

Bioengineering MENG Program Handbook 2023-2024



Oregon State
University

Oregon State University (OSU)

Bioengineering, MEng Program

NOTE: Official program requirements are available in the OSU catalog. If there is a conflict between what is stated here and what is presented in the catalog, the catalog requirements take precedent.

COURSEWORK REQUIREMENTS

RECOMMENDED PREREQUISITE COURSEWORK

The following is recommended prerequisite coursework to prepare you to be successful in the Bioengineering Graduate Program.

Students with a B.S. degree in a non-engineering field are strongly encouraged to take the following courses prior to enrolling in the BIOE core courses:

- Math through Differential Equations
- One year of Physics
- A course on computer programming (e.g., Matlab)

REQUIRED COURSEWORK

MEng students must take a total of 45 graduate credits. Thesis credits cannot be used, and blanket credits are limited to a maximum of 9. Thus, at least 36 credits of non-blanket coursework is required. At least half of the courses must be graduate stand-alone courses. The remaining courses can be the 500 component of 400/500 slash courses. (*Note: blanket courses are courses with a zero as the second number, e.g., CBEE 507.*)

MEng students must take the BIOE core, professional development and portfolio courses, and electives, as detailed below.

BIOE Core Courses (10 credits)

All BIOE MEng graduate students are **required** to take the following BIOE core courses:

BIOE 511	(3)	Cellular and Molecular Bioengineering
BIOE 512	(4)	Modeling of Physiological Systems
BIOE 513	(3)	Drug and Medical Device Regulation in Technology Development

Professional Development & Portfolio Project (3 credits):

During their first fall term, all newly enrolled MEng students are **required** to take:

CBEE 507	(1)	Professional Development Seminar
ENGR 520	(1)	MEng Introduction to Portfolio

During their last term, all MEng students are **required** to take:

ENGR 521	(1)	MEng Portfolio Completion
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The 1 credit professional development seminar serves as an extended orientation to CBEE and will provide mandatory training, an introduction to important OSU resources, and development of skills to aid in navigating graduate school. The 2 credit Portfolio series will support you in understanding and completing your MEng portfolio. The MEng portfolio demonstrates your mastery, synthesis, and communication of subject matter knowledge in the context of your professional goals. It serves as the culmination of the MEng program and is the final required project for the MEng degree.

Elective Course Selection (remaining credits):

At least 24 credits of elective courses are required. Electives must be non-blanket courses. Elective courses should be selected in consultation with your faculty advisor, and must be approved as a part of your Program of Study. When selecting elective courses, consideration should be given to your areas of interest, your background, and achieving a balance between breadth and depth. Typically, students choose a range of courses in each of the following categories: engineering fundamentals, mathematics and statistics, biomedical science, and bioengineering. Some representative courses in each of these categories are provided below. (This is a non-exhaustive list.)

Bioengineering:

<i>Course number</i>	<i>Course title</i>	<i>Credit hours</i>
BIOE 545	Surface analysis	3
BIOE 557	Bioreactors	3
BIOE 562	Bioseparations	3
ECE 599	Bioelectronic Systems and Devices	3
ECE 599	Biosensors and Medical Devices	3
CS 546	Networks in Computational Biology	3
IE 545	Human Factors Engineering	4
ROB 567	Human-Robot Interaction	4
ROB 562	Human Control Systems	4
KIN 525	Biomechanics of Musculoskeletal Injury	3
H 594	Applied Ergonomics	3
ME 513	Bio-Inspired Design	4
NSE 583	Radiation Biology	3

Biomedical Sciences:

<i>Course number</i>	<i>Course title</i>	<i>Credit hours</i>
VMB 521	Animal Models	3
VMB 652	Cancer Systems Biology	3
VMB 670	Introduction to Systems Biology	2

VMB 671	Molecular Tools	3
VMB 672	Molecular Approach to Cancer	1
VMB 673	Comparative Immunology	3
VMB 674	Vaccines and New Therapies	3
BB 585	Applied Bioinformatics	3
BB 586	Advanced Molecular Genetics	3
BB 590	Biochem 1: Structure & Function	3
BB 591	Biochem 2: Metabolism	3
BB 592	Biochem 3: Genetic Biochem	3
PHAR 525	Foundations of Drug Action I	3
PHAR 537	Bioorganic Chemistry	3
PHAR 547	Antibiotics and Infectious Disease	3
PHAR 548	Drug Actions in Immunology	3
PHAR 563	Cancer and Chemoprevention	2
PHAR 572	Applied Biopharmaceutics & Pharma	3
PHAR 574	Nanomedicine	3
PHAR 591	Pharmacology I	5
PHAR 594	Advances in Manipulating the Human Genome	3

Mathematics and Statistics:

<i>Course number</i>	<i>Course title</i>	<i>Credit hours</i>
ST 515	Design and Analysis of Planned Experiments	3
ST 592	Statistical Methods for Genomics Research	3
MTH 528	Stochastic Elements in Mathematical Biology	3
ME 526	Numerical Methods for Engineering Analysis	3
VMB 631	Mathematical Modeling of Biological Systems	3

Engineering Fundamentals:

<i>Course number</i>	<i>Course title</i>	<i>Credit hours</i>
ECE 564	Digital Signal Processing	4
ME 546	Convection Heat Transfer	3
ME 565	Incompressible Fluid Mechanics	3
CHE 520	Mass Transfer	4
CHE 537	Chemical Engineering Thermodynamics	4

Program of Study:

A program of study form must be submitted and on file with the graduate school. The program of study defines the student's path to completion of coursework, and, once approved, it becomes the obligation of the student to complete the requirements as formulated. MEng students will complete their program of study as part of ENGR 520 and, thus, should have their program of study completed by the end of their first term in the program. Changes in the program must be approved by the student's committee after submitting a [Petition for Change of Program form](#) available in the Graduate School. It is highly recommended that students get approval for any changes in their program prior to enrollment in courses.

Transfer Credit:

Eligible graduate coursework completed previously can be transferred for credit towards the MEng degree with the consent of the student's advisor. Completion of the [Transfer Credit Request Form](#) is required if these credits were obtained outside of OSU.

ADVISOR SELECTION

MEng students will be assigned an advisor by the Graduate Program Coordinator during their first term in the program.

COMMITTEE

The MEng committee consists of 3 members:

- the student's advisor;
- the College of Engineering MEng Coordinator; and
- the academic chair of CBEE (the Associate Head for Graduate Programs).

MENG PORTFOLIO

The MEng portfolio demonstrates the student's mastery, synthesis, and communication of subject matter knowledge in the context of the student's professional goals. It serves as the culmination of the MEng program and final examination for the MEng degree. MEng students will assemble their portfolio in their last term of residence as part of the course ENGR 521. The final portfolio will be assessed by both the course instructor and the student's academic advisor according to the rubric that will be provided to you by College of Engineering MEng Coordinator, Anita Hughes. Briefly, the aim of the portfolio is to highlight the following three elements:

- A. A statement of the candidate's professional goals for obtaining the MEng degree;
- B. An overview of how the MEng coursework, including both major and minor areas, provided the preparation needed to achieve the candidate's professional goals;
- C. A highlight of examples from class projects, homework, job search efforts, etc., that illustrate and elaborate on item B.

Additionally, the portfolio should demonstrate attainment of the program's three graduate learning outcomes.

TIMELINE AND CHECKLIST

On the following page is a brief list of the steps required to obtain the MEng degree. You should also become familiar with the specific and detailed information contained in the Graduate School Catalog as well as School requirements.

PROCEDURES FOR MENG STUDENTS

Check Box	Item #	Step	Timing
	1	Be assigned a major professor	By the end of your first term
	2	File a Program of Study form	By the completion of first term
	3	Register for ENGR 521 Portfolio Completion	Final term in residence
	4	Compare Program of Study form and transcripts for consistency	Completed in ENGR 521: Portfolio Completion course
	5	File Petition for Change in Program form , if needed	
	6	Review CBEE Graduate Learning Outcomes rubric used for evaluating final exams	
	7	Confirm submission of your approved Program of Study with Graduate School	
	8	File a Diploma Application	
	9	Fill out Exam Scheduling Form	As directed in ENGR 521 course
	10	Submit final draft of MEng Portfolio to MEng Coordinator, Anita Hughes	Using timeline within ENGR 521
	12	Graduate School Survey will be emailed to you. If you complete it a gift will be mailed to you.	A month after graduation

CURRICULUM CHART FOR BIOENGINEERING MEng STUDENTS

Year 1		
Fall	Winter	Spring
CBEE 507 Grad Seminar Prof. Dev. AND ENGR 520 MENG Portfolio Prep 2 cr		ENGR 521 MENG Portfolio Completion 1 cr
BIOE 511 Cell & Molecular BioE 3 cr	BIOE 513 Drug & Medical Device Regulations in Tech Dev 3 cr	Grad Minor or Elective 3-4 cr
BIOE 512 Modeling of Physiological Systems 4 cr	Grad Minor or Elective 3-4 cr	Grad Minor or Elective 3-4 cr
Grad Minor or Elective 3-4 cr	Grad Minor or Elective 3-4 cr	Grad Minor or Elective 3-4 cr
Grad Minor or Elective 3-4 cr	Grad Minor or Elective 3-4 cr	Grad Minor or Elective 3-4 cr
TOTAL	16	15
		14

BIOE core (10 cr): BIOE 511, BIOE 512, BIOE 513.

Professional Development & Portfolio (3 cr): CBEE 507 Professional Development is required in fall; ENGR 520/521 is required in first and last terms, respectively.

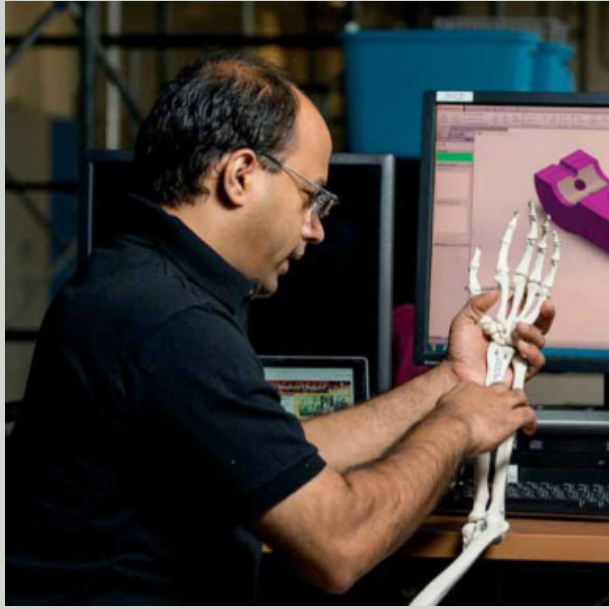
Graduate Elective (24+ cr): Any graduate-level course. These are the most flexible credits. If pursuing a minor, a graduate minor typically requires 15 credits of courses from the minor field.

45 Total Credits required

Note: The completion timeline can vary.

Evaluated Graduate Learning Objectives/Outcomes for BIOE MEng Program

MEng Outcomes
<p>Outcome 1: Demonstration of Scholarship</p> <p>The student will be able to assemble a capstone portfolio synthesizing aspects of core knowledge in the fields spanned by Bioengineering and to effectively communicate this work to a technically literate audience.</p> <p>This will be assessed using the MEng Final Portfolio Exam.</p>
<p>Outcome 2: Mastery of Subject Material</p> <p>The student will be able to think critically, creatively and to address technical problems in Bioengineering.</p> <p>This will be assessed through satisfactory completion of the graduate program of study.</p>
<p>Outcome 3: Ethical Conduct</p> <p>Students will be educated in ethical and responsible conduct in professional activities.</p> <p>This will be assessed through satisfactory completion of the graduate seminar (CBEE507).</p>



Bioengineering MS Program Handbook 2023-2024



Oregon State
University



UNIVERSITY OF
OREGON

University of Oregon (UO)/Oregon State University (OSU)

Joint MS Program

PROGRAM OVERVIEW

The UO/OSU Joint MS program provides an unrivaled research and training environment that will prepare you to excel in private, government and academic sectors through a combination of technical, innovation, entrepreneurial and professional training. You will draw on the combined strengths of both institutions to tackle the complex, interdisciplinary research challenges in bioengineering and accelerate your progress toward successful careers. Further, you will gain real-world experience in multi-site collaboration that will be a hallmark of both academic and private sector research for decades to come. Training in innovation, entrepreneurship, communication and teamwork is threaded throughout your coursework and research experience to accelerate your progress toward your degree and career.

The joint graduate program offers you many benefits relative to programs sited on a single campus. These benefits include:

1. Enhanced education by tapping broader and deeper faculty expertise in the collaborative development and delivery of educational content;
2. Enhanced research collaborations between the two campuses that result from frequent, substantive faculty and student interactions;
3. Elevation of the Program's national brand, rankings and industry reputation by tapping a larger critical mass of faculty mentors and expertise;
4. Accelerated education and research progress by sharing complementary educational and research facilities; and
5. Expanded employment opportunities through a broader network of external relationships.

You will have complete access to courses, libraries, and other facilities at both OSU and UO, and upon selecting a permanent lab, you can assemble a thesis committee with appropriate faculty from both campuses. Upon graduation, you will receive a diploma issued by both institutions.

HOME CAMPUS

Your primary research home, and the place where you receive your student services, is your "home campus". At this time, MS students can only work with research advisors at OSU, so all MS students will have OSU as their home campus. The home campus provides an administrative home to students and manages all student experiences that must be tied to a location (e.g., health and student services, Graduate School forms and procedures, recreation center access, and athletic programs). All MS students in the Joint Program will have complete access to courses, research facilities, and libraries at both OSU and UO.

The administrative home for OSU home campus students is the School of Chemical Biological and Environmental Engineering (CBEE). Students are encouraged to contact the CBEE graduate program coordinator Kimberly Compton (kimberly.compton@oregonstate.edu) if they have any questions.

For other regulations relevant to OSU graduate students, see the OSU Graduate School Catalog (<https://catalog.oregonstate.edu/college-departments/graduate-school/#policiestext>).

COURSEWORK REQUIREMENTS

RECOMMENDED PREREQUISITE COURSEWORK

The following is recommended prerequisite coursework to prepare you to be successful in the Bioengineering Graduate Program.

Students with a B.S. degree in a non-engineering field are strongly encouraged to take the following courses prior to enrolling in the BIOE core courses:

- Math through Differential Equations
- One year of Physics
- A course on computer programming (e.g., Python)

REQUIRED COURSEWORK

MS students must take a total of 45 graduate credits and 12 of those credits must be thesis credits (BIOE 503). No more than 6 credits of blanket-numbered courses, other than thesis, may be counted toward the 45-credit minimum (blanket courses are courses with a zero as the second number, e.g., CBEE 507). At least half of the credits must come from graduate stand-alone courses. Students must take the BIOE core, professional development courses, research seminar and electives, as detailed below.

BIOE Core Courses:

All BIOE graduate students are required to take the following BIOE core courses:

BIOE 511: Cellular and Molecular Bioengineering (3 credits)

BIOE 512: Modeling of Physiological Systems (4 credits)

BIOE 513: Drug and Medical Device Regulation (3 credits)

BIOE 614 (offered remotely via UO): Technology Ventures: From Concept to Commercialization (3 credits)

Professional Development:

All newly enrolled students are required to take the full professional development series, CBEE 507 Professional Development, during their first year (3 total credits). The professional

development series is intended to develop your understanding of the profession, to introduce the research activities that take place in the School, and to develop professional skills including literature searching and citations, communication skills, ethics, and navigating graduate school.

Research Seminar:

Research seminars give students the opportunity for broad exposure to new research in bioengineering. In year two and beyond, all enrolled students holding a GRA/GTA position are required to register for CBEE 507 Seminar: Presentation, all terms(F/W/Sp). In addition, students are encouraged to attend the Oregon Bioengineering Symposium each fall.

Elective Course Selection:

At least 14 credits of elective courses are required. Electives must be non-blanket courses. Elective courses should be selected in consultation with your faculty advisor. Consideration should be given to your research area, your background, and achieving a balance between breadth and depth. Typically, students choose a range of courses in each of the following categories: engineering fundamentals, mathematics and statistics, biomedical science, and bioengineering. Some representative OSU courses in each of these categories are provided below. (This is a non-exhaustive list.) Students can also take elective courses at the UO.

Bioengineering:

<i>Course number</i>	<i>Course title</i>	<i>Credit hours</i>
BIOE 545	Surface analysis	3
BIOE 557	Bioreactors	3
BIOE 562	Bioseparations	3
ECE 599	Bioelectronic Systems and Devices	3
ECE 599	Biosensors and Medical Devices	3
CS 546	Networks in Computational Biology	3
IE 545	Human Factors Engineering	4
ROB 567	Human-Robot Interaction	4
ROB 562	Human Control Systems	4
KIN 525	Biomechanics of Musculoskeletal Injury	3
H 594	Applied Ergonomics	3
ME 513	Bio-Inspired Design	4
NSE 583	Radiation Biology	3

Biomedical Sciences:

<i>Course number</i>	<i>Course title</i>	<i>Credit hours</i>
VMB 521	Animal Models	3
VMB 652	Cancer Systems Biology	3
VMB 670	Introduction to Systems Biology	2
VMB 671	Molecular Tools	3
VMB 672	Molecular Approach to Cancer	1
VMB 673	Comparative Immunology	3
VMB 674	Vaccines and New Therapies	3
BB 585	Applied Bioinformatics	3
BB 586	Advanced Molecular Genetics	3
BB 590	Biochem 1: Structure & Function	3

BB 591	Biochem 2: Metabolism	3
BB 592	Biochem 3: Genetic Biochem	3
PHAR 525	Foundations of Drug Action I	3
PHAR 537	Bioorganic Chemistry	3
PHAR 547	Antibiotics and Infectious Disease	3
PHAR 548	Drug Actions in Immunology	3
PHAR 563	Cancer and Chemoprevention	2
PHAR 572	Applied Biopharmaceutics & Pharma	3
PHAR 574	Nanomedicine	3
PHAR 591	Pharmacology I	5
PHAR 594	Advances in Manipulating the Human Genome	3

Mathematics and Statistics:

<i>Course number</i>	<i>Course title</i>	<i>Credit hours</i>
ST 515	Design and Analysis of Planned Experiments	3
ST 592	Statistical Methods for Genomics Research	3
MTH 528	Stochastic Elements in Mathematical Biology	3
ME 526	Numerical Methods for Engineering Analysis	3
VMB 631	Mathematical Modeling of Biological Systems	3

Engineering Fundamentals:

<i>Course number</i>	<i>Course title</i>	<i>Credit hours</i>
ECE 564	Digital Signal Processing	4
ME 546	Convection Heat Transfer	3
ME 565	Incompressible Fluid Mechanics	3
CHE 520	Mass Transfer	4
CHE 537	Chemical Engineering Thermodynamics	4

Program of Study:

A program of study form must be approved by the student's committee and filed with the graduate school. The program of study defines the student's path to completion of coursework, and, once approved, it becomes the obligation of the student to complete the requirements as formulated. The program of study must be submitted no later than 15 weeks prior to the defense. Students are encouraged to complete the program of study early so they can get input from their committee. Changes in the program may be made by submitting a [Petition for Change of Program form](#) available in the Graduate School.

Transfer Credit:

Eligible graduate coursework completed previously can be transferred for credit towards the MS degree with the consent of the student's committee. Completion of the [Transfer Credit Request Form](#) is required if these credits were obtained outside of OSU.

ADVISOR SELECTION

Students entering the program on a teaching assistantship in the School of CBEE typically do research rotations and should select a research advisor during their first term at OSU. With

assistance from CBEE, students will identify and contact faculty members to set up a meeting to discuss research opportunities. In addition to meeting with faculty, it can also be helpful to meet with graduate students, attend lab meetings and visit the lab. At the end of the term, students will submit an Advisor Selection Form listing their top three choices for preferred advisors. The selection process will be finalized by the start of the next term. The student must sign a “letter of intent” to work with the specific advisor. This agreement is binding except in extraordinary circumstances. If a student believes a change of advisor is warranted they are encouraged to talk with the Graduate Program Coordinator.

COMMITTEE

The principal authority over a student's program resides with the student's Master's Committee. This committee is responsible for assuring that University and School requirements are satisfied, and administering the final oral examination. The committee is typically formed during spring term of the first year.

The committee consists of at least 4 members:

- the student's research advisor;
- an additional BIOE faculty member from OSU or UO;
- the student's minor professor, or if no minor is selected, the committee member may be from graduate faculty at-large at OSU or UO; and
- one Graduate Council Representative (GCR). The role of the GCR is to provide outside advocacy for the student, and they may come from any discipline outside of BIOE.

The committee is originally formed, with approval from the research advisor, at the student's invitation. The Graduate Council Representative is selected from a list generated by the [online GCR list generation tool](#). The GCR is a permanent member of the committee and *must* attend all committee meetings, including the program of study committee meeting, and the final examination (thesis defense).

EXPECTATIONS FOR RESEARCH DISSEMINATION

Dissemination of research findings is vital to the success of our graduates and the reputation of our graduate program. Research can be disseminated in various ways, including presentations at scientific conferences, peer-reviewed publications and patents. It is generally on the basis of these presentations and publications that the quality and impact of one's research endeavors is assessed and potential for future success evaluated. Stated another way, simply completing a MS thesis is generally not sufficient for attainment of the career goals of students and faculty.

In general, MS students give at least one presentation and publish one manuscript on the basis of their research. Students will have ample opportunity to present their work and hone their scientific communication skills. In particular, students are encouraged to give an oral presentation during CBEE seminar, and to present a poster at the CBEE open house, which takes place each fall. In addition, students are encouraged to present their work at the Oregon Bioengineering Symposium, which is a one-day conference that takes place each fall. Specific

expectations for research dissemination, including guidelines and timelines, are matters to be arranged between students and their faculty advisors.

MS THESIS & FINAL ORAL EXAMINATION

All MS students must submit a thesis embodying the results of research and presenting evidence of originality and ability in independent investigation. The thesis must constitute a valid contribution to knowledge in the field of study and must be based on the candidate's own investigation, including one or more of the following elements:

- Contribution to theory,
- Development of a new method or technology,
- Generation of new scientific data that clearly advances the science, and
- Development and/or novel implementation of a numerical model.

The thesis must reflect a mastery of the literature of the subject and be written in scientific format. Thesis guidelines are available at <http://gradschool.oregonstate.edu/success/thesis-guide>. We recommend that students use a “manuscript-based” thesis format, in which published or draft publications are bundled into a single thesis document.

The results from studies conducted using human subjects without obtaining Institutional Review Board approval shall not be used to satisfy master's thesis requirements. For more information, please send an email to irb@oregonstate.edu or visit the IRB website at <http://oregonstate.edu/research/irb/>.

After completion of or while concurrently registered for all work required by the program, the student must pass a final oral examination. The final oral examination **must be scheduled in the Graduate School not less than two weeks prior** to the date of the examination. The final oral examination should be scheduled for at least two hours. The Graduate Program Coordinator must also be notified for announcement in the School of CBEE no less than two weeks prior to the examination date.

The initial portion of the final oral examination is open to all interested persons. After the open portion of the exam, the examining committee excludes all other persons and continues with the examination of the candidate's knowledge of his or her field. The committee then votes on whether or not the student should pass. If more than one negative vote is recorded by the examining committee, the candidate has failed the examination. **Only one re-examination is permitted.**

When scheduling their final oral examinations, MS students are **required to submit** the pretext pages of their thesis to the Graduate School **at least two weeks prior to the final oral examination**. Pretext pages include the abstract, copyright (optional), title page, approval page, acknowledgment page, contribution of authors, table of contents, list of figures, tables, appendices, dedication (optional), and preface (optional). It is expected that students will

distribute examination copies of their thesis to all committee members, including the Graduate Council representative, at least two weeks prior to the student's final oral examination.

Within six weeks after the final oral examination or before the first day of the following term, whichever comes first, students must upload one PDF copy of the thesis, without signatures, electronically to ScholarsArchive and submit the signed ETD submission approval form with a copy of the title page to the Graduate School. Signatures on the ETD submission approval form can be electronic, signed, scanned and emailed or faxed. If final submission occurs after the initial six-week period, the student may be subject to re-examination. Please refer to the Graduate School's website for complete details.

Within **six weeks** of the final oral examination, one printed copy your thesis must be submitted to the School of CBEE main office for binding and archiving in the CBEE thesis library.

TIMELINE AND CHECKLIST

On the following page is a brief list of the steps required to obtain the MS degree. You should also become familiar with the specific and detailed information contained in the Graduate School Catalog as well as School requirements.

PROCEDURES FOR MS STUDENTS			
Check Box	Item #	Step	Timing
	1	Choose a major professor and a general thesis topic	By the end of your first term
	2	Appoint Masters Committee with approval of your major professor	By the end of your second term
	3	Generate Grad Council Rep (GCR) list ; and contact those people until you find someone willing to serve as your GCR	
	4	File a Masters Program of Study form	
	5	Read the Thesis Guide on the Grad School's website	Prior to starting your thesis
	6	Notify your major professor and committee of your intended graduation term	AT LEAST 1 term before your intended graduation term
	7	Compare Program form and transcripts for consistency	
	8	File Petition to Change Program form if needed.	
	9	Confirm submission of your approved Program of Study with Graduate School	15 weeks prior to final oral examination
	10	File a Diploma Application	
	11	Review rubric used for evaluating final exams	
	12	Complete final draft of your thesis, and submit it to your major professor for review and approval	By the start of your last term
	13	Decide on a day and time (at least 2 hours) with all Committee members (including Grad Council Rep)	AT LEAST 2 weeks prior to final oral examination
	14	Reserve a room with CBEE Office Coordinator	

	15	Fill out Exam Scheduling Form	
	16	Submit thesis pretext pages to the Graduate School	
	17	Submit a final draft of the thesis to all committee members (with advisor's approval)	
	18	Submit final oral examination appointment to Graduate Program Coordinator for announcement circulation	
	19	Remind (e-mail) Committee of the final oral examination	2 days prior to final oral examination
	20	Final oral examination	
	21	Print Electronic Thesis and Dissertation Form , obtain signature, and submit final thesis paperwork (See Submission Instructions)	Within 6 weeks of the exam or by the last day of the current term, whichever is first; if you miss the deadline, you may be required to register for an additional 3 credits.
	22	Print copy of thesis for School binding; submit to CBEE Office Coordinator.	
	23	Complete Graduate School Exit Survey (this will be emailed to you)	A month after graduation

NOTES ABOUT THE CHECKSHEET

- Although it is not included in the checklist, dissemination of research findings is essential and is expected to occur throughout your time in the program. The timing of research presentations and manuscript preparation will depend on your research progress and should be discussed with your faculty advisor.
- Give yourself and your committee members a lot of time to plan for the defense date. Sometimes committee members will be on sabbatical leave during the term in which you plan to defend. You should check with your committee members about such leaves far in advance to better plan, especially if you need to change a committee member for any reason. Note that your GCR must attend all meetings and examinations during your degree program.
- The Diploma Application must be filed no later than week two of the term in which you defend. However, completion of the form a term or two early is OK. If you need to change your end term after you file a Diploma Application, simply fill out the application again.
- When you confirm your defense exam date with the Graduate School, you are initiating their final audit of your transcript and making sure your exam is on their calendar. If they are not aware of your defense date, even if you filled out all the paperwork, you will not be allowed to defend and will have to reschedule.

CURRICULUM CHART FOR BIOENGINEERING MS STUDENTS

						Total Credits
Year 1	Fall	CBEE 507 Grad Seminar Prof. Dev. 1 cr	BIOE 511 Cell & Molecular BioE 3 cr	BIOE 512 Modeling of Phys Systems 4 cr	Grad Minor or Elective 3-4 cr	12
	Winter	CBEE 507 Grad Seminar Prof. Dev. 1 cr	BIOE 513 Drug & Med Device Regs in Tech Dev 3 cr	Grad Minor or Elective 3-4 cr	BIOE 503 MS Thesis Variable 1-12 cr	12
	Spring	CBEE 507 Grad Seminar Prof. Dev. 1 cr	BIOE 614 Tech Ventures: Concept to Commercialization 3 cr	Grad Minor or Elective 3-4 cr	BIOE 503 MS Thesis Variable 1-12 cr	12
Year 2	Fall	CBEE 507 Grad Seminar Presentation 1 cr	Grad Minor or Elective 3-4 cr	BIOE 503 MS Thesis Variable 1-12 cr		12
	Winter	CBEE 507 Grad Seminar Presentation 1 cr	Grad Minor or Elective 3-4 cr	BIOE 503 MS Thesis Variable 1-12 cr		12
	Spring	CBEE 507 Grad Seminar Presentation 1 cr	BIOE 503 MS Thesis Variable 1-12 cr			12

BIOE core (13 cr): BIOE 511, BIOE 512, BIOE 513, BIOE 614. BIOE 614 is offered remotely through UO.

Professional development (3 cr): CBEE 507, Seminar Professional Development is required for 3 terms (F/W/Sp).

Research seminar: Students are requested to enroll in CBEE 507, Seminar Presentations, each term after the 1st year.

M.S. Thesis (12 cr): variable credits, thesis credits can go over 12 units total to meet GTA/GRA requirements

Graduate Elective (14+ cr): Any graduate-level course, typically 4-5 courses. These are the most flexible credits. A graduate minor typically requires 15 credits of courses from the minor field. Students should consult with their research advisor about elective courses.

45 Total Credits required

Note: the completion timeline can vary and depends on how long it takes for successful completion of the MS research project and thesis.

PROGRAM OF STUDY EXAMPLE



Oregon State University
Graduate School

MASTERS

Check One	<input type="checkbox"/> EdM	<input type="checkbox"/> MA	<input type="checkbox"/> MAPE	<input type="checkbox"/> MATRN	<input type="checkbox"/> MCoun	<input type="checkbox"/> MEng	<input type="checkbox"/> MF	<input type="checkbox"/> MFA	<input type="checkbox"/> MHP	<input type="checkbox"/> MPP	<input checked="" type="checkbox"/> MS	<input type="checkbox"/> PSM
Last Name (Family)		First Name		Middle Init.		(Former)						
Day Phone #		ID#		Email Address								
Degree Now Held		When/Where Rcvd										

Academic Unit	
Major	
Minor <input type="checkbox"/> or Option <input type="checkbox"/>	
Minor <input type="checkbox"/> or Option <input type="checkbox"/>	

Check One	<input type="checkbox"/> Non-Thesis	<input checked="" type="checkbox"/> Thesis
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CAPSTONE						
Transfer Symbol	G*	Thesis (6-12 credits) If applicable	Course		Cr.	Gr.
			Dept.	No.		
		Thesis	BIOE	503	12	
Transfer Symbol	G*	Non-Thesis Project, Research or PSM Internship (3-6 credits) If applicable	Course		Cr.	Gr.
			Dept.	No.		
				501		
				505		
				506		
				510		
Total					12	

Transfer Symbol	G*	Title of Major Courses	Course		Cr.	Gr.
			Dept.	No.		
	G	Cell & Molec BioE	BIOE	511	3	
		Bioconjugation	BIOE	540	3	
		SocJus, Ethics, Eng	BIOE	520	3	
	G	Chm Eng Analysis	CHE	525	4	
	G	Modeling Phys Syst	BIOE	512	4	
	G	Drug & Med Dev Reg	BIOE	513	2	
	G	Bicelc Sys & Device	ECE	599	4	
	G	Seminar Prof Dev	CBEE	507	3	
		Bioreactors	BIOE	557	3	
	G	Fluid Flow	CHE	514	4	
Total					33	

If additional lines are needed, use a second form

SUPPORTIVE REQUISITES

MA ONLY: Foreign language requirements vary among academic units.

Languages	
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Master's students are expected to "Be able to conduct scholarly or professional activities in an ethical manner". Indicate the training you have completed or will complete to meet this learning outcome. See page 2 of this form for more information.

Ethical Research Training	CITI Responsible Conduct of Research
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SFM ONLY (MF, MS & PhD): See SFM Advising Guide

Communication Training	
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a. Total Major Hours	
b. Total First Minor or Option Hours	
c. Total Blanket Hour Credits	3
d. Total 4XX/5XX Program Credits	9
e. Total Graduate Standalone Credits	36
TOTAL CREDITS ON PROGRAM (d+e)	45

*Mark courses that will be graduate standalone with the letter "G" in this column.

Transfer Symbol	G*	Title of Minor or Option Courses	Course		Cr.	Gr.
			Dept.	No.		
Total						

If additional lines are needed, use a second form

Transfer Symbol	G*	Title of Minor or Option Courses	Course		Cr.	Gr.
			Dept.	No.		
Total						

If additional lines are needed, use a second form

Transfer courses indicated above:

Transfer Symbol	University
T1	
T2	
T3	

Scoring Guide (Rubric) for Graduate Learning Outcome Assessment
M.S. THESIS and FINAL ORAL EXAM in BIOENGINEERING

Candidate Name: _____ Date: _____

Title of Examination Document: _____

Name and Signature of the Examining Committee Member: _____

Criteria	Unsatisfactory	Satisfactory	Exemplary
1a. Research Hypothesis and Objectives	Research problem not clearly stated, or statement not carefully considered and hypothesis driven; Research plan to investigate solution to the defined problem is not fully considered; Measurable technical outcomes not described.	Research problem clearly stated and hypotheses behind research activities identified; Research plan to investigate solution to the defined problem adequately considered; Measurable technical outcomes described.	Research problem fully considered and hypotheses behind all research questions clearly enunciated with broader impacts in the field identified; Research plan to investigate solution to the defined problem fully considered; Measurable technical outcomes described and significance of likely measurements discussed.
1b. Literature Review	The review belies a summative approach, with information presented in a disconnected, disjointed manner and not clearly tied to the research; widely known technical references clearly missing or not germane to the topic at hand.	The information is organized by themes that are related; Ideas are explored as the writing attempts to take an expert approach. However, some themes may be disconnected; some references known to experts in the field may be missing.	The information is clearly synthesized into themes. The writing demonstrates an expert approach by illustrating the relationship between themes, concepts, and ideas reported in the literature, and links these themes to the focus of the research. References are complete.
2. Ability to Demonstrate a Creative Solution to the Problem	Proposed concept is well known, previously described in technical literature, or is impossible/illogical	Proposed work is original and possible but derivative/incremental in nature	Proposed work is original, practical and demonstrates a novel approach.
3. Application of Science and Engineering Fundamentals	Science/Engineering principles underlying Research Hypothesis and Objectives not clearly identified. Lack of awareness of assumptions and limitations.	Science/Engineering principles underlying Research Hypothesis and Objectives identified and discussed. Major assumptions clearly stated.	Science/Engineering principles underlying Research Hypothesis and Objectives identified and discussed. Major assumptions clearly stated; as appropriate math models and associated predictions developed.
4a. Quality of Written Communication	Writing style is immature. Profuse grammatical errors, poor sentence construction and/or poor document structuring make it laborious to read.	Writing style is academic and flows by presenting information in a concise manner. There are only minor grammatical and spelling errors.	Writing style is scholarly and flows naturally, presenting information in a clear and precise manner. Voice is active and devoid of bias. No grammar or spelling errors.
4b. Quality of Oral Communication	Disorganized presentation with low original content; Excessively poor communication skills; Answers to questions show weakness in depth of knowledge in subject matter and/or poor critical thinking skills.	Adequately organized presentation where concepts flow logically; Adequate communication skills; Answers show adequate knowledge in subject area and adequate critical thinking skills	Highly engaging conference quality presentation; Excellent communication skills; Answers show superior knowledge in subject area and well developed critical thinking skills.

During the examination process I did not perceive any lapses in ethical performance and/or reporting of research: _____

Examiner: Please use the reverse of this form for written commentary as needed.

GRADUATE LEARNING OUTCOMES FOR BIOENGINEERING MS STUDENTS

Outcome 1: Scholarship

The student will be able to identify and conduct original research resulting in a significant contribution to knowledge in the fields spanned by Bioengineering and to effectively communicate this work to a technically literate audience.

This will be assessed using the M.S. Thesis and Final Oral Examination (“Defense”).

Outcome 2: Mastery of Subject Material

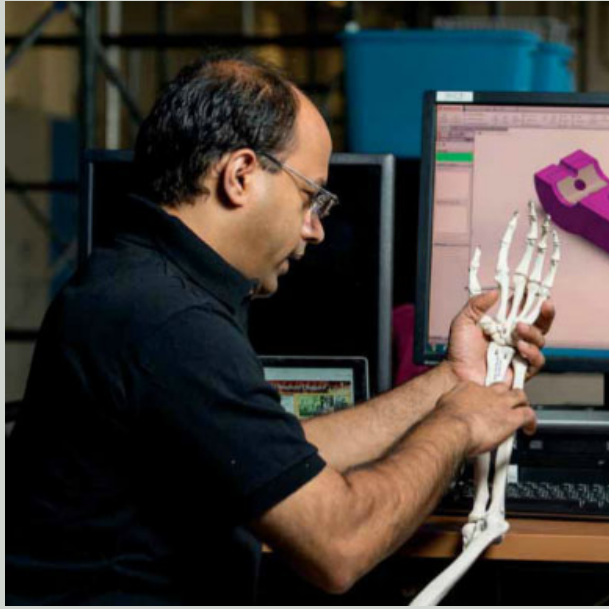
The student will be able to think critically, creatively and to address technical problems in the fields spanned by Bioengineering.

This will be assessed through satisfactory completion of the graduate program of study, as well as course summaries written by the instructors.

Outcome 3: Ethical Conduct

Students will be educated in ethical and responsible conduct in research and professional activities.

This will be assessed through satisfactory completion of the graduate seminar (BIOE 507), as well as ethical completion of the M.S. Thesis and Final Oral Examination.



Bioengineering PhD Program Handbook 2023-2024



Oregon State
University



UNIVERSITY OF
OREGON

University of Oregon (UO)/Oregon State University (OSU)

Joint PhD Program Student handbook

Program Overview

The UO/OSU Joint PhD program provides an unrivaled research and training environment that will prepare you to excel in private, government, and academic sectors through a combination of technical, innovation, entrepreneurial, and professional training. You will draw on the combined strengths of both institutions to tackle the complex, interdisciplinary research challenges in bioengineering and accelerate your progress toward successful careers. Further, you will gain real-world experience in multi-site collaboration that will be a hallmark of both academic and private sector research for decades to come. Training in innovation, entrepreneurship, communication, and teamwork is threaded throughout your coursework and research experience to accelerate your progress toward your degree and career.

The joint graduate program offers many benefits relative to programs sited on a single campus. These benefits include:

1. Enhanced education by tapping broader and deeper faculty expertise in the collaborative development and delivery of educational content;
2. Enhanced research collaborations between the two campuses that result from frequent, substantive faculty and student interactions;
3. Elevation of the Program's national brand, rankings, and industry reputation by tapping a larger critical mass of faculty mentors and expertise;
4. Accelerated education and research progress by sharing complementary educational and research facilities; and
5. Expanded employment opportunities through a broader network of external relationships.

You will have complete access to courses, research opportunities, libraries, and other facilities at both OSU and UO, and upon selecting a permanent lab, you can assemble a dissertation committee with appropriate faculty from both campuses. Upon graduation, you will receive a diploma issued by both institutions.

Home Campus

Your primary research home, and the place where you receive your student services, is your "home campus". You are initially admitted to a home campus based upon your research interests and the alignment of those interests with the faculty at that campus. The home campus provides an administrative home to students and manages all student experiences that must be tied to a location (e.g., health and student services, Graduate School forms and procedures, recreation center access, and athletic programs). Regardless of home campus, students will have the same core coursework, program requirements, and dissertation milestones; however, there may be minor differences in the approach to these milestones

between campuses. All students in the Joint Program will have complete access to courses, research opportunities, research facilities, and libraries at both OSU and UO.

Your home campus should match the administrative home of your primary research advisor's laboratory. Students can petition to change their home campus should there be a need to change their primary advisor. A home campus change is expected to be utilized infrequently, typically as a result of an unanticipated change in advisor or laboratory location.

Program requirements

There are several requirements of students within the joint program. Although the core requirements are the same, some of the details of implementation are governed by the academic policies of the home campus. Additional details regarding these policies are provided in the appendices provided for each of the home campuses. Note that students serving as teaching assistants will have some additional responsibilities related to their teaching appointment.

A. Enrollment:

You must maintain full-time enrollment at your home campus. Please consult the appendices for additional guidance.

It is possible for students to take a leave of absence to pursue internships or other opportunities outside the university for a limited duration. We recommend that students first meet with their dissertation committee and establish a plan for reengaging with their degree program upon return from leave. Please consult the appendices for additional guidance for your home campus.

B. Required coursework:

Students are required to complete a combination of bioengineering core courses, a professional development series, and electives. Students are required to maintain an average 3.0 GPA or greater.

Bioengineering Core:

BIOE 511 (OSU) or BIOE 611* (UO): Cellular and Tissue Engineering (3 Cr)

BIOE 512 (OSU) or BIOE 612* (UO): Modeling of Physiological Systems (4 Cr)

BIOE 513 (OSU): Drug and Medical Device Regulation (3 Cr)

BIOE 614* (UO): Technology Ventures: From Concept to Commercialization (3 Cr)

*UO courses are in the process of regularization and approval and will be delivered as BIOE 610 for academic year 2023-2024. Please contact the Knight Campus Academic Business Coordinator (bioengineering@uoregon.edu) if you have any questions.

Professional Development:

You are required to complete professional development training that includes career planning, communication training, and a course on the ethical conduct of research. Please see the appendices for details on the requirements at each home campus.

Electives:

You are required to complete elective coursework in bioengineering or related fields. Courses can include any graduate-level course across UO or OSU. We recommend that you consult with your research advisor and committee about selection of elective courses. Please see the appendices for details on the approval process for elective courses on each home campus.

C. Other joint program requirements

As you pursue the PhD, you will achieve a series of milestones related to your research training and dissertation work. As a joint program, each of the components in this set of requirements is the same on both campuses; however, slight differences exist in the method of execution between campuses. Please see the appendices for details on your home campus procedures.

- Establish dissertation committee – by the end of the spring term of your first year in the program
- Initial dissertation committee meeting – before the end of the fall term of your second year in the program
- Advancement exam – typically given in the second half of the spring term of your second year
- Review meetings with dissertation committee – annually after advancement
- Dissertation submission and defense

Appendix A: Procedures for UO Home Campus Students

GENERAL INFORMATION

The administrative home for UO home campus students is the Knight Campus for Accelerating Scientific Impact. Please contact the Knight Campus Academic Business Coordinator (bioengineering@uoregon.edu) if you have any questions.

Enrollment

You must maintain full-time enrollment. Full-time enrollment is 12 credits; however, you are encouraged to register for 16 credits per term.

- Credits each term will be a combination of required courses, electives, research credits (prior to advancing to candidacy) and dissertation credits (after advancement to candidacy). You should first register for courses agreed upon with your advisor(s), then register for research/dissertation credits to total 16 credits.
- While completing required coursework, students will typically register for one to two courses per term. After completing required coursework and advancing to candidacy, enrollment may consist entirely of dissertation credits or a combination of course and dissertation credits, as determined by you and your research advisor.
- Students do not formally enroll during the summer, nevertheless you are expected to participate in full-time research over summer terms consistent with your Graduate Employee (GE) appointment, unless specific arrangements have been made with research advisor and dissertation committee.
- Students wishing to take a leave of absence to pursue internships or other opportunities outside the university for a limited duration must first meet with their dissertation committee and establish a plan for reengaging with their degree program upon return from leave.

Electives

You are required to complete at least 10 credits of elective coursework.

- Courses can include any graduate-level course across UO or OSU, however, courses taken outside of the BIOE subject code must be approved by your curriculum advising team in consultation with your research advisor.

Career acceleration series

Knight Campus graduate training programs prioritize the acquisition of strong professional skills and proactive career exploration as complements to advanced research training. The overarching goal of this training program is to jump start, accelerate, and support your research productivity and career preparation.

Appendix A: UO Home Campus Procedures

You are required to complete career acceleration milestones and courses that provide a robust background in research ethics, design thinking, science communication, and career readiness. This series satisfies the Joint Program professional development requirement.

Career acceleration series requirements

- Participate in Impact Week
- Present a talk or poster at the annual Oregon Bioengineering Symposium
- Participate in departmental seminars as an audience member and presenter
- Create and annually update and discuss your individual development plan (IDP)
- **Complete the career acceleration course series:**
 - BIOE 610: Ethical Considerations in Research and Innovation (1 Cr, Fall 1st year)
 - BIOE 610: Science Communication & Design Thinking (1 Cr, Fall 1st year)
 - BIOE 610: Writing for Impact (1 Cr, Spring 1st year)
 - BIOE 610: Grant and Proposal Writing (1 Cr, Winter 2nd year)

Maintaining Satisfactory Progress

To be considered in good academic standing and remain enrolled in the bioengineering program, students must be in compliance with the policies of the Division of Graduate Studies (<https://graduatestudies.uoregon.edu/academics/policies/general/satisfactory-progress>) and maintain acceptable academic and research progress in the department by completing the joint program and Knight Campus program requirements and milestones outlined in this handbook.

Securing a position in a research laboratory is a necessary component of academic progress. Students who are admitted to the program, but not into a specific laboratory, must secure a position in a research laboratory as part of the department's research immersion program.

At the end of the research immersion quarter, students who have not received and accepted an offer to join a research group shall work with the department to develop a plan to secure a position within a research lab. This may require arranging additional rotations during the winter term. Feedback from the research immersion quarter rotations, and any subsequent rotations, shall be used to determine whether the student is making acceptable academic and research progress. A student that does not perform well in the rotations and does not secure an offer of a position in a research lab by the end of winter term will typically either voluntarily withdraw or be dismissed from the program at the end of the first academic year.

If there are concerns about a student's research progress after placement in a laboratory, but before the advancement to candidacy examination, the advisor should provide both oral and written feedback about expectations and timelines for improved performance. If the advisor deems that the student's progress is not improving within the expected timeframe, a meeting of the student's dissertation committee should be held to discuss the matter and to develop a plan for resolution. One outcome of the committee meeting is an *academic warning*. In this

case, the department will notify the student and the Division of Graduate Studies of the deficiencies that have led to the academic warning and outline the requirement(s) for reestablishing good academic standing.

Should the deficiencies persist for more than one quarter, the department will proceed to place the student on *academic probation*. A student on probation will be required to develop an academic improvement plan in consultation with their dissertation advisor and/or a designee of the department chair. Probationary status will be removed once the student has corrected the deficiencies that resulted in probation. If the student is unable to achieve the milestones within the academic improvement plan, the department may recommend that a student be dismissed from the program after at least one, and typically not more than two, quarters of probation. More details on the process related to academic probation can be found on the Division of Graduate Studies website:

<https://graduatestudies.uoregon.edu/academics/policies/general/satisfactory-progress>

UO Dissertation Requirements

As you pursue the PhD, you will achieve a series of milestones related to your research training and dissertation work. As a joint program, each of the components in this set of requirements is the same on both campuses; however, slight differences exist in the method of execution between campuses.

- Establish dissertation advisory committee – by June 15 of 1st year
- Initial dissertation advisory committee meeting (Fourth-Term Review) – ideally between Oct 15 and Nov 15, and no later than December 15 of 2nd year
- Advancement to candidacy exam – typically during spring term of second year, but no later than December 15 of 3rd year
- Annual review meetings with dissertation committee – each year after advancement, typically in winter term
- Dissertation submission and defense

Establishing your Dissertation Advisory Committee

University of Oregon Bioengineering PhD students will assemble their dissertation advisory committees during the spring term of their first year. You should work with your advisor to identify potential committee members. The minimum composition of the committee shall include:

1. Your Primary Research Advisor (your PI)
2. A BIOE faculty member from UO. If you are co-advised, this should be your co-advisor, regardless of their tenure home.
3. A BIOE faculty member from OSU. However, if you are co-advised and wish to have an external (non-UO/OSU) scientific contributor for position 4, this may be a UO BIOE

faculty member who serves as committee chair.

4. An additional scientific contributor:
 - a. This can be any tenure-related faculty member from UO, OSU, or at another institute of higher education.
 - b. If appropriate and your PI approves, this can be a collaborating clinical or industry partner. You must send a justification explaining why the collaborator would benefit your dissertation committee to the Academic Business Coordinator and include the collaborator's CV and contact information.
5. An institutional representative. This is a tenure-related member of the UO graduate faculty from a department other than bioengineering. This member serves the role of an impartial, "outside" committee member and ensures that all rules and standard practices governing committee procedures are followed.

After you have identified your ideal committee, the next step is to contact each candidate to determine if they are willing to serve on your committee. You should ask one of the members to serve as the chair of your committee. The chair of your committee must be a UO faculty member who is not your advisor or co-advisor or the institutional representative. Once all members have agreed, communicate the proposed committee composition to the Knight Campus Academic Business Coordinator (bioengineering@uoregon.edu).

Details about formal committee meetings are outlined below. In addition to these meetings, you are also encouraged to reach out to your committee chair and other members of your committee outside of your formal committee meetings to seek their mentorship, advice, and scientific expertise.

Initial dissertation advisory committee meeting (Fourth-Term Review)

During the fourth term of residence (usually the Fall term of the second year), you are required to meet with your dissertation advisory committee. This meeting is an opportunity for you to get better acquainted with your dissertation committee and to discuss research ideas and goals with them. While this review is not a pass/fail situation, your committee will assess your early progress toward the Ph.D. and provide you useful feedback. The committee will discuss your progress towards completion of course requirements and review your ideas and progress towards a dissertation.

To complete the fourth-term review a student must complete the following:

1. Report: Submit a 5-10-page report that includes an introduction to your dissertation project, a summary of early progress, and your initial ideas and plans for the dissertation. This report is due to your committee one week before the scheduled review.
2. Update your individual development plan (IDP) and submit it to your committee with your written report and forward a copy to the Knight Campus Academic Business Coordinator. You will not be assessed on your IDP, but it provides helpful context of your progress and future plans to your dissertation committee.

Appendix A: UO Home Campus Procedures

3. **Talk:** You should also prepare a 15-20-minute talk introducing the project and describing progress to date and proposed work. This talk will be a framework for the discussion at the review. Please reach out to the Knight Campus Academic Business Coordinator to schedule a location for your meeting.

Prior to the meeting, discuss the meeting format with your committee chair. All members of the committee should be invited to the meeting, but the institutional representative is not required to attend. Immediately following the meeting, your committee will give you an oral evaluation of your performance to date. In addition, your committee chair will write a brief report summarizing the meeting and the committee's assessment of your progress. This report will be sent to the Knight Campus Academic Business Coordinator for placement in your student file, and a copy of the report will be forwarded to you.

Advancement to Candidacy Exam (Sixth-Term Report)

Students should plan to schedule the 'Advancement to Candidacy Exam' for the sixth term (spring of the second year), but no later than the seventh term (fall of the third year), of their graduate career. The purpose of the advancement to candidacy exam is to assess your academic preparation and ability to successfully carry out research at the doctoral level. You will be evaluated on your depth of knowledge in the field, research progress, and dissertation research plans. These criteria are examined in the context of a written report which you will orally defend. Students are expected to have worked closely with their advisor on the research work accomplished and future directions of the work, and students are encouraged to discuss the content of the report with their mentor and other faculty. You should be able to place your research in the context of the field, report significant research progress, and present a compelling direction of the research that will comprise your dissertation.

To advance to candidacy, a student must:

1. Have completed all required core, elective, and professional development coursework with a minimum overall GPA of 3.0
2. Update your IDP and discuss it with your advisor; send a copy to the Knight Campus Academic Business Coordinator
3. Prepare a written report (details below)
4. Orally defend your written report (emphasizing both research progress and dissertation plans) in an Advancement to Candidacy Exam.

Written Report

Your written report should place your research in context, detail your research accomplishments while working in the mentor's research group, and provide a compelling and concrete plan for your dissertation research. The framework is based upon the components of the NIH F31 application that are most relevant to your advancement to candidacy and include:

- Research progress (6 pages)
- Proposed dissertation project summary (30 lines, max)

Appendix A: UO Home Campus Procedures

- Project narrative (3 sentence, max)
- Specific aims (1 page, max)
- Research strategy (significance and approach) (6 pages, max)
 - Significance (suggested 1-1.5 pages): Explain the importance of the problem or critical barrier to progress that the proposed project addresses. Explain how your project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
 - Approach (suggested 4-5 pages): Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims. Address how the data will be collected, analyzed, and interpreted.
- Research training plan (Goals, activities, and timeline. This should be a summary of key points from your IDP) (1 page)
- Manuscripts published, submitted, or in near final draft should be attached to complement the research report.
- Page limits based upon NIH guidelines (e.g., single-spaced, Arial, 11 pt.)

Additional details on the content for each of the sections outlined above can be found in the F31 solicitation. The grant and proposal writing course offered during winter quarter is designed to help you prepare a compelling report following this framework. Students are encouraged to use this opportunity to develop and submit an F31 or other grant/fellowship application based upon eligibility.

The Advancement to Candidacy written report is due to the Knight Campus Academic Business Coordinator and your committee one week before the exam.

Oral Defense/Advancement Exam

The Advancement to Candidacy oral defense will test your ability to think on your feet when confronted with probing questions and to demonstrate specific, as well as foundational knowledge that is important to your field of study. In both the written and oral presentations, you should stress the question(s) to be examined and indicate clearly how successful completion of the proposed research would answer the questions posed.

Students are advised to schedule this exam for 2.5 hours at minimum. The exam includes a 30-minute talk that complements the written report. Questions from the committee will lengthen the presentation. Generally, 1.5 hours are required for a discussion of your research progress and dissertation research plans. Contact the Knight Campus Academic Business Coordinator to schedule a location for your exam.

All members of the committee must attend the advancement exam. There are three possible outcomes of the advancement to candidacy exam. Students can pass unconditionally; they can be asked to rewrite selected part(s) of the report or to fulfill certain other obligations; or they can fail. The student's advisor will not participate in voting on the outcome of the exam.

Immediately following the exam, students will be given an oral evaluation of the outcome. In

addition, a brief summary of the meeting and the committee's assessment of the student's performance will be forwarded to the program for placement in your file. You will receive a copy of the report. If you are required to rewrite and/or redefend portions of the exam, written and verbal guidance will be provided about what could help you in a reexamination. A student in this situation should work closely with the committee chair to determine the best course of action.

The committee report should be sent to the Knight Campus Academic Business Coordinator to be placed in your student file.

Annual reviews

Each year following advancement to candidacy, you are required to meet with your dissertation advisory committee during Winter term. When appropriate, the annual review may coincide with a presentation at the departmental seminar series. The program will notify you when it is time to schedule the review. You should contact all members of your committee and try to accommodate their schedules in arranging a meeting. It is not necessary for all members to attend each year, but a minimal group consisting of the student's advisor, the committee chair, and one other member must be present. Prior to the meeting, update your IDP and discuss it with your advisor. Discuss the format of the meeting with your committee chair prior to the meeting.

1. **Report:** You are expected to write a brief report, usually 5-10 pages, summarizing research progress and plans for the coming year. You should also provide a list of other academic activities since the last Annual Review, such as courses taken for a grade, publications, seminars presented, and scientific meetings attended, including information on presentations given at the meeting, at the beginning of the report. Finally, describe your plans for completion of your dissertation.
2. **Talk:** You should be prepared to give a short presentation (15-20 minutes) on your progress, including a brief introduction, suitable for any committee members who are not specialists in the immediate area of research. You should also provide your committee with a brief update on your IDP, including steps you are taking to prepare for the next stages of your career.

Immediately following the review, you will be given an oral evaluation of your progress. In addition, a brief summary of the meeting and the committee's assessment of your progress will be forwarded to the Knight Campus Academic Business Coordinator for placement in your file. A copy of the report will be sent to you. Completion of annual reviews is required to maintain a student's academic standing. Failure to complete the reviews in a timely fashion means that the student is not making satisfactory progress and may not be eligible for financial support as a GE.

Ongoing committee engagement

You are encouraged to reach out to your committee chair and other members of your committee beyond your formal committee meetings to seek their advice on mentoring or their scientific expertise.

Dissertation defense

As you near the completion of your dissertation work and writing and after you have reached an agreement with your committee on a projected defense date, your defense can be scheduled. The procedural details for submitting your dissertation and defense can be found on the Graduate School website: <https://gradschool.uoregon.edu/academics/policies/doctoral/oral-defense-procedures>

The public defense of your dissertation must take place on campus at a date that you set in consultation with your committee chair and approved by the Graduate School. Tentative approval of the dissertation by the committee is required prior to the formal defense. This approval should be based on evaluation of copies of the final dissertation, which the candidate provides for the committee **at least 3 weeks before** the formal defense.

Check the graduate school website to ensure that you meet all the relevant deadlines. Some of the key deadlines include:

- To graduate in a given term, the oral defense must take place by **Friday of week 9** of that term.
- The deadline to apply for oral defense is **3 weeks before** the defense date.
- The signed Certificate of Completion must be submitted to the Graduate School **within 2 weeks** after the defense, or by the published deadline, whichever is earlier.
- The final, committee-approved dissertation must be uploaded, along with the Dissertation Approval Form, by **Monday of week 11** of the term of graduation.

If you have any questions, please contact the Knight Campus Academic Business Coordinator for more guidance.

Appendix A: UO Home Campus Procedures

Timeline

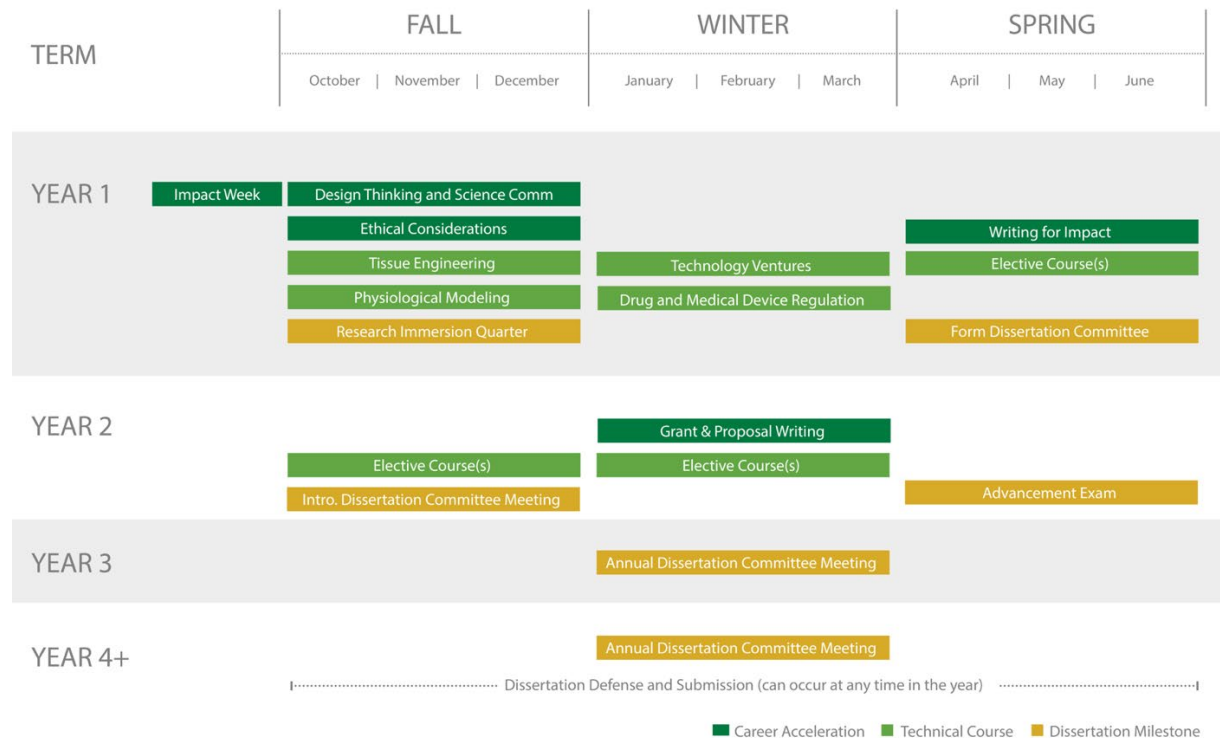


Figure A1) Typical timeline for completing course and program requirements

First year

- Participate in Impact Week and new student advising
- Complete rotations as part of Research Immersion Quarter (fall term)
- Meet with course advising team and submit plan of study
- Attend Oregon Bioengineering Symposium
- Create IDP and meet with the Director of Research Training and Career Acceleration to discuss IDP and plan of study
- Start Research
- Establish dissertation advisory committee by June 15

Second year

- Initial dissertation advisory committee meeting –during 4th term, ideally between Oct 15 and Nov 15
- Update IDP and discuss with advisor, send signed IDP form to Knight Campus Academic Business Coordinator

Appendix A: UO Home Campus Procedures

- Present (poster or talk) at Oregon Bioengineering Symposium
- Complete course requirements – spring term (3.0 GPA or better)
- Advancement exam – typically last half of spring term

Third year and beyond

- Annual review meetings with dissertation advisory committee – winter term each year
- Update IDP and discuss with advisor, send signed IDP form to Knight Campus Academic Business Coordinator
- Present at Department of Bioengineering seminar – at least once after year 3
- Annual participation/presentation at the Oregon Bioengineering Symposium
- Dissertation submission and defense (see above section for details and timing)

Appendix B: Procedures for OSU Home Campus Students

GENERAL INFORMATION

The administrative home for OSU home campus students is the School of Chemical Biological and Environmental Engineering (CBEE). Students are encouraged to contact the CBEE graduate program coordinator Kimberly Compton (kimberly.compton@oregonstate.edu) if they have any questions.

All Bioengineering PhD students must achieve a series of milestones that include coursework, a research project with guidance from the thesis committee, a preliminary oral examination, and a written dissertation and final examination. Details about each of these requirements are provided below.

For other regulations relevant to OSU graduate students, see the OSU Graduate School Catalog (<https://catalog.oregonstate.edu/college-departments/graduate-school/#policiestext>).

COURSEWORK REQUIREMENTS

RECOMMENDED PREREQUISITE COURSEWORK

The following is recommended prerequisite coursework to prepare you to be successful in the Bioengineering Graduate Program.

Students with a B.S. degree in a non-engineering field are strongly encouraged to take the following courses prior to enrolling in the BIOE core courses:

- Math through Differential Equations
- One year of Physics
- A course on computer programming (e.g., Python)

REQUIRED COURSEWORK

In total, PhD students must complete at least 108 graduate credits. Of these, at least 36 must be thesis credits (BIOE 603). At least half of the credits must come from graduate stand-alone courses. No more than 15 credits of blanket-numbered courses, other than thesis, may be counted toward the 108-credit minimum (blanket courses are courses with a zero as the second number, e.g., CBEE 507). In addition, students must take the BIOE core, professional development courses, research seminar and electives, as detailed below.

BIOE Core Courses:

All BIOE graduate students are required to take the following BIOE core courses:

BIOE 511 (OSU): Cellular and Molecular Bioengineering (3 Cr) -or- BIOE 611 (UO): Cellular and Tissue Engineering (3 Cr)

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BIOE 512 (OSU) or BIOE 612 (UO): Modeling of Physiological Systems (4 Cr)

BIOE 513 (offered remotely via OSU): Drug and Medical Device Regulation (3 Cr)

BIOE 614 (offered remotely via UO): Technology Ventures: From Concept to Commercialization (3 Cr)

Professional Development:

All newly enrolled students are required to take the full professional development series, CBEE 507 Professional Development, during their first year (3 total credits). The professional development series is intended to develop your understanding of the profession, to introduce the research activities that take place in the School, and to develop professional skills including literature searching and citations, communication skills, ethics, and navigating graduate school.

Research Seminar:

Research seminars give students the opportunity for broad exposure to new research in bioengineering. In year two and beyond, all enrolled students holding a GRA/GTA position are required to register for CBEE 507 Seminar: Presentation, all terms(F/W/Sp). In addition, students are encouraged to attend the Oregon Bioengineering Symposium each fall.

Elective Course Selection:

At least 14 credits of elective courses are required. Electives must be non-blanket courses. Elective courses should be selected in consultation with your faculty advisor. Consideration should be given to your research area, your background, and achieving a balance between breadth and depth. A list of possible elective courses is provided in Appendix C.

Program of Study:

A program of study form must be approved during a meeting with the student's committee and filed with the graduate school. The program of study defines the student's path to completion of coursework, and, once approved, it becomes the obligation of the student to complete the requirements as formulated. Doctoral students are required to submit the program of study form by the fifth term, but students are encouraged to complete the program of study early so they can get input from their committee. Changes in the program may be made by submitting a [Petition for Change of Program form](#) available in the Graduate School.

Transfer Credit:

Eligible graduate coursework completed previously can be transferred for credit towards the doctoral degree with the consent of the student's doctoral committee. Completion of the [Transfer Credit Request Form](#) is required if these credits were obtained outside of OSU.

ADVISOR SELECTION

Students entering the program on a teaching assistantship in the School of CBEE typically do research rotations and should select a research advisor during their first term at OSU. With

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assistance from CBEE, students will identify and contact faculty members to set up a meeting to discuss research opportunities. In addition to meeting with faculty, it can also be helpful to meet with graduate students, attend lab meetings and visit the lab. At the end of the term, students will submit an Advisor Selection Form listing their top three choices for preferred advisors. The selection process will be finalized by the start of the next term. The student must sign a “letter of intent” to work with the specific advisor. This agreement is binding except in extraordinary circumstances. If a student believes a change of advisor is warranted they are encouraged to talk with the Graduate Program Coordinator.

DOCTORAL COMMITTEE

The principal authority over a student's program resides with the student's Doctoral Committee. This committee is responsible for assuring that University and School requirements are satisfied, monitoring student progress, assigning and approving courses of study, approving dissertation topics and paths-forward, and administering preliminary and final oral examinations. The committee is typically formed during spring term of the first year.

The committee consists of at least 5 members:

- the student's research advisor;
- an additional BIOE faculty member from OSU;
- A BIOE faculty member from UO;
- the student's minor professor, or if no minor is selected, the committee member may be from graduate faculty at-large at OSU or UO; and
- one Graduate Council Representative (GCR). The role of the GCR is to provide outside advocacy for the student, and they may come from any discipline outside of BIOE.

The committee is originally formed, with approval from the research advisor, at the student's invitation. The Graduate Council Representative is selected from a list generated by the [online GCR list generation tool](#). The GCR is a permanent member of the committee and *must* attend all committee meetings, including the program of study committee meeting, the preliminary oral examination, and the final examination (dissertation defense).

PRELIMINARY ORAL EXAMINATION

The purpose of the preliminary oral examination is for the student to demonstrate their (i) ability to formulate a research plan, (ii) ability to communicate clearly, and (iii) understanding of the bioengineering content. Students must successfully complete the examination to advance to candidacy in the PhD program. The preliminary oral examination is taken near the completion of all course work on the Program of Study, typically around spring quarter of the second year.

To schedule the preliminary oral examination, students must contact the members of the committee to arrange the date, time, and place, then schedule the examination with the Graduate School not less than two weeks before the examination using the [Exam Scheduling](#)

[Form](#). Students must be formally enrolled (for a minimum of 3 credits) during the term in which the examination takes place.

For the preliminary oral examination, students must write a research proposal on a topic provided by their advisor, orally defend the research proposal, and answer questions from their committee on the proposal topic, as well as topics from the student's coursework. The written proposal should be submitted to the committee at least one week prior to the oral examination. The default format for the written document is that of the NIH F31 proposal (i.e., 1 page for specific aims and 6 pages for research strategy). Deviations from this format, that support the student's professional development (e.g., the student is writing a proposal for another grant mechanism that has slightly different formatting requirements), are allowed if agreed upon by the advisor and student.

The topic of the research proposal typically matches the student's anticipated PhD research, and provides an opportunity to propose extension of the research into new areas. Students are welcome to discuss the contents of the proposal with their faculty advisor, committee and peers, but the written document should be prepared independently by the student. The faculty advisor should formally provide the proposal topic to the student and thesis committee three weeks before the written document is due to the committee. However, students are encouraged to discuss potential proposal topics with their advisor earlier.

ANNUAL COMMITTEE MEETINGS

After completing the preliminary oral exam and advancing to candidacy, students should schedule annual committee meetings to present their research progress and plans for completing their doctoral research. The purpose of these meetings is to allow the committee to provide feedback to the student on their plan of research.

EXPECTATIONS FOR RESEARCH DISSEMINATION

Dissemination of research findings is vital to the success of our graduates and the reputation of our graduate program. Research can be disseminated in various ways, including presentations at scientific conferences, peer-reviewed publications and patents. It is generally on the basis of these presentations and publications that the quality and impact of one's research endeavors is assessed and potential for future success evaluated. Stated another way, simply completing a Ph.D. dissertation is generally not sufficient for attainment of the career goals of students and faculty.

In general, students give at least three presentations and publish about three manuscripts on the basis of their Ph.D. dissertation research. Students will have ample opportunity to present their work and hone their scientific communication skills. In particular, students are encouraged to give at least one oral presentation during CBEE seminar, and to present a poster at the CBEE open house, which takes place each fall. In addition, students are encouraged to present their work at the Oregon Bioengineering Symposium, which is a one-day conference that takes place

each fall. Specific expectations for research dissemination, including guidelines and timelines, are matters to be arranged between students and their faculty advisors.

DOCTORAL DISSERTATION & FINAL ORAL EXAMINATION

All Ph.D. candidates must submit a thesis embodying the results of research and presenting evidence of originality and ability in independent investigation. The thesis must constitute a valid contribution to knowledge in the field of study and must be based on the candidate's own investigation, including one or more of the following elements:

- Contribution to theory,
- Development of a new method or technology,
- Generation of new scientific data that clearly advances the science, and
- Development and/or novel implementation of a numerical model.

The thesis must reflect a mastery of the literature of the subject and be written in scientific format. Thesis guidelines are available at <http://gradschool.oregonstate.edu/success/thesis-guide>. We recommend that students use a "manuscript-based" thesis format, in which multiple published or draft publications are bundled into a single thesis document.

The results from studies conducted using human subjects without obtaining Institutional Review Board approval shall not be used to satisfy doctoral dissertation requirements. For more information, please send an email to irb@oregonstate.edu or visit the IRB website at <http://oregonstate.edu/research/irb/>.

After completion of or while concurrently registered for all work required by the program, the student must pass a final oral examination. The final oral examination **must be scheduled in the Graduate School not less than two weeks prior** to the date of the examination. The final oral examination should be scheduled for at least two hours. The Graduate Program Coordinator must also be notified for announcement in the School of CBEE no less than two weeks prior to the examination date.

The initial portion of the final oral examination is open to all interested persons. After the open portion of the exam, the examining committee excludes all other persons and continues with the examination of the candidate's knowledge of his or her field. The committee then votes on whether or not the student should pass. If more than one negative vote is recorded by the examining committee, the candidate has failed the examination. **Only one re-examination is permitted.**

The final oral examination must be taken within five years after the preliminary oral examination. If more than five years elapse, the candidate is required to take another preliminary oral examination.

Appendix B: OSU Home Campus Procedures

When scheduling their final oral examinations, doctoral students are **required to submit** the pretext pages of their dissertations to the Graduate School **at least two weeks prior to the final oral examination**. Pretext pages include the abstract, copyright (optional), title page, approval page, acknowledgment page, contribution of authors, table of contents, list of figures, tables, appendices, dedication (optional), and preface (optional). It is expected that students will distribute examination copies of their dissertation to all committee members, including the Graduate Council representative, at least two weeks prior to the student's final oral examination.

Within six weeks after the final oral examination or before the first day of the following term, whichever comes first, students must upload one PDF copy of the thesis, without signatures, electronically to ScholarsArchive and submit the signed ETD submission approval form with a copy of the title page to the Graduate School. Signatures on the ETD submission approval form can be electronic, signed, scanned and emailed or faxed. If final submission occurs after the initial six-week period, the student may be subject to re-examination. Please refer to the Graduate School's website for complete details.

Within **six weeks** of the final oral examination, one printed copy your thesis must be submitted to the School of CBEE main office for binding and archiving in the CBEE thesis library.

TIMELINE AND CHECKLIST

On the following page is a brief list of the steps required to obtain the PhD degree. You should also become familiar with the specific and detailed information contained in the Graduate School Catalog as well as School requirements.

Appendix B: OSU Home Campus Procedures

Procedures for PhD Students			
Check Box	Item #	Step	Timing
	1	Identify a Major Professor (research advisor)	By the end of the 1st term
	2	Select a committee with the help of your advisor	By the end of your first academic year
	3	Generate Grad Council Rep (GCR) list ; and contact those people until you find someone willing to serve as your GCR	
	4	Schedule doctoral program meeting with all committee members and reserve a room	
	5	Doctoral program meeting: Print Doctoral program meeting checklist and take to the meeting	
	6	File Doctoral Program of Study	
	7	Schedule the Preliminary Oral Examination with your committee and reserve a room	AT LEAST 2 weeks prior to preliminary oral examination
	8	Review Preliminary Oral Examination Scoring guide	
	9	Complete and Submit Exam Scheduling Form	
	10	Complete preliminary oral examination	Spring Term, Second Year
	12	Hold regular meetings with your Committee to keep them updated on your progress	Throughout your degree progression (at least once a year)
	13	Read the Thesis Guide on the Grad School's website	Prior to starting your dissertation
	14	Compare Doctoral Program of Study form and transcripts for consistency	1 term before your intended graduation term
	15	File Petition to Change Program form if needed.	
	16	File a Diploma Application	15 weeks prior to final oral examination
	17	Complete final draft of your dissertation and submit it to your major professor for review and approval	By the start of your last term
	18	Schedule the final oral examination with your committee and reserve a room	AT LEAST 2 weeks prior to final oral examination
	19	Submit final oral examination announcement to Graduate Program Coordinator for circulation	
	20	Review final oral examination scoring guide	
	21	Complete Exam Scheduling Form	
	22	Submit dissertation pretext pages to the Graduate School	

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	23	Submit a final draft dissertation to all committee members (with advisor's approval)	
	24	Confirm final oral examination appointment with the Grad School (make sure it's on their calendar!)	1 week after submitting exam scheduling form
	25	Remind (e-mail) Committee of the final oral examination	2 days prior to final oral examination
	26	Complete final oral examination	NO EARLIER THAN 1 term after passing preliminary oral examination
	27	Submit final copies (See Submission Instructions)	Within 6 weeks of the exam or by the first day of the next term, whichever is first; <u><i>if you miss the deadline, you will be required to register for an additional 3 credits, no exceptions!</i></u>
	28	Print copy of dissertation for School binding; submit to CBEE Office Coordinator.	
	29	Graduate School Survey will be emailed to you. If you complete it a gift will be mailed to you.	A month after graduation

NOTES ABOUT THE CHECKSHEET

- Although it is not included in the checklist, dissemination of research findings is essential and is expected to occur throughout your time in the PhD program. The timing of research presentations and manuscript preparation will depend on your research progress and should be discussed with your faculty advisor.
- Give yourself and your committee members a lot of time to plan for the defense date. Sometimes committee members will be on sabbatical leave during the term in which you plan to defend. You should check with your committee members about such leaves far in advance to better plan, especially if you need to change a committee member for any reason. Note that your GCR must attend all meetings and examinations during your degree program.
- The Diploma Application must be filed no later than week two of the term in which you defend. However, completion of the form a term or two early is OK. If you need to change your end term after you file a Diploma Application, simply fill out the application again.
- When you confirm your defense exam date with the Graduate School, you are making sure your exam is on their calendar. If they are not aware of your defense date, even if you filled out all the paperwork, you will not be allowed to defend and will have to reschedule.

CURRICULUM CHART FOR BIOENGINEERING PHD STUDENTS

						Total Credits
Year 1	Fall	CBEE 507 Grad Seminar Prof. Dev. 1 cr	BIOE 511 Cell & Molecular BioE 3 cr	BIOE 512 Modeling of Phys Systems 4 cr	Grad Minor or Elective 3-4 cr	12
	Winter	CBEE 507 Grad Seminar Prof. Dev. 1 cr	BIOE 513 Drug & Med Device Regs 3 cr	Grad Minor or Elective 3-4 cr	BIOE 603 PhD Thesis Variable 1-12 cr	12
	Spring	CBEE 507 Grad Seminar Prof. Dev. 1 cr	BIOE 614 Tech Ventures: Concept to Commercialization 3 cr	Grad Minor or Elective 3-4 cr	BIOE 603 PhD Thesis Variable 1-12 cr	12
Year 2	Fall	CBEE 507 Grad Seminar Presentation 1 cr	Grad Minor or Elective 3-4 cr	BIOE 603 PhD Thesis Variable 1-12 cr		12
	Winter	CBEE 507 Grad Seminar Presentation 1 cr	Grad Minor or Elective 3-4 cr	BIOE 603 PhD Thesis Variable 1-12 cr		12
	Spring	CBEE 507 Grad Seminar Presentation 1 cr	BIOE 603 PhD Thesis Variable 1-12 cr			12
Year 3-5	Fall	CBEE 507 Grad Seminar Presentation 1 cr	BIOE 603 PhD Thesis Variable 1-12 cr			12
	Winter	CBEE 507 Grad Seminar Presentation 1 cr	BIOE 603 PhD Thesis Variable 1-12 cr			12
	Spring	CBEE 507 Grad Seminar Presentation 1 cr	BIOE 603 PhD Thesis Variable 1-12 cr			12

BIOE core (13 cr): BIOE 511, BIOE 512, BIOE 513, BIOE 614. BIOE 614 is offered remotely through UO.

Professional development (3 cr): CBEE 507, Seminar Professional Development is required for 3 terms (F/W/Sp).

Research seminar: Students are requested to enroll in CBEE 507, Seminar Presentations, each term after the 1st year.

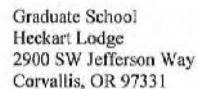
Ph.D. Thesis (36 cr): variable credits, thesis credits can go over 36 units total to meet GTA/GRA requirements

Graduate Elective (14+ cr): Any graduate-level course, typically 4-5 courses. These are the most flexible credits. A graduate minor typically requires 15 credits of courses from the minor field. Students should consult with their research advisor about elective courses.

108 Total Credits required

Note: the completion timeline can vary and depends on how long it takes for successful completion of the PhD research project and dissertation.

PROGRAM OF STUDY EXAMPLE



(Please check each)

If additional lines are needed, use a second form

Total	108
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If additional lines are needed, use a second form

Total

If additional lines are needed, use a second form

Total

Transfer Symbol	University
T1	
T2	
T3	
T4	

Foreign language requirements vary among academic units.

Doctoral students are expected to **"Be able to conduct scholarly or professional activities in an ethical manner"**. Indicate the training you have completed or will complete to meet this learning outcome. See [page 2](#) of this form for more information.

SFM ONLY (MF, MS & PhD): See SFM Advising Guide

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Appendix B: OSU Home Campus Procedures

Scoring Guide (Rubric) for Graduate Learning Outcome Assessment PhD PRELIMINARY or FINAL ORAL EXAM in BIOENGINEERING

Type of Examination (please select one):

PRELIMINARY ORAL EXAM ☐

FINAL ORAL EXAM ☐

Candidate Name: _____ Date: _____

Title of Examination Document: _____

Name and Signature of the Examining Committee Member: _____

Criteria	Does Not Pass Exam	Passes Exam	
	Unsatisfactory	Satisfactory	Exemplary
1a. Research Hypothesis and Objectives	Research problem not clearly stated, or statement not carefully considered and hypothesis driven; Research plan to investigate solution to the defined problem is not fully considered; measurable technical outcomes not described	Research problem clearly stated and hypotheses behind research activities identified; Research plan to investigate solution to the defined problem adequately considered; measurable technical outcomes described	Research problem fully considered and hypotheses behind all research questions clearly enunciated with broader impacts in the field identified; Research plan to investigate solution to the defined problem fully considered; measurable technical outcomes described and significance of likely measurements discussed
1b. Literature Review	Disorganized and too brief to adequately explore the topic; widely known technical references clearly missing or not germane to the topic at hand	Logically crafted and adequately explores the topic; some references known to experts in the field may be missing,	Fully explores the topic and illustrates the state of the knowledge in the field, may be missing an obscure reference or two
2. Ability to Demonstrate a Creative Solution to the Problem	Proposed concept is well known to be described in technical literature or is impossible/absurd	Proposed work is original and possible but derivative/incremental in nature	Proposed work is original, practical and high-risk/high-payoff
3. Application of Science and Engineering Fundamentals	Science/Engineering principles underlying Research Hypothesis and Objectives not clearly discussed	Science/Engineering principles underlying Research Hypothesis and Objectives discussed	Science/Engineering principles underlying Research Hypothesis and Objectives discussed; as appropriate math models and associated predictions developed
4a. Quality of Written Communication	Profuse grammatical errors, poor sentence construction and/or poor document structuring makes it impossible to read through	Adequate document structure, grammar and writing enables adequate understanding of the material presented	Near publication quality, great reading with minor flaws
4b. Quality of Oral Communication	Disorganized presentation with low real content; Excessively poor communication skills; Answers to questions show weakness in depth of knowledge in subject matter and/or poor critical thinking skills	Adequately organized presentation where concepts flow logically; Adequate communication skills; Answers show adequate knowledge in subject area and adequate critical thinking skills	Highly engaging conference quality presentation; Excellent communication skills; Answers show superior knowledge in subject area and well developed critical thinking skills

During the examination process I did not perceive any lapses in ethical performance and/or reporting of research: _____

Examiner: Please use the reverse of this form for written commentary as needed.

GRADUATE LEARNING OUTCOMES FOR BIOENGINEERING PHD STUDENTS

Outcome 1: Scholarship

The student will be able to identify and conduct original research resulting in a significant contribution to knowledge in the fields spanned by Bioengineering and to effectively communicate this work to a technically literate audience.

This will be assessed using the Ph.D. Thesis and Final Oral Examination (“Defense”).

Outcome 2: Mastery of Subject Material

The student will be able to think critically, creatively and to address technical problems in the fields spanned by Bioengineering.

This will be assessed through satisfactory completion of the graduate program of study, as well as course summaries written by the instructors.

Outcome 3: Ethical Conduct

Students will be educated in ethical and responsible conduct in research and professional activities.

This will be assessed through satisfactory completion of the graduate seminar (BIOE 507), as well as ethical completion of the Ph.D. Thesis and Final Oral Examination.

Appendix C: Example elective courses at OSU and UO

Students in the joint program have an unrivaled selection of elective courses to choose from, including any graduate-level course at OSU or UO. Elective courses should align with your research and career goals and should be selected in consultation with your faculty advisor and program administrators. Consideration should be given to your research area, career plans, your background, and achieving a balance between breadth and depth. Representative OSU and UO elective course options are provided below. This is a non-exhaustive list, please speak with your home campus program administrators if you have questions or wish to discuss additional options.

Bioengineering:

Course Number	Course Title	Credits
UO Campus		
BIOE 610	Biomaterials	4
BIOE 610	Protein Engineering	4
BIOE 610	Synthetic Biology	4
BIOE 610	Biosensors	4
BIOE 610	Embedded Systems	4
BIOE 610	Topics in Theory of Biological Systems	4
HPHY 513	Muscle Structure, Function, and Plasticity	4
HPHY 534	Movement Disorders	4
HPHY 684	Kinematics of Human Movement	4
OSU Campus		
BIOE 540	Bioconjugation	3
BIOE 545	Surface analysis	3
BIOE 557	Bioreactors	3
BIOE 562	Bioseparations	3
ECE 599	Bioelectronic Systems and Devices	3
CS 546	Networks in Computational Biology	3
CS 519	Algorithms for Computational Molecular Biology	3
CS 584	Human Factors Programming Languages	4
IE 545	Human Factors Engineering	4
IE 546	Human Factors Engineering II	4
ROB 567	Human-Robot Interaction	4
ROB 562	Human Control Systems	4
KIN 523	Biomechanics of Motor Activities	3
KIN 525	Biomechanics of Musculoskeletal Injury	3
CE 554	Driving Simulation	3
H 594	Applied Ergonomics	3
H 599	Advanced Ergonomics	3
ME 513	Bio-Inspired Design	4
NSE 583	Radiation Biology	3
VMB 631	Mathematical Modeling of Biological Systems	3

Appendix C: Example elective courses at OSU and UO

Biomedical Sciences:

Course Number	Course Title	Credits
<i>UO Campus</i>		
CH 561	Biochemistry	4
CH 562	Biochemistry	4
CH 563	Biochemistry	4
CH 564	RNA Biochemistry	4
CH 565	Physical Biochemistry	4
CH 566	Structural Biochemistry	4
BI 523	Human Molecular Genetics	4
BI 524	Advanced Molecular Genetics	4
BI 526	Genetics of Cancer	4
BI 527	Molecular Genetics of Human Disease	4
BI 528	Developmental Genetics	4
BI 563	Cellular Neuroscience	4
BI 566	Developmental Neurobiology	4
<i>OSU Campus</i>		
VMB 521	Animal Models	3
VMB 524	Bioanalytical Chemistry	3
VMB 670	Introduction to Systems Biology	2
VMB 671	Molecular Tools	3
VMB 673	Comparative Immunology	3
VMB 674	Vaccines and New Therapies	3
BB 585	Applied Bioinformatics	3
MCB 525	Techniques in Molecular and Cellular Biology	4
MCB 554	Genome Structure, Organization and Maintenance	4
MCB 555	Genome Expression and Regulation	4
MCB 576	Introduction to Computing in the Life Sciences	3
PHAR 525	Foundations of Drug Action I	3
PHAR 574	Nanomedicine	3

Mathematics and Statistics:

Course Number	Course Title	Credits
<i>UO Campus</i>		
MATH 521M	Partial Differential Equations: Fourier Analysis I	4
MATH 522	Partial Differential Equations: Fourier Analysis II	4
MATH 561	Introduction to Mathematical Models of Statistics I	4
PHYS 581	Design of Experiments	4
<i>OSU Campus</i>		
ST 515	Design and Analysis of Planned Experiments	3
ST 592	Statistical Methods for Genomics Research	3
MTH 528	Stochastic Elements in Mathematical Biology	3
ME 526	Numerical Methods for Engineering Analysis	3

Appendix C: Example elective courses at OSU and UO

Engineering Fundamentals:

Course Number	Course Title	Credits
<i>UO Campus</i>		
PHYS 611	Theoretical Mechanics	4
PHYS 612	Theoretical Mechanics	2
PHYS 613	Statistical Physics	2
PHYS 614	Statistical Physics	4
<i>OSU Campus</i>		
ECE 564	Digital Signal Processing	4
ME 546	Convection Heat Transfer	3
ME 565	Incompressible Fluid Mechanics	3
CHE 520	Mass Transfer	4
CHE 537	Chemical Engineering Thermodynamics	4

Innovation and Entrepreneurship:

Course Number	Course Title	Credits
<i>UO Campus</i>		
MGMT 625	New venture planning	3
MGMT 645	New Venture Scaling	3
MGMT 655	New Venture Execution	4
BA 661	Advanced Strategy and Leadership	3
BE 625	Business Law and Ethics	3
FIN 671	Corp finance and valuation	3
FIN 685	Venture Capital	3
J 548	Advertising campaigns	3
J 624	Strategic communication	3
J 626	Strategic marketing communication	3
LAW 610	Startup Business	3
LAW 610	Social entrepreneurship law	3
LAW 633	Business planning	3
LAW 673	Patent law and policy	3
MGMT 510	Technology and innovation management	3
MGMT 612	Managing Individuals and Organizations	3
MGMT 614	Strategic Management	3
MGMT 615	Leadership	3
MGMT 620	Global Business	3
MGMT 623	Negotiation	3
MGMT 640	Sustainable Business Development	3
MKTG 612	Marketing Management	3
MKTG 660	Marketing research	3
OBA 510	Predictive Analytics	3
OBA 510	Python Data Analysis	3
OBA 544	Business Database Management Systems	3
PPPM 581	Fundraising for non-profits	3
PPPM 685	Social enterprise	3
SBUS 645	Sports products	3
SPD 650	Sports product materials and manufacturing	3