may be obtained from the School's MECOP Advisor or the MECOP Coordinator in the Undergraduate Dean's Office.

Professional Organizations

American Institute of Chemical Engineers (AIChE)

The primary professional organization for the chemical engineering discipline is the American Institute of Chemical Engineers – known worldwide as AIChE (<http://www.aiche.org>). This organization is divided into several sub-groups that serve different needs. AIChE National is an international organization founded in 1908, which serves more than 100,000 chemical engineers worldwide. They are the main organizational body of AIChE, providing support and information to all the subgroups. The Oregon Section of AIChE is the local organization that serves professional chemical engineers working in Oregon Industry. They are headquartered in Corvallis, OR. The OSU Student Chapter of AIChE is the organization at OSU that serves as the students' primary contact with National AIChE. Founded in 1931, it is one of the oldest Student Chapters in the nation, and has a long and rich tradition of excellence. The Student Chapter is run by an elected board of chemical engineering students under the guidance of a Faculty Advisor.

The main purpose of the organization is to acquaint students with the chemical engineering profession and to provide a focal point for undergraduate CHE activities at OSU. Each quarter the Student Chapter publishes a newsletter and sponsors a number of social events, plant tours to local industry, faculty and industry seminars, industry "get togethers", and weekly Chapter meetings for officers and members. There is a close interaction with the Oregon Section of AIChE, which provides a valuable network of information and contacts for summer internship positions and permanent employment opportunities. Every undergraduate CHE student is strongly encouraged to join and actively participate in the Student Chapter – it's fun and rewarding.

Society for Biological Engineering (SBE)

The primary professional organization with which the bioengineering students align is the Society for Biological Engineering, SBE, (<http://bio.aiche.org>). Established by the American Institute of Chemical Engineers, the Society for Biological Engineering is a new technological community for engineers and applied scientists integrating biology with engineering. The Student Chapter is run by an elected board of bioengineering students under the guidance of a Faculty Advisor. Everyone is encouraged to join **OSU's bioengineering student association**. The association's main purpose is to acquaint students with the bioengineering profession and to provide a focal point for undergraduate activities, such as social events, seminars, and tours of biotech and biomedical device companies as well as hospitals and clinical research centers in the Pacific Northwest.

ENVE Student Club (EESO)

This organization brings together students in environmental engineering for a variety of activities. Some of these include: Featured speaker meetings about career opportunities, field trips to incinerators, wastewater treatment plants, and other places of interest, annual retreat to the Oregon Coast, camping, water sampling analysis/stream flow data at Oak Creek, networking with other environmental engineering students and many leadership opportunities.

Professional Registration

We encourage students to seek registration as a professional engineer. This process begins by successfully passing the Fundamentals of Engineering Exam (FE exam), which is normally held in April and late October. Information on applying to take the FE exam is available in 151 Batcheller Hall, Undergraduate Dean's Office. Applications are usually due on January 15th or July 15th to the Oregon State Board of Engineering Examiners, 728 Hawthorne Avenue NE, Salem, OR. See <http://www.osbeels.org> for more information. For more information at the national level, see <http://www.nspe.org>.

Frequently Asked Questions

When and how do I apply to the professional program?

Most students apply in the spring of their second year. You can get application off of the web during application times, March and November of each year. Notices as to application deadlines are posted outside the School of Chemical, Biological and Environmental Engineering and College of Engineering offices.

I am a transfer student and did not take general chemistry lab, and hence only have 12 credits of general chemistry instead of the required 15 credits. What are my options?

Depending upon the level of chemistry completed, you may have to take the CH 221, 222, 223 sequence. If the level of chemistry you completed is adequate, the three credits you are missing can be recovered by completing an additional course in chemistry. See the Head Advisor of your program for alternatives.

What if I can't finish the pre-engineering core courses by the end of my second year?

Three situations may apply:

- *One pre-engineering core course short at the end of spring term.* You may petition to be accepted in the professional program during spring term. If you are accepted, you will be expected to complete the course with a C- or better the next term the course is offered.
- *Two or three pre-engineering core courses short at the end of spring term.* Assuming you take the courses you are lacking during summer or fall terms, you may apply in November for admission to the professional program.

More than 3 courses short. Plan to apply in Spring of your third year. Take technical courses, restricted electives, etc. so that you do not lose ground. Consult with your advisor as to the best path to take.

Can I take a course S/U?

You can take a course S/U only if the course belongs to one of two categories: (1) humanities and social sciences electives (perspectives, DPD and synthesis courses) or HHS 231/ HHS 24X as part of BACC core or (2) free electives. Note that BIOE students may not elect S/U grading for the DPD requirement. All other courses must be graded on an A/F basis. The university sets limits on the maximum number of S/U credits which you can take, usually 3 times the number of quarters as a full-time student, up to 36 credits.

When I get a C- do previous grades below C- for that class count in the calculation of pre-engineering core GPA?

Yes. If you received F, then D, and then C- in a core course, all three grades will be counted in your pre-engineering core GPA. Although the average of the three grades is a D, the C- you received indicates you have an acceptable understanding of the material. Once in Pro-School, a professional program course for which a grade of D+ or lower, W or I is received may be repeated only once.

What if I get a D+ or lower in a required course?

You must earn a grade of C- or better in all required courses (all courses graded on an A/F basis). If you receive a D+ grade or lower in a required course you must repeat it and earn a grade of at least C-.

If I get a grade of C- in a required course, may I repeat it?

Only if it is NOT A PROFESSIONAL PROGRAM COURSE. See the current ACADEMIC POLICY – PROFESSIONAL PROGRAM sheet you received upon acceptance into the Professional Program.

When I submit my application to the professional program, how will it be judged?

The School of Chemical, Biological and Environmental Engineering uses pre-engineering core course grades to calculate your core GPA from your transcript (see Curriculum Requirements). The School then compares all applicants' core GPA's and selects the top applicants. (The CHE Program has an enrollment cap of 45 students per "year" to be enrolled in the professional program, the BIOE Program has an enrollment cap of 30, and the ENVE Program has an enrollment cap of XX. If these caps have been reached, additional qualified students may have to apply to other departments)

I am concerned about my GPA. Can I still make it into the Professional Engineering Program?

The minimum GPA required for acceptance into one of the three Professional Programs depends on the number of students the department can accept in a given year, the number of students who actually apply, and the GPA's of those students. *Typically*, the minimum GPA for acceptance into all three programs is around a 2.5, but the exact value at the time you apply may be different. If you are BELOW a 2.25, you will NOT be admitted to the professional

program. The Dean of Engineering has two written sets of policies and rules, one for pre-engineering and one for the professional program. These are available from The College Head Advisor's Office, Bat 151. Those policies are given to each student when they are admitted and cover such situations as probation and suspensions due to poor academic performance.

Can I apply to more than one department when I apply to the professional engineering program?

You may apply to more than one department. However, you must satisfy all requirements for each department to which you apply.

I applied but was not accepted to the professional engineering program. What do I do now?

One option is to wait and apply to the Professional Program next year. More realistically, you should consider another major or, if that is not acceptable, consider another university. In a case like this, it is always a good idea to talk to your advisor.

I am enrolled in the professional engineering program. Does that mean that I can take any upper-division engineering course?

Yes, as long as you have completed any prerequisite courses specified in the Oregon State University Bulletin and the OSU Schedule of Classes.

When and how do I apply for graduation?

Applications can be obtained at the Registrar's Office. Students should complete the application and resubmit it to this office at least two terms in advance of graduation. Application for receiving recognition on your diploma and transcripts for successfully completing a CHE Option must also be made at the same time. Option codes are located on the board outside of the main office.