



Oregon State
University

Environmental and Molecular Toxicology Program

Graduate Student Handbook

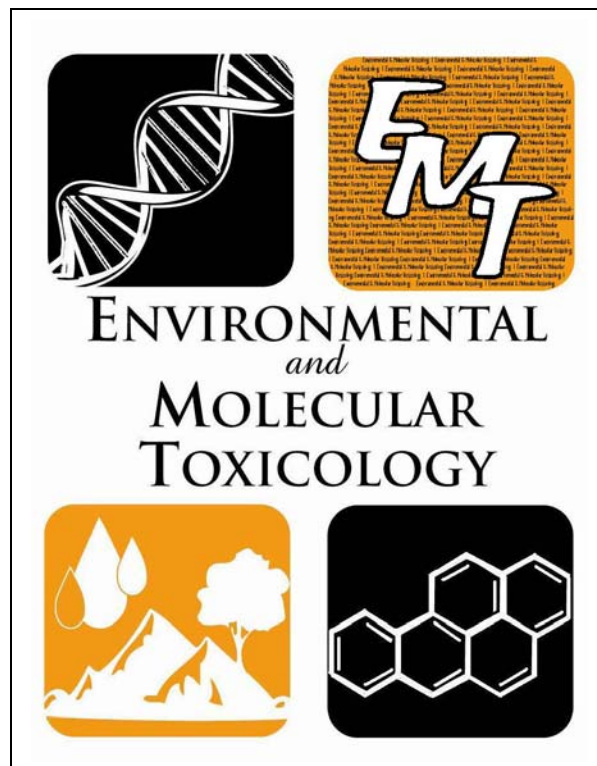


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I. Overview of the Toxicology Graduate Program

Program Overview

Graduate training in the Department of Environmental and Molecular Toxicology (EMT) is intended to provide the necessary knowledge, skills, encouragement, and guidance to assist the student in the successful achievement of their educational and early career professional goals. EMT offers a highly collegial and exceptionally collaborative, research and training environment dedicated to the success and advancement of all EMT students, faculty and staff. Our integrated curriculum, combining both the biological and physical sciences, offers unique and exciting training and research opportunities in the fields of Molecular Toxicology, Environmental Chemistry, Ecotoxicology and Risk Assessment in support of our state-of-the-art and internationally competitive research, outreach and education missions. Degrees offered in the Toxicology Program include both a thesis and non-thesis M.S. and the Ph.D.

PhD and MS requirements are structured to allow for maximal flexibility for students to work with their mentors and thesis/dissertation committees to design an individualized program of study to meet the unique educational and career goals for each student. Students complete a required core series of fundamental classes, participate in a modular Integrated Environmental Chemistry and Molecular Toxicology seminar course each term, and complete additional elective coursework as described in their individual programs. Ph.D. students in addition must complete the preliminary qualifying exam.

A key component of our graduate training program is the mentoring partnership between the individual student and his or her major professor who serves as primary advisor. Students, in consultation with their advisor, develop an Individual Professional Development Plan that includes elements of experiential learning, outreach and professional development.

All students conduct research, and thesis M.S. and Ph.D. students prepare a written thesis or dissertation and present and defend their accomplishments in a public seminar and final examination. Generally, non-thesis M.S. degrees will take 1-2 years, thesis M.S. degrees 2-3 years, and Ph.D. degrees 4-5 years to complete.

The EMT Department is committed to promoting and sustaining a collaborative, inclusive and caring community that strives for equity and equal opportunity for all faculty, staff and students. We recognize that diversity and excellence go hand-in-hand, enhancing our teaching, scholarship and outreach missions.

Admission Requirements and Program Selection Criteria

Must meet the Graduate School Admissions Requirements (<http://gradschool.oregonstate.edu/admissions>)

1) The following courses or equivalents as prerequisites for the program:

Biological Sciences	1 year
Organic Chemistry	1 year
Mathematics	Complete through integral calculus
Physics	1 year

Physical chemistry, biochemistry and statistics also are recommended strongly.

3) Minimum GPA of 3.25 on the most recent baccalaureate degree or subsequent graduate degree

4) GRE scores minimum total of 300 in the required verbal and quantitative tests, with at least a 4.0 on the analytical writing test

Under exceptional circumstances, specific requirements may be waived by the Admissions Committee.

December 31st is the closing date for M.S. and Ph.D. applications for the following Fall Term with full consideration for financial aid and research assistant appointments. Students may be admitted for other Terms, following review of the application materials by the Admissions Committee.

M.S. (Thesis) Program Steps

1. Application to the Graduate School by the student, and forwarding of their application with statement of interest to the EMT Department.
2. Acceptance of the student by the EMT Graduate Admissions Committee, and notification to the Graduate School.
3. Enrollment and course registration; advising with EMT Director of Academic Programs.
4. Beginning of coursework, selection of a major professor and initiation of thesis research project. Note key academic deadlines <http://gradschool.oregonstate.edu/progress/deadlines>.
5. Constitute Thesis Committee and develop student program and Individual Professional Development Plan (IDP) <http://superfund.oregonstate.edu/IDP>.
6. Program committee meeting; approval of program and IDP by major professor, committee members including minor professor (if applicable) and EMT Department Head; must be fulfilled prior to completing 18 credits of course work.
7. Complete and review first Annual Progress Report <https://emt.oregonstate.edu/emt/currentgraduates>.
8. Complete approved coursework and continue thesis research; meet with Committee once per year to review progress to date; complete and review Annual Progress Reports each year.
9. Finish research and write thesis: <http://gradschool.oregonstate.edu/progress/thesis-guide>.
10. Submit diploma application to Registrar, schedule final oral exam and deliver thesis pretext pages to Graduate School. Note deadlines <http://gradschool.oregonstate.edu/progress/deadlines>.
11. Submit thesis to Committee for reading and comments.
12. Defend thesis with a public seminar and a closed examination with Committee.
13. Final and corrected copy of thesis must be uploaded to ScholarsArchive before the first day of the term, or within 6 weeks after the Exam date, whichever comes first. Note submission requirements in the Thesis and Dissertation Guide: <http://gradschool.oregonstate.edu/progress/thesis-guide>.

M.S. (non-Thesis) Program Steps

1. Generally as listed above for Thesis M.S. students, including the completion of a Program of Study approved by the student's committee. Although students will conduct research, there is no requirement for the completion of a research project or defense of a thesis. Students must complete a final report/research paper that is defended in the student's final oral examination. The final oral exam includes a public seminar describing the student's research project.
(<http://catalog.oregonstate.edu/ChapterDetail.aspx?key=39#Section2270>)

Ph.D. Program Steps

1. Application to the Graduate School by student, and forwarding of student application with statement of interest to the EMT Department.
2. Acceptance of student by EMT Graduate Admissions Committee, and notification to the Graduate School.
3. Graduate appointment processed with EMT Departmental Administrator.
4. Enrollment and course registration; advising with EMT Director of Academic Programs.
5. Beginning of coursework and research rotations. Students who enter the program supported by their major professor may perform research rotations as appropriate, or begin their dissertation research projects directly.
6. Complete and review first Annual Progress Report <https://emt.oregonstate.edu/emt/currentgraduates>
7. Selection of major professor by student and beginning of dissertation research project. (No later than 12 months after beginning first term of coursework).
8. Constitute Dissertation Committee and develop student program and Individual Professional Development Plan (IDP) <http://superfund.oregonstate.edu/IDP>.
9. Approval of program of study by Dissertation Committee; for new students with a M.S. degree, this must be accomplished within 12 months after entering the program (i.e. during the first summer after entering the program); a similar time frame is strongly encouraged for other students; program must be approved by the end of the 5th quarter of enrollment.
10. Complete approved coursework and continue dissertation research; meet with Committee once per year to review progress to date; complete and review Annual Progress Reports each year.
11. Completion of EMT Preliminary Examination within two years of entering the program.
12. Finish research and write dissertation: <http://gradschool.oregonstate.edu/progress/thesis-guide>.
13. Submit Dissertation to Committee for reading and comments.
14. Submit diploma application to Registrar, schedule Final Oral Defense and deliver dissertation pretext pages to Graduate School. Note deadlines <http://gradschool.oregonstate.edu/progress/deadlines>.
15. Defend Dissertation with a public seminar followed by a closed examination with Committee.
16. Final and corrected copy of dissertation must be uploaded to ScholarsArchive before the first day of the term, or within 6 weeks after the Exam date, whichever comes first. Note submission requirements in the Thesis and Dissertation Guide: <http://gradschool.oregonstate.edu/progress/thesis-guide>

ENVIRONMENTAL AND MOLECULAR TOXICOLOGY GRADUATE FACULTY

ANDREW J. ANNALORA, Assistant Professor, Senior Research, Ph.D., University of New Mexico

- Cancer, epigenetics and structure-based drug development

KIM A. ANDERSON, Professor, Ph.D., Washington State University

- Environmental forensic chemistry involving bioavailability and speciation method development to decipher sources and fate of environmentally and biologically important chemicals.

WILLIAM BAIRD, Professor, Ph.D., University of Wisconsin

- Mechanisms of carcinogenesis by environmental polycyclic aromatic hydrocarbons

SUSANNE M. BRANDER, Assistant Professor, Senior Research, Ph.D., University of California, Davis

- Ecotoxicology, mechanisms of endocrine disrupting compounds (EDC's) across biological scales

ANDREW B. BUERMAYER, Director of Academic Programs, Associate Professor, Ph.D., University of Wisconsin - Madison

- Genetic and environmental cancer risks, genomic instability and cancer, mouse models of cancer, genetic toxicology and risk assessment

JENNIFER FIELD, Professor, Ph.D., Colorado School of Mines

- Environmental fate and transport of organic pollutants in groundwater and municipal wastewater, environmental analytical chemistry.

STACEY HARPER, Associate Professor, Ph.D., University of Nevada, Las Vegas

- Nanotoxicology, environmental impact of nanomaterials in aquatic systems, ecotoxicology, computational toxicology.

JEFFREY JENKINS, Professor, Director of the National Pesticide Information Center, Ph.D., Michigan State University

- Extension environmental chemistry, toxicology, environmental fate, risk assessment

PAUL C. JEPSON, Professor, Director of the Integrated Plant Protection Center, Ph.D., University of Cambridge, UK

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- Integrated pest management (IPM), pesticide application and efficacy, ecotoxicology, ecological risk assessment

NANCY I. KERKVLIT, Professor, Ph.D., Oregon State University

- Extension toxicology, immunotoxicology, flow cytometry

SIVA KUMAR KOLLURI, Associate Professor, Ph.D.

- Cancer therapeutics, nuclear receptor signaling, regulation of cell death (apoptosis and cell cycle)

CRAIG MARCUS, Department Head, Professor, Ph.D., Madison Wisconsin

- Structure, function and expression of the cytochromes P450 super family of enzyme

STACI SIMONICH, Professor, Ph.D., Indiana University

- Regional and global environmental fate, transport, and deposition of semi-volatile organic compounds in the atmosphere, aquatic, and terrestrial compartments.
- Novel and improved analytical methods and techniques for studying the fate of semi-volatile organic contaminants in the environment.
- Validation of regional and global environmental fate models for semi-volatile organic compounds.

WILLIAM STUBBLEFIELD, Professor, Ph.D. University of Wyoming

- Environmental Toxicology, aquatic toxicology, ecotoxicology and effects of chemicals on environmental stressors

ROBERT TANGUAY, Professor, Ph.D., University of California-Riverside

- Molecular and developmental toxicology of pharmaceuticals, environmental chemicals and nanomaterial

SUSAN TILTON, Assistant Professor, Ph.D., Oregon State University

- Molecular and computational toxicology, genomics, carcinogenesis
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LISA TRUONG, Assistant Professor, Senior Research, Ph.D., Oregon State University

- Computational toxicology and building predictive models for risk analysis

DAVID WILLIAMS, Professor, Ph.D., Oregon State University

- Biochemical toxicology, metabolism
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II. Program Policies and Student Representation

Graduate Student Expectations and Mentoring

Overall Goal

Graduate training in the Department of Environmental and Molecular Toxicology (EMT) is intended to provide the necessary knowledge, skills, encouragement, and guidance to assist the student in the successful achievement of their educational and early career professional goals. We are committed to promoting and sustaining a collaborative, inclusive and caring community that strives for equity and equal opportunity for all faculty, staff and students. We recognize that diversity and excellence go hand-in-hand, enhancing our teaching, scholarship and outreach missions. A key component of our graduate training program is the mentoring partnership between the individual student and his or her major professor who serves as primary advisor. A successful partnership requires a clear understanding of the individual responsibilities for the student and the major professor, as well as the Academic Programs Director and the Department Head.

Specific Objectives

The primary objective for the graduate training and mentoring program in EMT is to assist the student in completing a productive and successful graduate career. Specifically, the objectives for students are to:

1. develop short- and long-term educational and professional goals,
2. articulate a comprehensive plan to achieve these goals, and
3. implement the individual plan to successfully reach his or her goals.

The primary responsibility for achieving these objectives lies with the student. The most difficult aspect of the transition from undergraduate to graduate education can be realizing and accepting the significant increase in personal responsibility necessary to complete graduate training and earn an advanced degree. The Department Head, the Academic Program Director and the faculty mentor all play key roles in assisting students as articulated below. However, it is the student who must assume responsibility for their success.

Responsibilities for the Major Professor, Academic Program Director and Department Head

Major Professor:

1. Willing to invest significant time in student academic and professional development
2. Accessible to student with regular meetings
3. Practice tolerance, patience, and respect for mentee
4. Help a student direct his/her mental context and focus and encourage the exploration of options
5. Elicit feedback from student and provide constructive comments and suggestions
6. Individualize mentoring to address specific needs of mentee
7. Assist the student in selection of graduate faculty to serve on the student's thesis committee
8. Work with the student's thesis committee to help the student develop appropriate and achievable academic, research and professional goals
9. Help students be familiar with and navigate Graduate School policies, procedures and timelines
10. Assist the student in professional networking, including introducing student to key people and organizations
11. Provide input about academic and professional development training opportunities

Academic Program Director and Department Head:

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1. Provide advising for incoming students and serve as head academic advisor (Academic Program Director)
 2. Assist and support students in identifying graduate faculty to function as the major professor
 3. Follow up with student's progress through regular reviews and communication with both student and the major professor
 4. Resolve student conflicts/problems in a timely manner and in accordance with the procedures and policies outlined in the Graduate Student Handbook and the Graduate School.
 5. Help students be familiar with and navigate Graduate School policies, procedures and timelines
 6. Facilitate communication to the faculty of student concerns and suggestions for improvement in our programs through interaction with TEAM Tox and student representatives on departmental governance committees

Responsibilities and Expectations for Students

Graduate students in EMT are expected to pursue their education and research with focus, creative energy and intellect. Our most valuable resources are (1) people and their ideas and time, (2) analytical instrumentation and equipment, and (3) funding. As a member of the EMT, students must explicitly recognize the value of, and make efficient use of, these resources. To ensure a successful mentoring partnership with their major professor, students have the following responsibilities (not intended to be an exhaustive list):

1. Must be open to and respectful of the major professor comments and suggestions
2. Have realistic expectations of the mentoring relationship
3. Communicate openly with mentor
4. Engage in self-examination of strengths and weaknesses
5. Have the courage to try out new behaviors
6. Identify specific needs and make suggestions to the major professor regarding methods to address those needs
7. Develop and jointly with the major professor monitor progress on individual educational and professional goals

Appointments and work schedule:

Graduate Teaching (GTA) and Research Assistantships (GRA) are awarded by EMT to graduate students with superior records in their undergraduate and/or graduate work. Ph.D. students are typically provided full financial support and generally will be appointed at a 0.49 FTE and **receive a stipend to cover living expenses with tuition and fee remission**. Financial support of MS students is at the discretion of the major professor. The 0.49 FTE GRA or GTA appointments are considered "full-time". It is expected that full-time students pursuing a thesis M.S. or Ph.D. degree will spend their time during normal working hours in residence at the university, *plus as much additional time as their research and classroom activities require*. Any release time must be coordinated with, and approved by the major professor.

Financial support to pursue an advanced degree is a privilege, and is dependent upon the student maintaining good academic standing and adequate progress in reaching research and programmatic goals. The time and effort required for maintaining adequate progress will differ among individual students. Students should maintain good lines of communication with their major professor and Thesis/Dissertation Committee to ensure realistic goals are set and adequate progress can be maintained.

Academic Progress:

Students are expected to be familiar with the policies and procedures of the department, the Graduate School and the University. Students need to adhere to all deadlines and file the necessary paperwork (e.g.

Program of Study, etc.) on time. Academic program requirements for PhD and MS students are detailed in subsequent sections of this Handbook. Students must maintain good academic standing and progress towards completion of their degree.

Research Conduct:

All students are expected to engage in research in each term in which they are enrolled. Such research may include laboratory rotations for first-year students, research leading to the student's thesis or dissertation for M.S. and Ph.D. students, and research in-lieu of thesis as required for non-thesis M.S. students. Research typically requires work after hours and on weekends, whether in the laboratory or in the field. Work schedules generally are dictated by the needs of the experiments in progress. Research includes the goal setting and planning required to perform experiments successfully, the specific experimental manipulations, as well as consistent literature review to keep abreast of research developments and discoveries in toxicology and related sciences. Students are expected to generate high quality data, including the validation of sampling and analytical methods, the use of control experiments, and data quality assurance procedures. Any deliberate mishandling of data or activities that could constitute fraud will not be tolerated and may lead to disciplinary action up to and including dismissal. Students are expected to maintain complete and appropriate records, including a laboratory notebook containing summarized data/graphs/statistical analyses.

Laboratory Safety and Instrumentation:

All students will hold high expectations for safety and for the appropriate use of laboratory instrumentation. They must be willing to ask questions and seek additional training to ensure a safe laboratory environment. Students must complete and document all safety training required by the laboratory, the department and the university, and follow all standard laboratory precautions (even if the result is a delay in research productivity). This includes appropriate use of Personal Protective Equipment (appropriate gloves, safety glasses, closed-toe footwear, etc.), confining the use of hazardous and volatile chemicals in fume hoods, and not eating or drinking at laboratory benches. Laboratory equipment is a very costly resource, and improper use can be a safety hazard and a risk to the instrument. Students must receive training in the appropriate use of all laboratory instrumentation. Additional resources can be found on the departmental website: <https://emt.oregonstate.edu/emt/safety-information>

Research Compliance:

All research, teaching and testing activities at Oregon State University are regulated to ensure compliance with federal, state and local regulations and policies. Students are required to obtain appropriate training and certification in research compliance areas prior to initiation of regulated activities. OSU manages the wide array of regulated activities through a number of compliance committees, including Institutional Animal Care and Use, Occupational Health and Safety, Chemical Safety, Conflict of Interest, Diving Control Board, Institutional Review Board (for human subjects research), and Radiation Safety. Students should be aware that non-compliance or misconduct can result in severe penalties to the institution, and, in some instances, to the individuals involved. It is the responsibility of all members of the university community to be familiar with OSU policies as related to these research compliance areas. Information regarding the specific training needed can be found at the website for the Office of Research Integrity. (<http://oregonstate.edu/research/ori/index.htm>).

University and Program Policies and Requirements

General University Academic Regulations The general University academic regulations are described in the *OSU Catalog* and available online: <http://catalog.oregonstate.edu/>. Additional policies governing all graduate

students or specifically students enrolled in masters or doctoral degree programs are detailed within the catalog. All students must be familiar with these academic regulations, as they apply to all graduate students at Oregon State University. **In addition, EMT students also must adhere to** the Toxicology programmatic requirements described herein.

Prerequisites for the Toxicology Program The prerequisites for admission into the Graduate Program in Toxicology are: applicants should have a BS or BA degree in an area of science relating to toxicology (including but not limited to chemistry, biochemistry, biology, molecular biology, pharmacy, medicine, etc) or an advanced professional toxicology-related degree. Students need a strong background in math through integral calculus, physics, biochemistry, inorganic and organic chemistry. All students seeking admission into the Ph.D. Program will be required to take the Graduate Record Exam (GRE) and submit scores in verbal, quantitative, and analytical writing. Scores in specialty areas are optional, but very helpful. International students must submit TOEFL scores. Applications are submitted on-line via the OSU Graduate School website (<http://gradschool.oregonstate.edu/admissions/process>). Admission to the Ph.D. and M.S. Programs in Toxicology is determined by recommendation of the Graduate Admissions Committee.

Transfer Credit Students who wish to transfer graduate credits from other schools must provide transcripts for courses already completed to the Graduate School prior to the submission of a study program. If a student undertakes a transfer course after his or her study program has been approved, the student must provide the Graduate School with a transcript of this course prior to the final examination. The Graduate School does not assume responsibility for obtaining transcripts from other institutions.

Courses to be transferred **must be graduate level**, taken after the completion of a four-year baccalaureate degree (or equivalent), with grades of "B" (3.00 or equivalent) or better. No more than 5 years can have passed from the time of completion of graduate requirements and entry into the Toxicology Graduate Program. Up to 15 hours of graduate credit may be transferred into the M.S. Program. Graduate courses to be transferred to the Ph.D. Program in Toxicology can be courses that were used to satisfy the graduate course requirements for a graduate certificate or a master's degree (or equivalent) with similar stipulations. There is no limit on transfer credit toward the doctoral degree as long as the doctoral residence requirement is satisfied (<http://catalog.oregonstate.edu/ChapterDetail.aspx?key=38#Section1802>). All transfer credit courses must be approved by the EMT Academic Programs Committee. Graduate courses to be transferred to an OSU master's degree must not have been used to satisfy the requirements for a master's degree (or equivalent) or a doctoral degree from another institution.

Student Advisement

Director of Academic Programs and Graduate Admissions Committee.

The Director of Academic Programs provides leadership for the academic programs of the department. In this role, the director works with the *Academic Programs* and the *Graduate Admissions Committees* to provide oversight in the form of planning, coordination, implementation and administration of academic programs. The Graduate Admissions Committee consists of a subset of the full-time graduate faculty members of the Toxicology Program. This committee has responsibilities for graduate admissions and recruitment, and for retention and academic progress within the toxicology program. The Director of Academic Programs has responsibility to advise students in their first year of study prior to selection of a major professor. In this role, the director will help the student plan a schedule, provide orientation for the Program and its requirements, and aid in selection of laboratory rotations and a major professor. The student should confer with the director as necessary before the start of each term to plan course schedules and to keep the director informed of progress in course work and in selecting a major professor. The director will consult with the Admissions Committee and the Department Head as necessary.

Major Professor

Students will select a major professor (mentor or primary advisor) who will be responsible for guiding the

student's work and chairing the student's Thesis/Dissertation or Final Oral Exam (for non-thesis MS students) Committee. Full-time M.S. students typically select their major professor prior to beginning their first term of enrollment. Non-thesis or part-time M.S. students will be assigned an advisor/major professor after consultation with the Admissions Committee and/or the EMT Department Head. For Ph.D. students, this selection should occur prior to the completion of the student's first year in the Program, typically after the completion of the first year rotations. However, the faculty member selected must also agree to be a student's major professor, and may decline to do so without providing justification. Major professors are responsible for the financial support of students they accept. Full time Ph.D. students in good academic standing and making adequate progress on their research are typically provided full financial support. Financial support of M.S. students is at the discretion of the major professor/advisor. M.S. students, especially part-time students, are not guaranteed support.

Thesis/Dissertation or Final Exam Committee

The purpose of the Thesis/Dissertation or Final Exam (for non-thesis M.S. students) Committee is to help develop the student's Plan of Study, to guide research, to review progress towards a degree and to review and approve the final dissertation or thesis. All Committee members must sign and approve (or disapprove) the student's dissertation or thesis before it may be submitted to the Graduate School.

The Ph.D. Dissertation Committee will consist of no less than five members: the student's major professor, *at least* one other full-time faculty member from EMT, *at least* one graduate faculty member from outside EMT, and a Graduate Council Representative (GCR) (required for all graduate thesis committees). The Committee is constituted by the student in consultation with the major professor, and should take into account the planned thesis research project. Similarly, the M.S. Thesis Committee will consist of no less than four members: the student's major professor, *at least* one other full-time faculty member from EMT, *at least* one graduate faculty member from outside the Program (or representing the minor program if one is declared) and a Graduate Council Representative (GCR). The Final Exam Committee for non-thesis MS students consists of at least three members of the graduate faculty as indicated above for an MS thesis committee with the exception that there is no requirement for a GCR.

Student Attendance and Participation

Graduate Appointments

Graduate teaching and research assistantships are awarded by the department to graduate students with superior records in their undergraduate and/or graduate work. To qualify for appointment as a graduate assistant the student must:

1. Be a regularly admitted, conditionally admitted, or provisionally admitted graduate student at OSU (i.e., not a graduate non degree-seeking, post baccalaureate student, or PharmD or DVM student).
2. Be enrolled as a full-time degree-seeking graduate student at OSU, completing a minimum of 12 credits of instruction each Fall, Winter and Spring term, and 3 credits during summer session. EMT students have additional requirements listed below; see **Registration Requirements**. Audit registrations and enrollment in OSU Extended Campus may not be used to satisfy these minimum enrollment requirements.
3. Be making satisfactory progress toward an advanced degree.

Toxicology Graduate Research Assistants (GRA) generally will be appointed on a full-year basis (12 months) at a 0.49 FTE. No appointment can be for less than .20 FTE or more than .49 FTE per term. A graduate assistant on less than .49 FTE may take on extra duties; however, **the total stipend plus salary from all sources within the Oregon University System shall not exceed the equivalent of .49 FTE for any term.** For example, a student seeking additional teaching experience may be appointed at a .20 FTE as a Graduate Teaching Assistant. During that term, the same student would also be appointed at a .29 FTE GRA so that the total appointment does not exceed .49 FTE.

Students appointed as Toxicology GRAs at 0.49 FTE receive a stipend to cover living expenses and are eligible to participate in graduate student health insurance program. Minimum stipend levels are set by Department policy. Tuition and fee remission also generally are covered, either paid directly from a research grant or by the student from his/her stipend.

Graduate students are represented by the Coalition of Graduate Employees, American Federation of Teachers Local 6069. Terms and conditions of employment for service not performed as a requirement for their degrees are prescribed in the Collective Bargaining Agreement between OSU, OUS, and the Coalition of Graduate Employees, American Federation of Teachers Local 6069.

Schedule and Release Time

All major professors should be given a copy of the student's schedule at the beginning of each semester (including summer term), and a local address and phone number (home and/or work) where they may be reached. Students will be provided keys to laboratories and work areas and after-hour permits so that they can access areas after hours. Students should check their mailbox and email account daily for mail and messages. Students are expected to work during term breaks and summer terms in their selected laboratories and should coordinate with their major professor regarding their schedules. Students must have approval from their major professor for time off during the period of their appointment, except for official University Holidays.

Full-Time Students

The 0.49 FTE Graduate Research Assistant appointment is considered "full-time". It is expected that full-time students pursuing a thesis degree will spend their time during normal working hours in residence at EMT, *plus as much additional time as their research and classroom activities require*. (Exceptions may be granted to students attending class or conducting research activities at another site.) As noted below (see **Review of Student Progress**), the most critical measure of success as a graduate student is adequate progress in reaching research and programmatic goals. The time and effort required for maintaining adequate progress will differ among individual students. Students should maintain good lines of communication with their major professor and Thesis/Dissertation Committee to ensure realistic goals are set and adequate progress can be maintained.

Part-Time Students

Part-time students must work out an appropriate schedule detailing the amount of time that the student will be present during each semester for instructional and research activities, and have it approved by their advisor/major professor. It is required that part-time students give their advisor/major professor a copy of their schedule each term AND summer and maintain regular contact with them. These schedules constitute a formal long-range plan for completion of the students selected degree program.

Outside Employment

Full-time students receiving financial aid through EMT, the NIEHS Training Grant, the Superfund Basic Research Program, or other departmental, college or university sources are generally not permitted to have outside employment. This includes students with fellowships or scholarships paid directly to the student. It is expected students will devote all their time to their studies and research projects. In special cases, full-time students may petition to have a work schedule and hours spent in outside employment approved at the beginning of each semester by the Director of Academic Programs and by their major professor. Engaging in outside employment without approval can be grounds for dismissal from the Program.

Leave of Absence

On-leave status is available to students who need to suspend their program of study for good cause. Students who desire a leave of absence will work with their major professor, program administrator, and the Graduate School to arrange authorized leave. Additional details can be found on the Graduate School website: <http://catalog.oregonstate.edu/ChapterDetail.aspx?key=38#Section1804>

Registration Requirements

Full-time status as a graduate student is defined by the Oregon University System as enrollment in 9 credits per term. The maximum load for a full-time graduate student is 16 credits. A student may exceed this limit only with the approval of the Graduate School. Students receiving approval to exceed 16 credits will be assessed a per-credit overload fee. Full-time status (i.e., a minimum of 9 credits per term) may be sufficient to qualify for purposes of veterans' benefits, visa requirements, external fellowships, and federal financial aid. To assure full compliance with visa regulations, international students should consult with the Office of International Student and Faculty Services for additional information about registration requirements.

In addition to the above registration requirements, the following requirements apply to graduate teaching assistants (GTA) and graduate research assistants (GRA). As a condition of their academic appointments, graduate teaching and research assistants are required to register for three credits above the minimum full-time load (i.e., a minimum of 12 credits) each term of the appointment during the academic year (fall, winter, and spring.) During summer session, a minimum registration of 3 credits is required for graduate assistants. *Audit registrations and enrollment in OSU Extended Campus courses may not be used to satisfy enrollment requirements for graduate assistant salary/stipend, tuition remission, salary supplement or health insurance benefits.*

Full-time students in the Toxicology Graduate Program appointed as Graduate Research Assistants or Graduate Fellows should be registered for 12 credits each term of the academic year and for 3 credits during the summer session. Students should use research credits (TOX 501/601 for research not expected to be included in a thesis project, e.g. during laboratory rotations) or thesis credits (TOX 503/603) as appropriate to fill their schedules.

Grade Requirement

A grade-point average of 3.00 (a "B" average) is required: 1) for all courses taken as a degree-seeking graduate student (i.e. the cumulative GPA for all classes taken as a graduate student), and 2) for courses included in the graduate degree or graduate certificate program of study (i.e. the cumulative GPA for all classes included on the Program of Study). Grades below "C" (2.00) cannot be used on a graduate program of study. A cumulative grade-point average of 3.00 is required before the final oral or written exam may be undertaken.

Review of Student Progress

First year students in the Toxicology Program without a major professor will be evaluated by the Director of Academic Programs at the end of each term. Following selection of the major professor, that professor and the student's Thesis/Dissertation Committee will take over as the progress assessment team. The Thesis/Dissertation Committee will meet at least once per calendar year to assess student progress and to complete and review the Annual Report. *It is the responsibility of the individual student to arrange for these meetings and document their progress. Registration holds may be placed on student registration at the discretion of the EMT Department Head in consultation with the Chair of the Academic Programs Committee and the student's major professor to ensure that these meetings occur.*

The appropriate team will help the student to assess progress and set goals for completion of various aspects of the Program. Lack of progress in the Toxicology Program is grounds for dismissal from the Program. Lack of progress may include lack of research productivity and/or poor grades in academic coursework. A grade lower than a B- in any course will be considered a failing grade for Toxicology graduate students. A student receiving a grade lower than a B- may be granted a single opportunity to repeat that course to obtain a passing grade. A student receiving a cumulative total of two or more grades lower than B- may be subject to dismissal from the Program.

Research

All students are expected to be engaged in research in each term in which they are enrolled. Such research

would include laboratory rotations for first-year Ph.D. students, research leading to the student's thesis and dissertation for M.S. and Ph.D. students, and research in-lieu of thesis as required for non-thesis M.S. students. The specific number of credits and course number used for research taken each term will depend on where a student is in their course of study and what other electives are concurrently taken as described below (see Curriculum and sample plans of study below). Research typically requires work after hours and on weekends, whether in the laboratory or in the field. Work schedules generally are dictated by the needs of the experiments in progress. Research includes the goal setting and planning required to successfully perform experiments, the specific experimental manipulations, as well as consistent literature review to keep abreast of research developments and discoveries in toxicology and the related sciences.

Laboratory Rotations

The purpose of laboratory rotations is twofold: firstly, for the student to be exposed to a diversity of research fields and techniques and provide some breadth to their research training, and secondly, to assist the student in identifying an area of research interest and subsequently aid in his/her selection of a research mentor. Rotations (TOX 601) will be performed until a major professor has been selected. The suggested length of each rotation is one academic quarter and constitutes 80-100 hours of "hands-on" experience in each host laboratory. Prior to initiating each rotation, the student should meet with the host laboratory mentor to establish the specific dates of the rotation, the specific training activities to be conducted during the rotation, the schedule of hours the student will be expected to maintain during the rotation, and other activities expected of the student during the rotation, such as attendance at lab meetings, journal clubs, seminars or participation in other host laboratory functions or activities. It is the responsibility of the student to balance time commitments to rotation research and activities against the demands of the didactic curriculum, so as not to compromise progress in didactic coursework. Toxicology graduate students should enroll in TOX 503/603 *after* mentor selection for thesis research. Non-thesis MS students should only use TOX 501 for research credits.

Thesis/Dissertation Research

Students should keep all Thesis/Dissertation Committee members apprised of their progress and should solicit input regularly from the members, in addition to the annual meetings of the Committee. Any disputes among the committee members regarding the course of action for a student shall be resolved by the student working with his/her major professor. The Director of Academic Programs and the Department Head may be consulted as well.

Funding for Research

Students wishing to seek outside funds for thesis or dissertation projects must apply for these funds through their major professor and the OSU Office of Research. Under some special circumstances where funding agencies provide support directly to students, students may have funds awarded to them through OSU. Students are strongly encouraged to apply for external funding in the form of grants, fellowships, etc.

Research Data and Notebooks

All students are responsible for maintaining complete, orderly and legible research notebooks, the format of which is to be determined by the major professor supervising their research. All research data and laboratory notebooks generated during graduate study are the property of OSU, the faculty member under whose direction the work was conducted and/or the appropriate funding agency. No data or laboratory notebooks may be removed from the laboratory or work area without the expressed written permission of the appropriate faculty member. Only copies of data and notebooks should be removed from the laboratory to prevent accidental loss or damage.

Research Compliance

All research, teaching and testing activities at Oregon State University are regulated to ensure compliance with federal, state and local regulations and policies. Students are required to obtain appropriate training and certification in research compliance areas prior to initiation of regulated activities. The Office of Research Integrity works with OSU faculty, staff, and students to help assure proper conduct of research in areas pertaining to the use of human subjects, and non-human vertebrate animals. The office also works

with faculty and Academic Affairs to identify and appropriately manage issues that could be perceived to present financial conflicts of interest. OSU manages the wide array of regulated activities through a number of compliance committees, including Animal Care and Use, Occupational Health and Safety, Chemical Safety, Conflict of Interest, Diving Control Board, Institutional Review Board (for human subjects research), Radiation Safety and Scientific and Scholarly Misconduct. Students should be aware that non-compliance can result in severe penalties to the institution, and, in some instances, to the individuals involved. It is the responsibility of all members of the university community to be familiar with OSU policies as related to these research compliance areas. Information regarding the specific training needed for different compliance areas can be found at the website for the Office of Research Integrity (<http://oregonstate.edu/research/ori/index.htm>).

Student Conduct Regulations and Academic Dishonesty

Graduate students enrolled at Oregon State University are expected to conform to the policies developed to govern the behavior of students as members of the university community. The regulations have been formulated by the Student Conduct Committee, the Student Activities Committee, the University Administration, and the State Board of Higher Education. Violations of the regulations subject a student to appropriate disciplinary or judicial action. The regulations and the procedures for disciplinary action and appeal are available via the Office of Student Conduct and Community Standards Website at <http://studentlife.oregonstate.edu/studentconduct/>.

Research Ethics

Toxicology Program graduate students, like their faculty mentors, must to adhere to the highest standards of professional and scientific ethics in the conduct and reporting of their research and professional efforts. Guidelines for such ethical conduct to be adhered to are outlined in a number of milieus, and it is the personal responsibility of all graduate students to familiarize themselves with this code of ethics and adhere strictly to them. Deviations from these principles are cause for immediate dismissal from the program.

<http://www.niehs.nih.gov/research/resources/bioethics/>

<http://www1.od.nih.gov/oir/sourcebook/ethic-conduct/Conduct%20Research%206-11-07.pdf>

<http://ethics.od.nih.gov/train.htm>

<http://www1.od.nih.gov/oir/sourcebook/comm-adv/ethic-forum.htm>

<http://www1.od.nih.gov/oir/sourcebook/index.htm>

http://www.nhgri.nih.gov/About_NHGRI/Dir/Ethics/message.html

Toxicology Graduate Student Representation

Student Grievance

Students should initially seek out their advisor and/or major professor to discuss and resolve grievances. If unable to resolve problems by working with his/her major professor, the student may request a meeting with the student's Thesis/Dissertation Committee or the Director of Academic Programs, and/or the EMT Graduate Admissions Committee to resolve grievances. Problems not resolved within either committee shall be brought to the Head of EMT and if necessary, subsequently to the CAS Dean. The OSU Dean of Graduate Studies will be available to discuss irresolvable grievance issues, and ultimately the Faculty Senate Graduate Committee rules on student grievances that are not resolved elsewhere. All students desiring to appeal matters relating to their graduate education should request a copy of Grievance Procedures for graduate students at Oregon State University from the Graduate School. These procedures are also available on the Web at <http://gradschool.oregonstate.edu/progress/grievance-procedures>. Graduate assistants whose terms and conditions of employment are prescribed by the Collective Bargaining Agreement between OSU, OUS, and the Coalition of Graduate Employees, American Federation of Teachers Local 6069 should also refer to that document.

TEAM Tox

Mission

TEAM Tox is an organization open to all graduate and post graduate trainees working in EMT laboratories. The primary mission of TEAM Tox is to enhance and diversify the educational experience of all EMT graduate and post graduate trainees, provide opportunities for professional development above and beyond the formal EMT curriculum, enhance interactions between both EMT trainees and between EMT trainees and faculty, and provide a mechanism for representation of trainees issues and concerns to the EMT faculty and administration. Such activities will include, but not be limited to, participation and planning for student recruiting events, departmental seminars, departmental research days, departmental social events, departmental newsletters and year book, alumni and community outreach events. Additional information, including the current bylaws can be found by following the appropriate link on the EMT website: <https://emt.oregonstate.edu/environmental-and-molecular-toxicology/team-tox>

Switching from MS to PhD Program

Toxicology graduate students may request to switch from a MS to the PhD program.

Overview: The Graduate Admissions Committee (GAC) will review requests generated by a current MS degree-seeking student in good standing prior to completion of the MS final exam. After review, and if the application is viewed favorably, the GAC will forward to the Department Head a recommendation to support the student's application to the Graduate School for Concurrent Enrollment. After approval by the Graduate School of the change in academic program, the student completes the MS degree requirements, including passing the final exam, earns the MS degree, and progresses directly into the PhD program. Classes taken as a MS student count towards the PhD degree requirements. Students in both non-thesis and thesis MS programs may apply to switch programs.

Process for Graduate Admissions Committee review of change in program request:

1. Current MS student in good standing, anytime prior to MS final exam, makes formal request to the GAC for consideration for concurrent enrollment. Required documentation in support includes: a statement of purpose indicating the desire to pursue a PhD, a letter of support from the research mentor, a resume or curriculum vitae, and a current transcript.
2. GAC reviews request (may include an interview or request for additional information) and forwards recommendation to Department Head.
3. With approval of Department Head, student submits *Change of Major* form to Graduate School indicating, "Work on Concurrent Degree".
4. Student passes MS final exam (earning either thesis or non-thesis MS) and is at that point now considered a PhD student. Department deadline for forming the PhD thesis committee, the program meeting (to approve any additional electives) and completing the qualifying (preliminary) exam is one year following successful completion of the MS degree.

III. Program Curriculum

The curriculum provides students with a fundamental understanding of the interdisciplinary science of toxicology, and prepares them for leadership positions in research and development, academia, government, or professional services. The curriculum is broadly organized around two concentration areas: **Environmental Chemistry and Ecotoxicology** and **Molecular and Cellular Toxicology**. Required core courses, advanced training in a specialized area, and interdisciplinary and team-based experiential learning and professional development opportunities together strengthen the student's training in the basic sciences and ensure a thorough knowledge of the applied science of toxicology. The curriculum is both broad-based (required core) and flexible (many elective choices), with an emphasis on individualized programs of study based on the individual student's educational background and designed to meet the students' training, educational and professional goals. A required Special Topics course (TOX 599/699 - students participant in all terms in residence) is a unique feature of our curriculum. Current issue topics are addressed in a modular format using student-directed, team-based investigations that emphasis the breadth and integration of the science, from hazard identification to exposure, and from effects to risk analysis and communication.

Integrated Environmental Chemistry and Molecular Toxicology Students must enroll in the modular Integrated Environmental Chemistry and Molecular Toxicology course each term during for the entire period in which they are enrolled in the Toxicology Program; TOX 599 for M.S. students and TOX 699 for Ph.D. students. This modular course is designed to provide students working in teams and individually an opportunity to integrate knowledge across fields focused around a chosen topic of toxicology. A secondary purpose is to disseminate up-to-date research progress in the various areas of toxicology and expand the breadth of the students' familiarity with the broad field of toxicology. The modular class allow the faculty an opportunity to assist students in developing a seminar style, to judge a student's ability to think on his/her feet and for students to gain speaking confidence in a friendly environment.

Experiential Learning and Professional Development

Students, in consultation with their advisor/research mentor, will develop an Individual Professional Development Plan that includes elements of experiential learning, outreach and professional development. Individual activities for the student's plan are chosen from a designated list and are assigned point values depending on the anticipated time commitment and expectations of the activity. MS students must complete all required training activities and a minimum of 4 units of elective training opportunities. Ph.D. students must complete all required training activities and a minimum of 8 units of elective training opportunities. Required training activities and a partial list of elective opportunities are below; a current list of additional elective training activities is maintained in the department. Required training activities and a list of elective opportunities are maintained on the department website: <http://superfund.oregonstate.edu/IDP> . Additional guidance is included below.

Learning Outcomes for the MS and PhD Degree Programs

The graduate programs of the Department of Environmental & Molecular Toxicology (EMT) include thesis and non-thesis M.S. degrees and the Ph.D. degree in Toxicology. Our goal is to educate students in the toxicological sciences, in particular focused on development of the trans-disciplinary skill sets needed to address and understand the effects of chemicals and other agents on humans and the environment, and to create, disseminate and apply new knowledge to enhance the treatment and prevention of human disease and to ensure the protection of the environment and public health. Integrated educational experiences focused on issues relevant to the environmental health sciences are constructed from individualized biomedical and non-biomedical didactic training, combined with experiential learning opportunities. Such an approach is complimented with both formal and informal opportunities for students in science communication and outreach activities. Our trans-disciplinary programs prepare students to better understand the broad and complex challenges in the environmental health sciences and position them for

future careers in academic, industrial and environmental regulatory positions.

As a result of successfully completing the requirements toward the Ph.D., students shall: (a) produce and defend an original significant contribution to knowledge, (b) demonstrate mastery of subject material, and (c) be able to conduct scholarly activities in an ethical manner.

As a result of successfully completing the requirements toward the M.S., students shall: (a) conduct research or produce some other form of creative work, (b) demonstrate mastery of subject material, and (c) be able to conduct scholarly or professional activities in an ethical manner

These general program outcomes are further delineated with the following specific Student Learning Outcomes (SLO).

Outcome 1: Substantive Knowledge in Environmental and Molecular Toxicology. Students will acquire substantive general knowledge of current understanding, emerging issues and trends within the fields of environmental chemistry, ecotoxicology and molecular toxicology. **(Applies to non-thesis MS, thesis MS and PhD.)**

Outcome 2: Analysis of Scientific Literature. Students will acquire the skills necessary to thoroughly research a discipline-specific topic within the published scientific literature, including: **(A)** the ability to identify important hypotheses, theories, controversies, and seminal works describing the current state-of-the science on a specific topic, and **(B)** critically analyze scientific methods, results and conclusions. **(Applies to non-thesis MS, thesis MS and PhD.) (C)** In addition, students will be able to identify knowledge gaps and potential future research needed to advance a specific discipline. **(Applies to PhD.)**

Outcome 3: Communication Skills. Students will be able to clearly communicate scientific concepts, hypotheses, results and interpretations in both written **(A)** and oral **(B)** form. **(Applies to non-thesis MS, thesis MS and PhD.)**

Outcome 4: Capstone/Thesis Project. Students will demonstrate **(A)** the ability to design discipline-specific scientific research that if implemented would produce valid, tangible results. **(Applies to non-thesis MS, thesis MS and PhD.)**

Students will **(B)** complete independent, original, discipline-specific scientific research that produces valid, tangible results, and **(C)** accurately interpret the results from this research. **(Applies to thesis MS and PhD.)**

Students will **(D)** complete a high-quality thematic research paper (non-thesis). **(Applies to non-thesis MS.)**

Students will complete and successfully defend a high-quality **(E)** **(Applies to thesis MS.)** or publication-quality **(F)** **(Applies to PhD.)** thesis describing the research conducted by the student.

Outcome 5: Ethics and Responsible Conduct. Students will demonstrate high ethical and professional standards and responsible conduct in research, including fulfilling all requirements for human subjects, use of animals in research, conflict of interest, data processing, and data reporting. **(Applies to non-thesis MS, thesis MS and PhD.)**

Masters Program in Toxicology

The MS in Toxicology offers two different options for students, with a focus either on thesis research or

advanced non-thesis training. Each option requires a shared core of study (foundational studies in the molecular basis of environmental disease, environmental chemistry and risk assessment) with different requirements for restricted and unrestricted electives. Supporting requirements include statistics and professional ethics. The curriculum emphasizes individualized programs of study based on the student's educational background and designed to meet the student's training, educational and professional goals. Required experiential learning and professional development activities ensure students are well trained in transferable skills necessary to meet the challenges of professional work in many fields.

- **Option 1. Thesis research in the Environmental Health Sciences**
 - Hypothesis-driven thesis research generally addresses one of two concentration areas: Environmental Chemistry and Ecotoxicology, or Molecular and Cellular Toxicology.
- **Option 2. Non-thesis study in Applied Toxicology**
 - Advanced course work and non-thesis research addressing important questions in the interdisciplinary field of toxicology

Requirements

Both the Thesis and non-Thesis M.S. degree programs in Toxicology require a minimum of 45 graduate credits including thesis (6 to 12 credits) or research-in-lieu-of-thesis (3 to 6 credits). Students must enroll in a modular Integrated Environmental Chemistry and Molecular Toxicology course each term (TOX 599).

Graduate Study Program

Programs of study must be filed with the Graduate School before completing 18 graduate credits. If a minor is declared, approximately two-thirds of the work (30 graduate credits) should be listed in the major field and one-third (15 graduate credits) in the minor field. In such cases, the student's advisory committee must include a member representing the minor department.

The program is developed under the guidance of the major professor, and minor professor when a minor is included, and signed by those professors and the EMT Department Head before filing in the Graduate School. Each candidate's program should include substantial work with at least three faculty members offering graduate instruction. Changes in the program may be made by submitting a Petition for Change Form, available in the Graduate School.

M.S. in Toxicology Degree Requirements and Course of Study

There are three options to complete a MS degree in Toxicology. Each requires a shared core of study (18 credits), with different requirements for restricted and unrestricted electives and thesis research or research in-lieu-of-thesis as described below.

- Option 1. Thesis research in the Environmental Health Sciences
- Option 2. Non-thesis study in Applied Toxicology

1. Core Courses (20 credits)

The core courses consist of foundational studies in the molecular basis of environmental disease and target organ toxicology, environmental chemistry, and ecotoxicology and risk assessment. Supporting requirements include statistics and professional ethics.

- TOX 512 (3cr)* Target Organ Toxicology: Molecular Mechanisms of Environmental Disease (fall) (requires 1 cr of TOX 599 Mol. Mech. Environ. Dis.)
- TOX 599 (1cr) Mol. Mech. Environ. Dis. (fall)
- TOX 530 (3cr) Chemical Behavior in the Environment (fall)
- TOX 513 (3cr) Environmental Toxicology and Risk Assessment (spring)

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- TOX 699 (3cr total) Special Topics: Integrated Env. Chem. & Mol. Toxicology (fall, winter, spring, years 1-2, 1cr per term)
 - ST 511 (4cr) Methods of Data Analysis (fall or winter) (4cr)
 - GRAD 520 (1cr) Responsible Conduct of Research (fall, winter or spring) (1cr)
 - TOX 699 (2cr total) Special Topics: Experiential Learning (any term)
-

20 credits total

2. Restricted Electives (minimum 6 credits)

At least two of the student's electives must be chosen from a designated list; students thus develop additional expertise and familiarity with the breadth and depth of the science of toxicology. In Academic Year 2017 – 2018, the following courses are approved:

- TOX 505 Reading and Conference (1-16)
- TOX 511 Fundamentals of Toxicology (3)
- TOX 529 Toxic Substances in Food (3)
- TOX 535 Genes and Chemicals in Agriculture: Value and Risk (3)
- TOX 554 Genome Organization, Structure and Function (4)
- TOX 555 Ecotoxicology: Aquatic Systems (3)
- TOX 575 Advanced Xenobiotic Metabolism (1-3)
- TOX 590 Environmental Forensic Chemistry (3)
- TOX 699 Special Topics: Molecular Therapeutics (3)
- TOX 599 Special Topics: Systems Biological Approaches to Environ. Risk Analysis (3)
- TOX 699 Special Topics (1-16)

3. Additional Electives - The student's remaining electives depend on the MS option being pursued.

3a. Option 1. Research in the Environmental Health Sciences – Unrestricted Electives (minimum 10 credits).

Additional electives for Option 1 are unrestricted. Specific courses will be chosen by the student in consultation with the mentor and the Thesis/Dissertation Committee to enhance and support the student's research, educational and professional goals. Courses may include additional TOX classes, but may also be chosen from any area of study that will meet the student's needs and interests (e.g. biochemistry and biophysics, chemistry, integrative biology (zoology), molecular and cellular biology, statistics, public health, biological or chemical engineering, etc.). Consistent with Graduate School requirements, 400/500 level courses may be used as unrestricted electives.

3b. Option 2. Non-Thesis Study in Applied Toxicology – Unrestricted Electives (minimum 13 credits).

Additional electives for Option 2 also are unrestricted. Specific courses will be chosen primarily by the student and their advisor/mentor to enhance and support the student's training, educational and professional goals. Courses may include additional TOX classes, but may also be chosen from any area of study that will meet the student's needs and interests. Consistent with Graduate School requirements, 400/500 level courses may be used as unrestricted electives.

4. Supervised Research leading to a thesis (minimum 9 credits) or non-thesis final report (minimum 6 credits)

AGP-TOX Master's students are expected to satisfy the supervised research requirements for the Masters in Toxicology by completing either a Thesis (Option 1) or a Research Paper (Option 2). Thesis research leading to an oral defense requires a minimum of 9 credits (TOX 503 Thesis), whereas the Master's Research Paper (final report) requires a minimum of 6 credits of supervised research (TOX 501 Research).

Doctoral Program in Toxicology

Requirements

The doctor of philosophy degree is granted primarily for creative attainments. There is no rigid credit requirement; however, the equivalent of at least three years of full-time graduate work beyond the bachelor's degree (at least 108 graduate credits) is required. After admission into the doctoral program, a minimum of one full-time academic year (at least 36 graduate credits) should be devoted to the preparation of the thesis. The equivalent of one full-time academic year of regular non-blanket course work (at least 36 graduate credits) must be included on a doctoral program.

Graduate Study Program

The student's doctoral study program is formulated and approved at a formal meeting of his or her Thesis/Dissertation committee, which consists of a minimum of five members of the graduate faculty, including two from the major department and a representative of the Graduate Council. If a minor is declared, it must consist of at least 18 credits (15 credits for an integrated minor) and the committee must include a member representing the minor department. All committee members must be on the graduate faculty with appropriate authorization to serve on the student's committee.

When the program is approved by the doctoral committee, the departmental chair, and the dean of the Graduate School, it becomes the obligation of the student to complete the requirements as formulated. Changes in the program may be made by submitting a Petition for Change Form available in the Graduate School.

No more than 15 credits of blanket-numbered courses, other than thesis, may be included in the minimum 108-credit program.

Note:

- **TOX 501/601 Research count towards the 15 credit limit on blanket credits. These credits should only be used for rotations or other similar, supervised but non-thesis research.**
- **TOX 503/603 Thesis credits do not count towards the blanket credit limit, and should be used as soon as a student joins a lab and is working towards their thesis**

A regular graduate student who holds a master's degree must file a study program with the Graduate School by the end of one calendar year of enrollment as a doctoral student.

A regular graduate student who does not hold a master's degree must file a study program with the Graduate School by the end of the fifth quarter of enrollment as a doctoral student.

A student who does not file a program within the specified deadline will not be allowed to register for the next term. A registration hold also will be placed on graduate students whose programs of study are not approved after initial evaluation by the Graduate School and until appropriate action is taken to bring the program of study into compliance with Graduate Council policy.

Academic Requirements

The curriculum described below provides students with core courses in environmental chemistry, ecotoxicology and molecular and cellular toxicology, statistics and scientific ethics. Electives are selected by students and their Dissertation Committee to complement graduate research in environmental chemistry,

ecotoxicology or molecular toxicology.

PhD in Toxicology: Degree Requirements and Course of Study

Specific course requirements and a sample plan of study are detailed below. A PhD Program of study requires 108 credits min in total:

- 50% of total must be graduate, stand-alone courses (not 4XX/5XX slash)
- 36 credits of which must be regular, non blanket course work (not 50X or 60X)
- No more than 15 credits of blanket-numbered courses (50X or 60X), other than thesis (TOX 603), may be included in the minimum 108-credit program
- Declared graduate minor is 18 credits min.

1. Core Courses (21 credits)

The core courses consist of foundational studies in the molecular basis of environmental disease and target organ toxicology, environmental chemistry, and ecotoxicology and risk assessment. Supporting requirements include statistics and professional ethics.

- TOX 512 (3cr)* Target Organ Toxicology: Molecular Mechanisms of Environmental Disease (fall) (requires 1 cr of TOX 599 Mol. Mech. Environ. Dis.)
- TOX 599 (1cr) Mol. Mech. Environ. Dis. (fall)
- TOX 530 (3cr) Chemical Behavior in the Environment (fall)
- TOX 513 (3cr) Environmental Toxicology and Risk Assessment (spring)
- TOX 699 (6cr total) Special Topics: Integrated Env. Chem. & Mol. Toxicology (fall, winter, spring, years 1-2, 1cr per term)
- ST 511 (4cr) Methods of Data Analysis (fall or winter) (4cr)
- GRAD 520 (1cr) Responsible Conduct of Research (fall, winter or spring) (1cr)

21 credits total

All count towards 27 credits min PhD residency requirement

2. Unrestricted Electives (minimum 6 credits)

Additional elective choices are unrestricted, but cannot include blanket courses (those with a 50X or 60X course number). Specific courses will be chosen by the student in consultation with the mentor and the Thesis/Dissertation Committee to enhance and support the student's research, educational and professional goals. Courses may include additional TOX classes (listed below), but may also be chosen from any area of study that will meet the student's needs and interests.

a. TOX Electives

The following courses are currently available for students to develop additional expertise and understanding of the breadth and depth of the science of toxicology.

- TOX 511 *Fundamentals of Toxicology (3) (not recommended for TOX PhD students)*
- TOX 529 Toxic Substances in Food (3)
- TOX 535 Genes and Chemicals in Agriculture: Value and Risk (3)
- TOX 554 Genome Organization, Structure and Function (4)
- TOX 555 Ecotoxicology: Aquatic Systems (3)
- TOX 575 Advanced Xenobiotic Metabolism (2)
- TOX 590 Environmental Forensic Chemistry (3)
- TOX 611 *Testing for Genotoxins (laboratory course) (3) (not currently offered)*
- TOX 699 Special Topics: Molecular Therapeutics (3)
- TOX 599 Special Topics: Systems Biology Approaches to Environ. Risk Analysis (3)

-
- TOX 699 Special Topics (1-16)

4. Supervised Thesis Research (minimum 36 credits)

Each candidate for the PhD degree must complete and successfully defend a thesis embodying the results of research and giving evidence of originality and ability in independent investigation. The thesis must be a real contribution to knowledge in the field of toxicology, based on the candidate's own investigation. It must show a mastery of the literature of the subject and be written in creditable literary form. Given the interdisciplinary nature of toxicology, students are strongly encouraged to develop an interdisciplinary and collaborative project working with collaborators in the program, in other programs on campus, and/or from outside the university.

5. Experiential Learning and Professional Development

Students, in consultation with their advisor/research mentor, will develop an Individual Professional Development Plan that includes elements of experiential learning, outreach and professional development. Individual activities for the student's plan are chosen from a designated list and are assigned point values depending on the anticipated time commitment and expectations of the activity. Ph.D. students must complete all required training activities and a minimum of 6 units of elective training opportunities. Required training activities and a partial list of elective opportunities are below; a current list of additional elective training activities is maintained in the department. A list of required and optional activities is maintained on the department website: <http://superfund.oregonstate.edu/IDP>

A sample plan of study and schedule is included below.

<i>Summary: Credit Requirements for the PhD in Toxicology</i>			
	Non-Blanket	Total	
Core courses	21	21	
Elective courses	6 (min)	6 (min)	
Thesis		36 (min) - 81	
	27 (min)	108 (min)	
<i>Sample PhD Course of Study Schedule (minimum 27 credits non-blanket courses)</i>			
Academic Year 1 (12 credits total per term)	Fall	Winter	Spring
	TOX 512 (3 credits)	ST 511 (4 credits)	TOX 513 (3 credits)
	TOX 599 (1 credit) Mol. Mech. Env. Dis.		
	TOX 530 (3 credits)	GRAD 520 (1 credit)	
	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.
	Electives (0-3 credits)	Electives (3-5 credits)	Electives (5-7 credits)
	TOX 601 Research Rotation (1-3 credits)	TOX 601 Research Rotation (1-3 credits)	TOX 601 Research Rotation (1-3 credits)
Summer Year 1 (3 cr)	TOX 603 Thesis Research (3 credits)		
Academic Year 2 (12 credits total per term)	Fall	Winter	Spring
	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.
	Electives (3-8 credits)	Electives (3-8 credits)	Electives (3-8 credits)
	TOX 603 Thesis Research (3-8 credits)	TOX 603 Thesis Research (3-8 credits)	TOX 603 Thesis Research (3-8 credits)
Summer Year 2 (3 cr)	TOX 603 Thesis Research (3 credits)		
Academic Years 3+ (12 credits total per term)	Fall	Winter	Spring
	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.	TOX 699 (1 credit) Int. Env. Chem. & Mol. Tox.
	Thesis Research (8-11 credits)	Thesis Research (8-11 credits)	Thesis Research (8-11 credits)
	Electives (possibly 1-3 credits)	Electives (possibly 1-3 credits)	Electives (possibly 1-3 credits)
Summer Years 3+ (3 cr)	TOX 603 Thesis Research (3 credits)		

Other additional advanced coursework outside TOX Program complimentary to research project may be required or appropriate.

Current course descriptions can be found on the departmental website and the on-line course catalog.

Experiential Learning and Professional Development Guidance

Students, in consultation with their advisor/research mentor, will develop an Individual Professional Development Plan that includes elements of experiential learning, outreach and professional development. Individual activities for the student's plan are chosen from a designated list and are assigned point values depending on the anticipated time commitment and expectations of the activity. Ph.D. students must complete all required training activities and a minimum of 8 units of elective training opportunities. Required training activities and a list of elective opportunities are maintained on the department website: <http://superfund.oregonstate.edu/IDP>

1. **The basics:** every student should create an account and register for experiential learning activities through the on-line portal (<http://superfund.oregonstate.edu/IDP>). Having each of you register for activities is one important way that we can track the interest level in different potential activities and use that information to prioritize the scheduling of specific activities.
 - a. PhD students are required to complete 8 units, and MS students 4 units of experiential learning activities
 - b. Two units of experiential learning are worth 1 credit of regular, registered course work (TOX 599/699 ST: Experiential Learning)
2. **Registering for credit:** We will use the course *TOX 599/699 Special Topics: Experiential Learning* for students to earn regular course credits towards their degrees. These credits are **not** "blanket course credits" and will count on you programs of study. For PhD students, TOX 699 credits will count as part of the core 36 regular course credits needed. Starting Fall term 2016, there will be a section of TOX 599/699 in the course catalog each term for which students can register for variable number (whole number only) of credits (similar to research or thesis credits). Students only need to register for this course once in their programs to log the total number of experiential learning credits earned (based on how many units have been completed). Otherwise, students will use the on-line portal to track completion of, and interest in, specific activities.
3. **Mentor and Committee Annual Review:** Each student should meet annually with their mentor and committee to review their planned and completed experiential learning activities while pursuing their degree. Print out the list of your activities from the on-line portal and bring to your annual committee meeting. For departmental tracking purposes, please also submit a copy of this printout with your annual student reviews to Mary Mucia.

IV. Preliminary and Final Examinations and Thesis Requirements

Ph.D. Preliminary Exam

Objective

The overall objective of the preliminary examination for advancement to Ph.D. candidacy should assess whether a graduate student has the capacity and potential:

- i) to understand the science that informs our understanding of how chemical occurrence and fate leads to potential exposure and how exposure potentially triggers adverse-outcome pathways in humans and organisms in the environment
- ii) to be a creative and critical thinker;
- iii) to understand the scientific literature;
- iv) to conduct original and independent research; and
- v) to communicate the ideas and results of experiments.

Thus, the ideal examination format would select for these characteristics and prepare the student for the selective pressures that will be encountered upon completing the Environmental and Molecular Toxicology Ph.D. degree Program. In order to maintain high standards and produce quality graduate students, the examination must be rigorous and challenging. In addition, the exam format should set specific limits on the amount of time that the student dedicates to this process.

Exam Format

The preliminary examination format outlined below consists of both oral and written elements. This examination must be completed no later than the end of the 8th academic term after entering the program (including summer terms). Any delay in scheduling the examination must be approved by the student's Thesis/Dissertation Committee. In most cases, the student would schedule the exam in the Spring or Summer term of the second year of residency, although students may take the exam earlier, after completing at least one year in the Program. The examination consists of a written and oral presentation of a research proposal. As outlined, the student's ability to develop, research, and defend original scientific ideas would be evaluated. The student is expected to demonstrate a capacity for critical thinking and a command of the specific field of focus. Since the student would have completed most, if not all, of the required coursework prior to scheduling the preliminary exam, the student's general knowledge of environmental and molecular toxicology should also be evaluated.

Procedural Outline

Research Proposal (written/oral)

1. Student submits an outline description (required elements listed below) for a potential research project. The subject of the project must be chosen by the student based on their knowledge and review of the literature, and must describe original, hypothesis-driven research. The proposed project cannot be taken directly from their mentors published or unpublished content (i.e. manuscripts, abstracts, database of funded projects, submitted grant applications, etc.). Proposed

projects however can be related to the thesis research of the student.

Project outlines (limited to 1 page) must include:

- a) Description of an unresolved question relevant to the field of environmental and molecular toxicology. (1-3 sentences)
- b) Statement of specific hypothesis to be tested. (1-2 sentences)
- c) Description of an experimental approach designed to test the hypothesis, including a minimum of two specific aims, and a statement of the rationale (justification) for the proposed approach. (2-6 sentences)
- d) Statement of the significance of the proposed research. (1-2 sentences)

2. The student's graduate committee is responsible for the review and approval of the topic to be developed into a full written proposal. Approval of the topic would occur within one week after the outline is submitted if it is deemed of high originality, quality, potential significance and likely to contribute meaningfully to the student's education and training. During this period the outline would be returned to the student, and the student would receive feedback from the committee concerning the quality and design of the outlined project. Major strengths and weaknesses in the experimental design or rationale would be identified at this stage. Students may be required to modify their proposal topics and/or develop new topics if the original submission is deemed unacceptable.

3. Student develops a written research proposal using the format and topic guidelines of application for the EPA, NIH, NSF, or other appropriate granting agency. The written proposal must be completed and returned to the committee within 4 weeks after the topic was approved. The scope of the project would be equivalent to that of a proposal expected to take approximately 2-3 years of research time. The proposal is limited in length to 10 pages of single-spaced text (11 point Arial font with 0.5 inch margins), and must include the following elements:

A. Specific Aims. State concisely and realistically what the research described in this application is intended to accomplish and what hypothesis is to be tested. **Do not exceed one page.**

B. Background and Significance. Briefly describe the background to the present proposal, critically evaluating the existing literature and specifically identifying gaps, which the project is intended to fill. State concisely the importance of the research described in this application and relate the specific aims to the long-term objectives. **Limit to two pages.**

C. Research Design and Methods. Discuss in detail the experimental design and procedures to be used to accomplish the specific aims of the project. Describe the protocols to be used and the tentative sequence of investigation. Include the means by which the data will be analyzed and interpreted. Discuss the potential difficulties and limitations of the proposed research and alternative approaches to achieve the aims. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised. **Limit to seven pages.**

D. Literature Cited. In text citations should use a numbered format. The student is strongly encouraged to use Endnote or similar reference management software to insert the references. The literature citation list at the end of the proposal does not count towards the 10 page limit.

E. Appendix. Students may include additional figures in an appendix, limited to 5 pages. The appendix may not be used to circumvent the page limits of the proposal.

4. Timeline: must be completed by the end of the 8th academic term including summers. Lab personnel cannot contribute to the work. The oral exam should be scheduled within 2 weeks of completion of the written proposal. This deadline can be extended only by unanimous approval of the student's graduate committee.

5. During the exam the student would present the proposed research plan and defend the experimental approach. Presentation would involve a seminar format with slides/overheads and would be expected to last no longer than 30 min. Following the presentation, the student would be judged on the soundness of the hypothesis, their understanding of the subject matter, their ability to defend the proposed experimental design, and their general knowledge of the field of environmental and molecular toxicology. The exam is expected to last approximately 2 hours, and is limited in length to 3 hours.

Examination Committee:

The examination committee is the graduate student's Thesis/Dissertation Committee. The committee consists of a minimum of five members of the graduate faculty, including at least two members from the major department and a representative of the Graduate Council Representative (GCR). If a minor is declared, the committee must include a member from the minor department. All committee members must be on the graduate faculty with appropriate authorization to serve on the student's committee. The major professor would serve as the chairperson of the committee to oversee the exam and will ensure that the student independently answers the questions. The GCR chairs the evaluation of the student's performance. The decision concerning whether the student merits advancement to Ph.D. candidacy would be the responsibility of the examination committee.

Evaluation:

The basic question for the committee is whether or not they believe the student is adequately prepared to conduct doctoral level research and has a good chance of successfully completing such research. Following a discussion of the student's performance on the examination, each committee member is then asked to vote on the basic question. It is appropriate for secret ballots to be used, and secret ballots must be used if requested by any committee member.

If there is one negative vote on this question, the student will have passed. If there are two or more negative votes on this question, the student has not passed.

If the committee decision is that the student has not passed the examination, the committee must then decide whether or not to allow the student to take a re-examination. If the majority of the committee votes in favor of a re-examination, the recommendation for re-examination should be recorded. In addition, the committee must set a time interval that must elapse before the re-examination is permitted. If the majority of the committee votes against a re-examination, the recommendation to terminate the student's work toward this degree should be recorded.

Final Oral Examinations

Master's Degree Final Oral Exam

Successful completion of a final oral examination is required for both thesis and non-thesis option master's

degrees in Toxicology.

Non-thesis M.S. Non-thesis option master's students in Toxicology are required to prepare and defend a final report. This report may describe research undertaken by the student, or may be a position paper based on the student's literature review and independent analysis of a current issue in toxicology. The final examination will consist of an oral presentation and defense of the research paper/report by the student to their committee. Not more than half of the examination period should be devoted to the presentation of the research project/final report; the remaining time can be spent on questions relating to the student's knowledge of the major field, and minor field if one is included in the program. For non-thesis master's degree programs, the major professor is responsible for directing and assigning a final grade for the research or culminating project. Other members of the non-thesis committee will assess the student's defense of the project in the final oral examination, as well as the student's knowledge of his or her field, and vote to pass or fail the student. The examining committee consists of three members of the graduate faculty—two in the major field and one in the minor field if a minor is included. When a minor is not included, the third member may be from the graduate faculty at large.

Thesis M.S. The oral exam given to thesis option students will be administered by the student's Dissertation Committee and will be based upon the student's thesis research and general areas of toxicology and appropriate fields related to the student's research project. The student will schedule their oral exam in the form of a public seminar on the OSU main campus presenting and defending their thesis research, with an emphasis on the background and significance of the problem, and the results of the studies conducted to test their hypotheses. Following the public seminar, the student and their Dissertation Committee will meet in closed session to continue the examination. The exam may consist of questions from core areas of toxicology, supporting sciences, and areas in which the student has received specialty training (e.g., elective coursework, as well as questions relating to the student's thesis research. Typically, the oral examination will take 1-2 hours. The oral examination may not be scheduled until the student has received approval from their Thesis Committee.

For thesis option master's candidates, not more than half of the examination period should be devoted to the presentation and defense of the thesis; the remaining time can be spent on questions relating to the student's knowledge of the major field, and minor field if a minor is included in the program of study. Graduate faculty serving on thesis-oriented master's degree programs may contribute to the direction of the student's thesis, will assess the student's thesis and his or her defense of it in the final oral examination, will vote to pass or fail the student, and may sign the thesis when it is in acceptable final form. The examining committee consists of at least four members of the graduate faculty—two in the major field, one in the minor field if a minor is included, and a Graduate Council representative. When a minor is not included, the fourth member may be from the graduate faculty at large. All members of the student's graduate committee must approve the scheduling of the final examination.

Students writing a thesis must have a Graduate Council representative on their committee. It is the student's responsibility to obtain his or her own Graduate Council representative from a list provided by the Graduate School. This must be done prior to scheduling the final exam.

Master's Thesis Requirements

The results from studies conducted using human subjects without obtaining Institutional Review Board approval shall not be used to satisfy master's thesis or doctoral dissertation requirements. For complete details, please refer to <http://oregonstate.edu/research/osprc/rc/humansubjects.htm>.

When scheduling their final oral examinations, thesis option master's students are required to submit the pretext pages of their thesis to the Graduate School at least one week 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 to all their committee members, including the Graduate Council Representative, sufficiently early to permit thorough review of the thesis prior to the student's final oral examination.

Within six weeks after the final oral examination, one printed and one electronic final copy of the thesis, including copies of the abstract, must be submitted to the Graduate School office. If these copies are submitted after the initial six-week period, the student may be subject to re-examination. Please refer to the Graduate School's Web site for complete details (http://oregonstate.edu/dept/grad_school/current/thesis.html).

The student must obtain on the thesis approval page the original signatures of the major professor and the head of the major department. The required Graduate School signature will be obtained by the Graduate School. The thesis will not be accepted for graduation requirements until it has received approval by the graduate dean.

Full information concerning the prescribed style for theses is given in the booklet, *Preparing a Thesis or Dissertation at OSU: A Graduate Student Guide*, available on the Web at http://oregonstate.edu/Dept/grad_school/.

Doctoral Thesis/Dissertation Requirements

Each candidate for the PhD degree must submit a thesis embodying the results of research and giving evidence of originality and ability in independent investigation. The thesis must be a real contribution to knowledge, based on the candidate's own investigation. It must show a mastery of the literature of the subject and be written in creditable literary form. The booklet, *Preparing a Thesis or Dissertation at OSU: A Graduate Student's Guide*, is available electronically on the Web at http://oregonstate.edu/Dept/grad_school/.

The results from studies conducted using human subjects without obtaining Institutional Review Board approval shall not be used to satisfy master's thesis or doctoral dissertation requirements. For complete details, please refer to <http://oregonstate.edu/research/osprc/rc/humansubjects.htm>.

Doctoral Degree Final Oral Exam

The examining committee consists of the student's Thesis/Dissertation committee. The Dissertation/Thesis defense will be scheduled at such a time when all members of the student's Dissertation/Thesis Committee can attend. A Dissertation/Thesis scheduling form must be completed and submitted to OGS *at least 2 weeks* prior to the date of the defense. When scheduling their final oral examinations, doctoral 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).

An open invitation will be made to all EMT and OSU faculty, students, and guests to invite them to the thesis/dissertation defense. In preparation for the Dissertation/Thesis defense, it is the responsibility of the student to contact committee members and other faculty members to determine their availability when scheduling the date. The student will provide all Dissertation/Thesis committee members with a copy of his/her final draft of the thesis/ dissertation at least two weeks prior to the scheduled defense.

The final oral examination consists of a public thesis defense on the OSU main campus followed by a closed session of the examining committee with the candidate. The thesis defense portion of the final oral exam

will be open to all interested persons and should be limited to one hour. After the open portion of the exam, the examining committee should exclude all other persons and continue with the examination of the candidate's knowledge of his or her field and the evaluation of the candidate's performance. Under normal circumstances, the closed portion of final examination should be scheduled for two hours.

In the oral examination, the candidate is expected to defend the thesis and show a satisfactory knowledge of his or her field. If more than one negative vote is recorded by the examining committee, the candidate will have failed the examination. No more than two re-examinations are permitted by the Graduate School, although academic units may permit fewer re-examinations.

Within six weeks of the final oral examination, one printed and one electronic final copy of the thesis and one extra copy of the abstract and title page must be submitted to the Graduate School. Please refer to the Graduate School's Web site for complete details (http://oregonstate.edu/dept/grad_school/current/thesis.html#library). The final printing and presentation of the Dissertation/Thesis must be in strict adherence to format and style stipulated by the OSU Office of Graduate Studies (OGS). Full information concerning the prescribed style for theses is given in the booklet, *Preparing a Thesis or Dissertation at OSU: A Graduate Student Guide*, available on the web at http://oregonstate.edu/Dept/grad_school/. The thesis will not be accepted for graduation requirements until it has received approval by the graduate dean.