



Oregon State
University

School of Chemical, Biological, and Environmental Engineering (CBEE)

College of Engineering
cbee.oregonstate.edu

Undergraduate Advising Guide **Bioengineering (BIOE)**

Revised 06/13/18

Bioengineering is an interdisciplinary field that applies engineering principles and quantitative methods to the advancement of knowledge at the molecular and cellular levels through the ecosystem level, and to the development of new and novel biologics, materials, devices, and processes. In practice, bioengineers address issues in the broad areas of bioenvironmental, biomedical and bioprocess technology.

At many universities, life sciences and engineering are more or less parallel cultures, reflected in two almost completely disparate disciplines, where students in one have trouble taking courses in the other. At OSU, bioengineers are trained to work at the interface between these disciplines. Activities in bioengineering are inextricably linked to issues relevant to public health and confidence. Perhaps more than in any other engineering discipline, bioengineers must maintain an awareness of ethical issues in their field, and the patterns of thought that lead to moral judgment and decision-making. Further, the ability to communicate effectively with people from disparate disciplines, both inside and outside of science, is essential to bioengineers.

General questions? Email cbee.advising@oregonstate.edu

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CBEE Advising Practices & Policies

Per College of Engineering rules, advising appointments are required once per term minimum for all engineering undergraduate students. You should schedule your advising appointment online at cbee.oregonstate.edu/undergraduate-advising.

Appointment Types:

Don't know what type of appointment to schedule? Below are common appointment types and the required appointment time for each.

15-Minute Appointment

- Form Signed
- Letter Requests
- Graduate/Degree Check
- ProSchool Application
- Class Overrides

30-Minute Appointment

- General Advising
- PIN Number
- Registration Issues
- Academic Standing
- Change of Major
- Transfer Advising
- Degree Partner Program (DPP)
- Research/Job/Internships
- Grad School

Walk-In Hours:

CBEE Advisors provide one walk-in hour daily, from 3-4pm. These hours are intended for students with quick 1-15 minute questions. No PINs will be distributed during walk-in hours.

Late policy:

If you arrive to a scheduled advising appointment 5 minutes or more late, you may be asked to reschedule. If you arrive 10 minutes or more late, you must reschedule. When we reserve time for you, we require all of that time to provide you with the best quality work possible. When you are late it decreases the advisors ability to accomplish this.

We strive to see every student as close to their appointment time as possible. It is your responsibility to remember your appointment and to be on time. We understand that true emergencies happen. We ask that you please be courteous of your advisors valuable time and attention. The Advisors, Faculty and Staff thank you.

No show policy:

No penalty for the first no show on a scheduled appointment. If you no show on a 2nd appointment or more, we will withhold your PIN for registration until the final day of Phase I registration. If you schedule an appointment and need to cancel, please contact your advisor.

Bioengineering (192 Credits)

Revised 6/13/18

Credits	First Year = 46 credits			Second Year = 51 credits			Third Year = 47 credits			Fourth Year = 48 credits														
	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring												
1	Chemistry CH 231 (4FW)	Chemistry CH 232 (4WS)	Chemistry CH 233 (4FS)	Organic Chemistry CH 331 (4FW)	Organic Chemistry CH 332 (4WS)	EE Fund. ENGR 201 (3FWS)	Biochemistry BB 450 (4FWS)	Biochemistry BB 451 (3FWS)	Biomedical Engr. Principles BIOE 340 (3S)	Bioengr. Prod. Design BIOE 491* (4F)	Bioengr. Prod. Design BIOE 492 (4W)	Bioengr. Proc. Design BIOE 490 (4S)												
2						Process Analysis CBEE 213 (4S)							Transport I CHE 331 (4F)	Transport II CHE 332 (3W)	Transport III CHE 333 (3WS)									
3																Biochemistry Lab BB 493 (3F)	Bio-separations BIOE 462 (3WS)	Engineering Elective (3-4FWS)						
4																			Bioreactors BIOE 457 (3F)	Bioengr. Laboratory BIOE 415 (3W)				
5	CH 261 (1)	CH 262 (1)	CH 263 (1)	Physics w/ Calculus PH 212 (4FWS)	Physics w/ Calculus PH 213 (4FWS)	Statics ENGR 211 (3FWS)	Thermo CHE 311 (3F)	Social Justice & Ethics BIOE 420 (3W)	Biomat. & Biointerfaces BIOE 351 (3S)															
6	Differential Calculus MTH 251 (4FWS)	Integral Calculus MTH 252 (4FWS)	Vector Calculus MTH 254 (4FWS)							Anatomy & Physiology BI 231 (3F)	Differential Equations MTH 256 (4FWS)	Matrix & Power Series MTH 306 (4FWS)	Engineering Ethics CBEE 320 (3F)	Engineering Elective (3-4FWS)	DPD (3FWS)	Process Laboratory CBEE 414 (3F)	Engineering Elective (3-4FWS)				Engineering Elective (3-4FWS)			
7																		Orientation CBEE 101 (3F)	Engr. Comp. CBEE 102 (3W)	Physics w/ Calculus PH 211 (4FWS)		Anatomy & Physiology BI 233 (3S)	Perspective (3FWS)	Perspective (3FWS)
8				English Composition WR 121 (3FWS)	COMM 111/114 (3FWS)	HHS 231 (2FWS)	BI 241 (2F) or MB 230 (4FWS)	Perspective (3FWS)	Perspective (3FWS)															
9	PAC (1FWS)	Perspective (3FWS)	Perspective (3FWS)							Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Synthesis (3FWS)									
10																Orientation CBEE 101 (3F)	Engr. Comp. CBEE 102 (3W)	Physics w/ Calculus PH 211 (4FWS)	Anatomy & Physiology BI 231 (3F)	Differential Equations MTH 256 (4FWS)	Matrix & Power Series MTH 306 (4FWS)	Engineering Ethics CBEE 320 (3F)	Engineering Elective (3-4FWS)	DPD (3FWS)
11				English Composition WR 121 (3FWS)	COMM 111/114 (3FWS)	HHS 231 (2FWS)	BI 241 (2F) or MB 230 (4FWS)	Perspective (3FWS)	Perspective (3FWS)															
12	PAC (1FWS)	Perspective (3FWS)	Perspective (3FWS)							Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)									
13																Orientation CBEE 101 (3F)	Engr. Comp. CBEE 102 (3W)	Physics w/ Calculus PH 211 (4FWS)	Anatomy & Physiology BI 231 (3F)	Differential Equations MTH 256 (4FWS)	Matrix & Power Series MTH 306 (4FWS)	Engineering Ethics CBEE 320 (3F)	Engineering Elective (3-4FWS)	DPD (3FWS)
14				English Composition WR 121 (3FWS)	COMM 111/114 (3FWS)	HHS 231 (2FWS)	BI 241 (2F) or MB 230 (4FWS)	Perspective (3FWS)	Perspective (3FWS)															
15	PAC (1FWS)	Perspective (3FWS)	Perspective (3FWS)							Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)									
16																Orientation CBEE 101 (3F)	Engr. Comp. CBEE 102 (3W)	Physics w/ Calculus PH 211 (4FWS)	Anatomy & Physiology BI 231 (3F)	Differential Equations MTH 256 (4FWS)	Matrix & Power Series MTH 306 (4FWS)	Engineering Ethics CBEE 320 (3F)	Engineering Elective (3-4FWS)	DPD (3FWS)
17				English Composition WR 121 (3FWS)	COMM 111/114 (3FWS)	HHS 231 (2FWS)	BI 241 (2F) or MB 230 (4FWS)	Perspective (3FWS)	Perspective (3FWS)															
18	PAC (1FWS)	Perspective (3FWS)	Perspective (3FWS)							Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)	Perspective (3FWS)									

- Pre-Core classes used in GPA calculation
- Pre-requisites for Pro School classes not used in GPA calculation
- Engineering Electives (6 credits bioengineering, 9 credits restricted engineering electives)
- Baccalaureate Core course not covered by major requirements (S/U grading allowed)

This advising guide is intended for scheduling only. Course offerings and requirements are subject to change. Please reference the OSU Online catalog for a complete list of degree requirements.

*An override must be obtained from your advisor to enroll in BIOE 491.

Bioengineering Major

Total Credits: 190

Required Courses

Math

Course #	Credit Hours	Description	Prerequisites	Terms Offered
MTH 251	4	Differential Calculus	MTH 112	FWS
MTH 252	4	Integral Calculus	MTH 251	FWS
MTH 254	4	Vector Calculus I	MTH 252	FWS
MTH 256	4	Differential Equations	MTH 254	FWS
MTH 306	4	Matrix & Power Series	MTH 252	FWS

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Science

Course #	Credit Hours	Description	Prerequisites	Terms Offered
BI 241 or MB 230	2 or 4	Anatomy & Physiology Lab (BI 241) or Introduction Microbiology (MB 230)	BI 241: BI 231 (co), MB 230: none	BI 241:F MB 230: FWS
BI 231	3	Human Anatomy & Physiology	none	F
BI 233	3	Human Anatomy & Physiology	BI 231	S
BB 450	4	General Biochemistry	CH 332 or 336	FWS
BB 451	3	General Biochemistry	BB 450	FWS
BB 493	3	Biochemistry Lab I	BB 451 or 492	F
CH 231/261	5	General Chemistry + Lab	MTH 111	FW
CH 232/262	5	General Chemistry + Lab	CH 231	WS
CH 233/263	5	General Chemistry + Lab	CH 232	FS
CH 331	4	Organic Chemistry (Series CH334/5/6 can substitute)	CH 233	FW
CH 332	4	Organic Chemistry (Series CH334/5/6 can substitute)	CH 331	WS
PH 211	4	General Physics with Calculus	MTH 251, MTH 252 (co)	FWS
PH 212	4	General Physics with Calculus	PH 211, MTH 252	FWS
PH 213	4	General Physics with Calculus	PH 212, MTH 254	WS

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Engineering

Course #	Credit Hours	Description	Prerequisites	Terms Offered
BIOE 340	3	Biomedical Engineering Principles	CHE 332, BI 233 (co), CHE 333 (co)	S
BIOE 351	3	Biomaterials & Biointerfaces	BB 451 (co), CHE 333 (co)	S
BIOE 415	3	Bioengineering Laboratory	CBEE 414	W
BIOE 420	3	Social Justice, Ethics, & Engineering	-	W
BIOE 457	3	Bioreactors	BB 451, CHE 333	F
BIOE 462	3	Bioseparations	BB 451, CHE 333	WS
BIOE 490	4	Bioengineering Process Design	BIOE 457 (co), CHE 333	S
BIOE 491	4	Bioengineering Product Design	BIOE 490	F
BIOE 492	4	Bioengineering Capstone Design	BIOE 491	W
CBEE 101	3	Chemical, Biological and Environmental Engineering Orientation	-	F
CBEE 102	3	Engineering Problem Solving and Computation	MTH 112	W
CBEE 211	3	Material Balances and Stoichiometry	MTH 252, CH 233, 2nd year engr standing	F
CBEE 212	3	Energy Balances	CBEE 211, MTH 256 (co)	W
CBEE 213	4	Process Data Analysis	CBEE 212	S
CBEE 320	3	Professionalism and Engineering Ethics	-	F
CBEE 414	3	Process Engineering Laboratory	CBEE 213 (co), CHE 311, CHE 333	F
CHE 311	3	Thermodynamics	CBEE 212, MTH 256	F
CHE 331	4	Transport Phenomena I: Fluids	CBEE 212 (co), MTH 256	F
CHE 332	3	Transport Phenomena II: Heat	CHE 311 and 331	W
CHE 333	3	Transport Phenomena III: Mass	CHE 331	S
ENGR 201	3	Electrical Engineering Fundamentals	MTH 252	FWS
ENGR 211	3	Statics	MTH 252, 2nd year engr standing	FWS

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Elective Courses

BIOE majors are required to take 6 credits of bioengineering electives and 9 credits restricted engineering electives,

Bioengineering Electives (6 credit minimum)

Course #	Credit Hours	Description	Prerequisites	Terms Offered
BIOE 459	3	Cell Engineering	BB 451, CHE 333	W
BIOE 440	3	Bioconjugation	BB 450	S
CBEE 416	3	CBEE Laboratory II	CHE 415 or BIOE 415 or ENVE 415	S
CS 446	3	Networks in Computational Biology	CS 261, CS 325 (co)	F

Restricted Engineering Electives (9 credit minimum)

Course #	Credit Hours	Description	Prerequisites	Terms Offered
BEE 320	4	Biosystems Analysis and Modeling	MTH 256	F
BEE 468	3	Bioremediation Engineering	-	W
BIOE 440	3	Bioconjugation	BB 450	S
BIOE 445	3	Surface Analysis	BIOE 351	
BIOE 459	3	Cell Engineering	BB 451, CHE 333	W
CBEE 416	3	CBEE Laboratory II	CHE 415 or BIOE 415 or ENVE 415	S
CHE 312	3	Chemical Engineering Thermodynamics	CHE 311	W
CHE 334	2	Transport Phenomena Laboratory	CBEE 213, CHE 333 (co)	S
CHE 361	3	Chemical Process Dynamics & Simulation	MTH 256, CHE 331 (co)	W
CHE 445	4	Polymer Engineering & Science	CH 336, MTH 256	FS
CHE 450	3	Conventional & Alternative Energy Systems	none	W
CHE 451	3	Solar Energy Technologies	CHE 311	F
CHE 461	3	Process Control	CHE 331, CHE 332 (co)	S
CS 446	3	Networks in Computational Biology	CS 261, CS 325 (co)	F
ENGR 212	3	Dynamics	ENGR 211, PH 211	FWS
ENGR 213	3	Strength of Materials	ENGR 211	FWS
ENGR 248	3	Engineering Graphics & 3D Modeling	-	FWS
ENVE 322	4	Fundamentals of Environmental Engineering	CH 232, MTH 256	W
ENVE 421	4	Water and Wastewater Characterization	ENVE 321 or ENVE 322	F
ENVE 422	4	Environmental Engineering Design	ENVE 421	W
ENVE 425	3	Air Pollution Control	ENVE 321 or ENVE 322	S
ENVE 431	3	Fate & Transport of Chemicals in Environmental Systems	CH 440 or CHE 331, ENVE 421	W

Baccalaureate Core

OSU requires completion of a set of Baccalaureate Core ("Bacc Core") courses, divided into 4 categories- Skills, Perspectives, Synthesis, and Difference, Power, and Discrimination (DPD). Some of these course requirements are met by technical courses within your major. Those Bacc Core requirements not fulfilled through technical course requirements are outlined below.

Total Credits: 37

Skills (12 credits)

Course #	Credit Hours	Description	S/U Allowed
WR 121	3	English Composition	No
WR 327	3	Technical Writing	No
COMM 111 or 114	3	Public Speaking (COMM 111) or Argument and Critical Discourse COMM (114)	No
HHS 231	2	Lifetime Fitness for Health	Yes
HHS 24x or PAC	1	Lifetime Fitness or Physical Activity Courses	Yes

Perspectives (16 credits)

Course Categories	Credit Hours	S/U Allowed
Biological Science w/ Lab	4	No
Cultural Diversity	3	Yes
Literature & Arts	3	Yes
Social Processes & Institutions	3	Yes
Western Culture	3	Yes

Synthesis (6 credits)

Course Categories	Credit Hours	S/U Allowed
Contemporary Global Issues	3	Yes
Science, Technology, and Society	3	Yes

Difference, Power, & Discrimination (3 credits)- No S/U grading

Difference, Power, & Discrimination (DPD) Courses

All OSU undergraduate students are required to take a DPD course before graduation. Below is a condensed list of course offerings in DPD for BIOE students. BIOE students must take one of these DPD courses. Other university DPD courses that do not appear on this list will not be accepted towards the BIOE DPD requirement.

AG 301	Ecosystem science of Pacific NW Indians	3 credits
ANTH 251	Language in the USA	3 credits
ANTH 345	Biological and cultural constructions of race	3 credits
ANTH 451	Sociolinguistics	3 credits
ECON 383	The economics of discrimination	4 credits
ED 216	Purpose, Structure & Function of Education in a Democracy	3 credits
ENG 420	Studies in difference, power, and discrimination	3 credits
ES 212	Survey of Chicano/a-Latino/a studies III	3 credits
ES 213	Contemporary Latino/a culture and issues	3 credits
ES 216	Las presencia Mexicana en los Estados Unidos	3 credits
ES 221	Survey of African American studies I	3 credits
ES 223	Survey of African American studies III	3 credits
ES 233	Asian American Studies II: Activism & Empowerment	3 credits
ES 243	Native American experience in the 20th century U.S.	3 credits
ES 351	Ethnic minorities in Oregon	3 credits
ES 452	Ethnicity in film	3 credits
FW 340	Multicultural perspectives in natural resources	3 credits
H 465	Public health and women: social and policy issues	3 credits
HST 210	Religion in the United States	4 credits
HST 368	Lesbian and gay movements in modern America	3 credits
LING 251	Languages of Oregon	3 credits
MB 330	Disease and society	3 credits
PHL 280	Ethics of diversity	4 credits
PHL 380	The body, medicine and culture	3 credits
PS 363	Gender and race in American political thought	4 credits
PS 375	The civil rights movement and policies	4 credits
SOC 312	Sociology of the family	3 credits
SOC 426	Social inequality	3 credits
TA 360	Multicultural American Theatre	3 credits
TCS 200	Twentieth century realities: the U.S.	3 credits
WGSS 262	Introduction to Queer Studies	3 credits
WGSS 325	Disney: Gender, Race, Empire	3 credits
WGSS 414	Systems of oppression in women's lives	3 credits
WGSS 420	Hate, resistance, and reconciliation	3 credits

Important Links

Student Online Services: myosu.oregonstate.edu

In your online account, you can register for classes, access MyDegrees, view & order transcripts, view account holds, and pay your student fees & tuition.

Catalog: <https://catalog.oregonstate.edu/>

The general OSU catalog contains information about all of the different major and minor programs at OSU, including course requirements and prerequisites.

Course Descriptions: <https://catalog.oregonstate.edu/courses/>

Detailed course descriptions can be found here, sorted by subject.

OSU Schedule of Classes Searcher: <https://catalog.oregonstate.edu/course-search/>

Use this tool to search for class availability sorted by term, requirement, subject, or campus.

Transfer Credits: <http://registrar.oregonstate.edu/transfer-credits>

General guide to transferring credits to OSU.

Transfer Course Search:

https://adminfo.ucsadm.oregonstate.edu/prod/OSU_ADMTAM.P_tcs_splash_page

This tool allows you to search course equivalencies by the institution and course subject/number.

Registrar Forms: <http://registrar.oregonstate.edu/forms>

Forms relating to registration, grading, student records, veterans benefits, and graduation.

College of Engineering (COE): <http://engineering.oregonstate.edu/>

College of Engineering home page.

Professional School: <http://engineering.oregonstate.edu/pro-school>

College of Engineering Professional School information, including application cycles and the link to the application.

MY COE: <http://engineering.oregonstate.edu/my-coe>

Page with information about COE procedures and links to other OSU websites that are relevant to COE students.

CBEE Advising: <http://cbee.oregonstate.edu/undergraduate-advising>

Go to this site to book an appointment with your advisor! This page also contains general advising information and the latest copy of the advising guide.

Research, Internships, and Careers: <http://cbee.oregonstate.edu/careers>.

Practical work experience in a research laboratory or in industry is essential to your future employment and educational goals. CBEE students have a variety of opportunities to develop laboratory skills and obtain career advice from faculty and peer mentors.