

**SYSTEMS ECOLOGY
INTERCOLLEGIATE GRADUATE PROGRAM**

**COLLEGE OF ARTS AND SCIENCES
and
COLLEGE OF FORESTRY AND CONSERVATION**

**Administered in
DIVISION OF BIOLOGICAL SCIENCES (DBS)**

**Graduate Student Guidelines and Requirements for Policies and
Procedures**

Systems Ecology Intercollegiate Graduate Program Guidelines and Requirements

Systems Ecology Intercollegiate Graduate Program Guidelines and Requirements

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2 Overview

This document describes the governing guidelines for the Systems Ecology Intercollegiate Graduate Program (SEIGP or Program), including the processes for application for admission and requirements for completion of a program-of-study for PhD and MS graduate students. All graduate students are administratively considered as students of the SEIGP, which is "co-sponsored" by both the College of Arts and Sciences and the College of Forestry and Conservation (CFC) and administered by the Division of Biological Sciences (DBS). The SEIGP faculty are not restricted to DBS and CFC. Rather, SEIGP faculty come from across the campus representing many departments and schools from a wide range of disciplines. Agreement to join the SEIGP as a graduate student includes acknowledging this document as guidance for the implementation and administration of the Graduate Program and the conduct for students, until it may be modified by the SEIGP faculty.

3 Description of Program

Systems ecology, as an area of study, is an interdisciplinary approach to the study of ecological systems that focuses on interactions and transformations within and among biological systems. A key component of the discipline is recognition of the large effect of humans on most of the earth's ecosystems. The goal of the program is to produce scholars who have a fundamental, interdisciplinary understanding of interactions of physical, chemical and biological factors affecting ecological systems across spatial and temporal scales and the factors affecting coupled natural and human systems. Because ecosystems are often extremely complex, the approach to systems ecology increasingly depends on computational and analytic tools that allow for a synthetic understanding of processes and responses that influence ecosystems and humans. In addition, this type of synthesis requires cross-disciplinary thinking because relevant problems and questions often transcend traditional disciplinary boundaries.

The SEIGP focuses on transdisciplinary approaches to understanding ecological systems by integrating natural and social science perspectives, and fosters faculty and graduate students who desire to synthesize that understanding across multiple scales ranging from genes to ecosystems and minutes to millennia. The main objectives of the SEIGP are to: 1) create knowledge about linkages between natural and cultural attributes at regional spatial scales; 2) enhance the learning experience for graduate students interested in broad questions in large-scale ecology; 3) develop the professional capacity of students; and 4) use the knowledge generated through this program to inform policy, broadly defined, at multiple scales. Research emanating from the SEIGP promotes healthy ecosystems, understanding of system processes across the large landscapes and riverscapes, enhances principles of environmental stewardship, and prepares graduate students to engage in science, policy, and management in an increasingly complex world of interaction between nature and humans.

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4 Admission to Program

4.1 Deadline for consideration

The annual application deadline for consideration for admission the following fall semester is **January 10**. Application materials are available through the UM Graduate School (<http://www.umt.edu/grad/>). Admission to SEIGP at other times is possible but not preferred. All admissions to the SEIGP must be approved by a majority vote of the Graduate Admissions Committee.

4.2 Admission criteria

Admission to the graduate program is competitive and based on the following criteria.

1. Minimum Undergraduate GPA - 3.0; Master's Degree GPA - 3.5 (4.0 scale)
2. GRE scores for verbal, quantitative, and analytical at or above the 60th percentile
3. Strong letters of recommendation
4. Well-articulated statement of applicant's interests and goals
5. Students must document strong support from a SEIGP faculty that has agreed to be the faculty advisor at UM
6. Previous research and/or relevant experience

4.3 Application Procedures

To apply to the SEIGP, a prospective student **must** have a faculty member agree to serve as his/her advisor (see Criteria 5 above). Thus, it is **required** that students contact a SEIGP faculty member directly as part of the application procedure (see Application Procedures 7 below). Many well-qualified students are not offered admission because they have not secured the tacit support of a faculty member.

Applications to the SEIGP must include the following:

1. Completed application form (available on-line from the UM Graduate School <http://www.umt.edu/grad/>)
2. Completed summary sheet of all college course work (available on the UM Graduate School website)
3. Official transcript(s) of all college and university courses completed
4. A short statement (1-2 pages) of interests and goals
5. A Curriculum Vitae (CV) detailing work experience from college entry to present
6. Three letters of recommendation (sent direct to DBS from the author)
7. Statement of support from potential SEIGP faculty advisor
8. GRE scores for verbal, quantitative, and analytical (SEIGP does not require the "Subject Exam")
9. Test of English as a Foreign Language (TOEFL) scores (foreign students only)

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Between the application deadline (10 January) and 15 February, the SEIGP Graduate Admissions Committee will review all applications. Applicants will be evaluated based on the Criteria (see above) and classified into one of four categories: (1) outstanding, nationally competitive candidates who should be accepted in the program; (2) very good candidates who qualify, but only after the top candidate pool has been exhausted; (3) candidates who meet minimum standards; and (4) unacceptable candidates. SEIGP does not allow probationary admission.

4.4 Transfer of UM Graduate Students from other programs to SEIGP

UM Graduate Students that are in other UM graduate programs may transfer to the SEIGP if: 1) their Graduate Advisor (Major Professor) is a SEIGP faculty member in good standing in the program, 2) they meet all the requirements for admission specified in section 4.2 above, and 3) upon entering the program (after January 1, 2013) all SEIGP graduate students must meet program core requirements established by the SEIGP curriculum committee. A student might, in rare circumstances, have a core course waived if the student's committee determines that the student has taken an equivalent course.

4.5 Research Assistantship (RA) support

Most graduate students in the SE program will be supported by research funds controlled by the principal investigators (PI) of grants and contracts. All RA awards are competitive. Student eligibility will be determined based on the admission criteria outlined above, but final selection of the RA will be made by the Graduate Advisor, who most often will be the PI on the grant supporting the RA.

4.6 Response to an offer of RA support

The following is a matter of nationally recognized standards and one of common courtesy. All offers of a research assistantship come from the Major Advisor of the prospective student. Offers may be made as early as **1 February**. Students are under no obligation to respond to this offer prior to **April 15**. Nonetheless, if there is no response to an offer after a two-week period of time, the faculty may withdraw the offer so that it can be made to another student. If a student accepts an offer before April 15, and subsequently desires to withdraw that acceptance, the student may do so by submitting a written resignation of the offer at any time through April 15. After April 15, the student should not accept another offer without first obtaining a written release from the institution to which a commitment has been made.

5 Graduate Advisor and Advisory Committee

5.1 Graduate Advisor

A student's Graduate Advisor (Graduate Advisor synonym = "Major Professor") is the faculty member who agreed to serve as the student's primary advisor and is generally the PI on the grant supporting the student. The Graduate Advisor is the primary individual that helps direct the graduate student through the academic pursuits of the student's program-of-study. The

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Graduate Advisor typically provides office and lab space for the student and oversees the expenditures and resources associated with the student's research.

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5.2 Process for Designation of Graduate Advising Committee

It is the responsibility of the student, in consultation with their Major Professor, to constitute a Graduate Committee (see next section) according to program timelines, and to arrange committee meetings on schedules described in the Appendices of these guidelines. Through discussion and mutual agreement, the student and Graduate Advisor/Major Professor will select an advisory committee before the end of the first semester for M.S. students and the mid-term of the second semester for Ph.D. students. The student is responsible for approaching faculty and requesting that they serve on the committee. The Major Professor, in agreement with the student, then submits the names of potential committee members to the Associate Dean of DBS for approval (Note: this is done using the DBS Graduate Committee Appointment form – See Appendices). The Associate Dean of DBS then forwards the names to the Graduate School for formal approval. By university by-laws, all committee appointments are officially made by the Dean of the Graduate School. Appointment of faculty to a Graduate Committee is subject to change, but should represent the firmest commitment possible. Changes to the Graduate Committee must be approved by the majority of the existing committee and the Dean of the Graduate School.

5.3 Role of Graduate Advisory Committee

The primary role of a student's Graduate Committee is to provide the intellectual expertise necessary to enable a student to devise and implement high quality research within their chosen area of interest. As a member of a student's Graduate Committee, faculty members have the following obligations: (1) Committee members must meet with the student *as a committee* at least once each academic year to assure progress in the student's program-of-study. The results of each committee meeting will be placed into the student's file using the SEIGP Committee Meeting Report form (see Appendices). The function of this annual committee meeting will be to review student progress, to provide substantive input into the intellectual development of a research proposal, to provide guidance regarding the implementation of research, and to ensure that student research meets a high standard of scholarship. It is the primary responsibility of the Major Professor and the student to demonstrate to the committee that milestones and timelines of progress are being met. It is also the responsibility of the Major Professor and the graduate student to schedule and coordinate these annual meetings. (2) By accepting service on the Graduate Committee, committee members agree to read and comment on research proposals or dissertation chapters in a timely manner. Students must work with their Graduate Committee to set specific deadlines for submission to the committee for approval of proposals or dissertation or thesis chapters. (3) Graduate Committee members must communicate to students what their expectations are regarding performance standards on the comprehensive exam, and clearly outline the general areas/topics in which they expect students to have competency. (4) Committee members are expected to attend and participate in the student's thesis or dissertation defense. SEIGP committee members are also expected to attend seminars or presentations by the student scheduled as part of the program requirements.

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5.4 Student – Committee Interactions and Expectations

Students must recognize that faculty face multiple competing demands and deadlines, and thus must schedule review of their materials into the Graduate Committee's faculty workload. Students should submit materials so that committee members have adequate time for review and students have sufficient time to incorporate faculty feedback before deadlines and target dates. Students should scale the time available for review with the size of documents to be reviewed. Students and faculty should develop clear understanding of expectations for such turnaround well in advance of any deadlines. This generally means submitting documents weeks to months in advance of deadlines, depending on the nature of the material being submitted for evaluation or review. Open, frequent, and honest communication is the basis for positive working relationships between students and faculty advisors. Disagreements often can be traced to a failure to raise concerns or speak frankly about points of dissatisfaction as they arise. Communicating about such issues in a productive and respectful way is an important part of professional life. Students should expect respectful, frank, and critical feedback on their academic performance and professional effectiveness, based on the academic standards of the SEIGP and the professional judgments of the Major Professor and Graduate Committee members. At the same time, committee members should expect to hear from students about aspects of the faculty-student relationship that are counterproductive to student success, if they arise.

Students are strongly encouraged to consult with their Major Professor about concerns or problems at the earliest opportunity. Indeed, discussion with the faculty advisor must be the first step in addressing any academic, research, or professional concern. Subsequently, unresolved issues should be discussed with a member of the student's Graduate Committee; students also may seek informal guidance from another faculty member. Students wishing to pursue an issue further should consult with the SEIGP Program Director. Student-faculty interactions that grow to the stage of conflict, or unresolved student concerns about the quality of faculty advisement, should be brought formally in writing to the attention of the SEIGP Program Director. If the Program Director cannot resolve the issue, it should be taken to the Associate Dean of the Division of Biological Sciences.

5.5 Committee membership

SEIGP Graduate Committees must adhere to all rules and limitations of the Graduate School and of the standards of CAS, CFC, and DBS (see the Graduate School policies at <http://www.umt.edu/grad/>). Master's Degree and PhD degree Graduate Committees differ in several ways, as described herein. Qualifications for serving as Major Professor of a SEIGP graduate student or serving on Graduate Committees are described in the SEIGP Faculty Guidelines document.

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5.5.1 M.S. committees

Master's Degree Graduate Committees must consist of at least three members; two must be SEIGP faculty members (one of whom is the Major Professor) and one must be a UM tenure-track faculty member who is not in the SEIGP graduate program. By UM Graduate School regulations, this third, non-SEIGP committee member must be a UM employee because their additional responsibility as a committee member is to ensure that the student is held to UM academic standards, that the student is treated fairly by all committee members, and that the student's progress is not unduly delayed by failure of other committee members to act in a timely manner. Occasionally, a fourth committee member may serve at the discretion of the Dean of the Graduate School. If there are more than 3 members on the committee, SEIGP faculty must compose at least 50% of committee composition.

5.5.2 Ph.D. committees

Ph.D. Graduate Committees must consist of at least five faculty members; three members must be SEIGP faculty members (one of whom is the Major Professor), the fourth member must be a UM tenure-track faculty member who is not in the SEIGP graduate program, and the fifth member may come from inside or outside of the SEIGP (further discussion below). By UM Graduate School regulations, this fourth (non-SEIGP) committee member must be a UM employee because they have the additional responsibility as a committee member is to ensure that the student is held to UM academic standards, that the student is treated fairly by all committee members, and that the student's progress is not unduly delayed by failure of other committee members to act in a timely manner. The fifth committee member may come from within the SEIGP faculty, other graduate programs at UM, or from a university or agency outside of UM. If there are more than 5 members on the committee, SEIGP faculty must compose at least 50% of committee composition. The fifth member of the committee may be either a UM faculty member or someone from outside of UM who has been approved by the Dean of the Graduate School as qualified by training, experience, and/or degree held to assist in the guidance and evaluation of the research and dissertation. A committee member that is not a UM faculty, cannot vote on whether to pass the student unless the member has a Ph.D. and/or is approved by the other members of the Graduate Committee.

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6 Coursework and Academic Standards

6.1 General Coursework

Prior to the start of the first semester at UM, the entering SEIGP graduate student must meet with their Major Professor to select the first-semester course work. Before mid-term of the first semester in residence, each SEIGP student must arrange a meeting to examine the student's previous and proposed coursework. For M.S. students, this meeting will be with the student's Graduate Committee. For Ph.D. students, this meeting will be with the student's Major Professor and two additional SEIGP faculty members who are likely to be appointed to the student's Graduate Committee. Faculty will consider the student's undergraduate background and GRE scores to identify any deficiencies in coursework. From this, the committee will formalize a coursework program-of-study for the next semester. Oversight for course work in subsequent semesters of the PhD student will be the purview of the fully constituted Graduate Committee. The Graduate Committee will also guide the student in selecting courses to meet career or other educational goals and provide the necessary background for research and desired area of expertise. Selection of coursework to be taken must meet SEIGP core requirements and Graduate School requirements. Elective course work shall be suggested by the student in consultation with the Major Professor and presented to the committee. The Graduate Committee shall have the final approval of proposed course work that adheres to the current SEIGP curriculum requirements as set by the Curriculum Committee. A student might, in rare circumstances, have a core course waived if the student's committee determines that the student has taken an equivalent course. The results of all graduate Committee meetings must be placed in the student's file using the SEIGP required forms (see Appendices).

6.2 Specific Coursework

BIOS 532 (Fundamentals of Ecosystem Ecology) and BIOS 534 (Integrated Systems Ecology) are required components of both the M.S. and Ph.D. degrees in SE. Both courses are offered on an annual basis (BIOS 532 generally in autumn; BIOS 534 generally in spring). Both courses must be successfully completed by all SE students in partial fulfillment of their respective degrees. In addition, all Ph.D. students in Systems Ecology must select and successfully complete one or more of the following modeling courses in partial fulfillment of their doctoral degrees. It is possible that some other existing or new courses may be deemed appropriate to fulfill the modeling requirement, but any proposed substitutions must be approved by the student's committee and/or the Director of SE.

G 538 (FORS 538) Applied Statistical Modeling in Ecology 3cr. Offered in the Fall. Prerequisites: STAT451/452 or equivalent. This is an applied course covering advanced statistical modeling techniques using examples from forestry, ecology, and the environmental sciences. Covers data management, visualization, and scripting with *R*, an open source data analysis and statistics platform. Explores various parametric and semi-parametric modeling strategies that allow for non-linear response functions and/or non-Gaussian response distributions. Estimation and inference in the context of generalized linear models, generalized

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additive models, and classification and regression trees are discussed using examples from the scientific literature. Lays the foundation for subsequent graduate-level analytic coursework.

G 587 (GEOG 587) Digital Image Analysis and Modeling 3 cr. Offered spring odd-numbered years. Prereq., GPHY 487 (GEOG 487) or FOR 351 or consent of instr.; coreq., GPHY 589 (GEOG 589). Advanced topics in image analysis (e.g. hyperspectral images and pattern-recognition-based classification) and foundations of simple raster-based models.

G 532 (NRSM 532) Forest Ecosystem Analysis 3 cr. Offered autumn. Prereq., FORS 330 (FOR 330) or equiv. Current research on important processes in forest ecosystems, including carbon, water and nutrient cycles, with emphasis on recent computer simulation models.

G 595 (FORS 595-01) Introduction to Landscape Ecology 3 cr. The purpose of this course is to provide students with an introduction to the discipline of landscape ecology with a focus on applications within ecology and natural resource management. In addition to studying the fundamentals of landscape ecology through reading primary literature, students will gain exposure to a range of applied tools including GIS, environmental remote sensing, state transition models (Markov models), neutral models, FRAGSTATS, and species distribution models. Another stated objective is to engage students in student-directed learning within an inter-disciplinary environment to improve and refine student's oral and written communication skills.

G 562 (WILD 562) Wildlife Habitat Modeling 3 cr. Offered autumn, odd years. Prereq., consent of instr. A survey of theory and applications in the study of resource selection by animals.

G 576 (WILD 576) Ecological Modeling and Analysis 2-3 cr. Offered intermittently. Prereq., consent of instr. Investigation of mathematical and statistical problems in ecology and wildlife biology. Specific material each semester is determined by student interest.

G 573 (GEOS 573) Applied Groundwater Modeling 3 cr. Offered autumn. Prereq., GEO 420 (GEOS 480) or consent of instr. Development of numerical modeling techniques, finite difference and finite element modeling of groundwater flow systems. Application of standard 2D and 3D models to field problems.

G 585 (GEOS 585) Hydrologic Modeling 3 cr. Advanced topics in computer modeling and model analysis including calibration, sensitivity and uncertainty analysis. Apply modeling techniques to investigate a real world problem. Along with the overarching goals, in this course we will get familiar with computer environments and how computers process numbers and what it means for numerical modeling. We will revisit some linear algebra concepts useful to understand the contents of the course and understand the literature and we will get familiar with some data pre- and post-processing tools.

G 577 (CSCI 577) Computer Simulation and Modeling 3 cr. Co-convene with CSCI 477. Prereq., M 172 (MATH 153), CSCI 135 (CS 132), or consent of instr. Matrix languages. ODE solving; Euler-Richardson, Runge-Kutta, PDE solving; finite differences, finite elements, multi-grid techniques. Discrete methods for solution, renormalization group method, critical phenomena. Emphasis on

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presentation of results and interactive programs. **Conduct, document, and present graduate level research involving computer simulation methods.** Credit not allowed for CSCI 477 (CS 477) and this course.

UG 445 (MATH 475) Statistical, Dynamical, and Computational Modeling 4 cr. Offered autumn odd-numbered years. Prereq., consent of instr. An interdisciplinary course on the integration of statistical and dynamical models with applications to biological problems. Linear and nonlinear models, estimation, systems of ordinary differential equations, numerical integration, bootstrapping, MCMC methods. Intended both for students in mathematics and the natural sciences.

In addition, the SECC suggests that the following **Statistics Courses** may be deemed appropriate for some SE students and thus be recommended by their M.S. or Ph.D. Committee:

G 503 (FORS 503) GIS: Methods and Applications I 3 cr. Offered autumn. Prereq., consent of instr. Introduction to the theory and development of statistical gradient and predictive distribution models in the resource and conservation sciences. Course will develop climatic, edaphic, biophysical, and inventory data sources for use in predictive distribution modeling. Survey of multiple modeling approaches, limitations and assumptions, and applications in the resource and conservation fields. Emphasis on the integration of GIS and raster analysis methods with spatial and non-spatial statistical techniques.

G 572 (WILD 572) Model Selection and Inference 3 cr. Offered autumn odd-numbered years. Prereq., one semester of 400-level statistics/biometry or consent of instr. Comparison and overview of statistical approaches commonly used in applied ecology, including frequentist/ANOVA models, information theoretic and Bayesian methods.

G 538 (WILD 576) Ecological Modeling and Analysis 3cr. Offered in the Fall. Prerequisites: STAT451/452 or equivalent. This is an applied course covering advanced statistical modeling techniques using examples from forestry, ecology, and the environmental sciences. Covers data management, visualization, and scripting with **R**, an open source data analysis and statistics platform. Explores various parametric and semi-parametric modeling strategies that allow for non-linear response functions and/or non-Gaussian response distributions. Estimation and inference in the context of generalized linear models, generalized additive models, and classification and regression trees are discussed using examples from the scientific literature. Lays the foundation for subsequent graduate-level analytic coursework.

6.3 Credit requirements

All course work must be approved by the Graduate Committee. Master's students must complete a committee-approved program of 30 (or more) semester credits of graduate-level coursework. As many as 10 credits may be thesis (SYEC 599). At least 10 credits of the non-thesis coursework must be at the 500 level. Ph.D. students must complete 60 semester credits of graduate-level coursework (as many as 20 may be dissertation, SYEC 699). The other 40 credits may include coursework, graduate seminars, or independent research (SYEC 596). There are no restrictions on the distribution of these 40 credits, however at least 20 credits of the non-thesis coursework must be at the 500 level or above, and the proposed coursework must

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be approved by the advisory committee. No more than 30 credits from a Master's Degree can be applied to the PhD credit requirements.

All students supported via a Research (RA) or Teaching Assistantships (TA) in SE should register for nine credits each semester during the academic year. As per the University of Montana's continuous enrollment policy, graduate degree candidates must register for at least three credits each fall and spring semester until graduation (Please see section 8). In some cases, students can petition the Associate Dean of the Graduate School to reduce the registration requirement to one credit (*e.g.*, students who have completed most requirements but have not submitted a final version of the thesis or dissertation).

6.4 Transfer Credits

Students may petition the Graduate School for the transfer of graduate credits from another institution into their graduate program at UM (see the Graduate School student guidelines for credit transfer limitations). After a semester of satisfactory work at UM in a graduate program, the student can ask their Graduate Committee to make a written request to the Graduate School to accept transfer credits. An official copy of the student's transcript of the courses for transfer and catalog course description should accompany the recommendation. Students are advised to petition for credit transfer as soon as feasible to avoid complications at graduation. See UM Graduate School credit requirements as these may change from year to year.

6.5 Academic standards

Graduate students must maintain a 3.0 grade-point average in courses taken for graduate credit. No grade lower than a B will be accepted toward any SEIGP M.S. or Ph.D. degree requirement. Letter grades must be obtained in all courses used to meet credit requirements except seminars, research, thesis, and dissertation, which are graded on either an N (continuation) or Credit/No credit basis. Pass grades are not included in grade point calculations but may apply toward degree requirements when earned in courses offered only on a Credit/No credit basis. See university requirements for full-time graduate students funded by RAs as these may change from year to year. It is the student's responsibility to comply with university requirements. Advice can be sought from the Major Professor, the Program Director of SEIGP or from the Associate Dean of DBS.

6.6 Grant proposals

Students are expected to write and submit grant proposals. Especially for graduate students seeking a Ph.D., learning to write and acquire research funding is considered an integral part of the Ph.D. learning process. Ph.D. students will be highly encouraged to develop grant proposals; however, students are not permitted to submit proposals. Submission of grants for sponsored research can only be done by faculty as a matter of policy of the UM.

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7 Continuous Registration and Leaves of Absence

The Graduate School requires that graduate students register for credits every fall and spring semester. The number of credits should be that deemed commensurate with use of facilities and faculty time. Students must register for a leave-of-absence if they do not plan to be continuously registered. Students who leave the SEIGP for two or more semesters without approval by the Graduate School will be dropped from the program. Re-admission is allowed through petition or reapplication through the Graduate School.

8 Seminars

8.1 Focus Group Seminars

All graduate students and faculty members are expected to participate regularly in a programmatically approved seminar course in which formal seminar presentations are required. These seminars may be organized by laboratory groups or by topics of research of faculty members. All new graduate students (M.S. and Ph.D.) are required to present a short 20 – 30 minute research proposal to this seminar group during their first year in the program.

8.2 Graduate Student Presentations

M.S. students are encouraged to present at least one talk or poster about their research at a regional or national scientific meeting prior to or associated with the completion of the degree program and graduation. Ph.D. students are expected to present an oral presentation of their research at a national or international scientific meeting during their degree program.

9 Research Planning and Proposals

9.1 Formal research proposal

Each student is required to complete a formal research proposal that presents the theoretical and empirical framework within which the study has been designed and will be carried out. Specifically, the proposal should consist of a title, an introduction to the research problem, how the problem fits into a broader conceptual framework defined by existing scientific literature, a justification of its importance, the specific objectives, questions and hypotheses, methods (including details about design and proposed methods of analysis), significance, and a timetable.

M.S. candidates must obtain Graduate Committee approval of a research proposal no later than 1 April of their first academic year. Students must also present an oral defense of their thesis proposal to their committee.

Ph.D. students must obtain Graduate Committee approval of a preliminary research proposal (i.e. pre-proposal) no later than 1 April of their first academic year. The committee approval of the Committee Required Coursework form should be completed in association with approval of this pre-proposal. The final dissertation proposal must be approved by the student's Graduate

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Committee by 1 April of the second academic year. This proposal must be well structured; for example, in the format of an NSF Dissertation Improvement Grant.

After approval by the Graduate Committee, for either M.S. or Ph.D. students, a copy of the proposal signed by all committee members must be placed in the student's file. Ph.D. students must also submit a Major Professor-signed copy of the proposal for file in the DBS Administrative Office.

In approving the proposal, the Graduate Committee agrees that successful completion of the project will be sufficient research for a satisfactory thesis or dissertation. Any substantive changes made after Graduate Committee approval require discussion and approval by committee in a formal committee meeting and clearly described in context of the original proposal in the committee meeting summary.

10 Foreign Language Requirement

There is no foreign language requirement for the MS or Ph.D. degree. However, familiarity with foreign journals, meetings in foreign languages, and especially an experience in a foreign country (e.g. attending a conference, course, or participating in a foreign research program) is strongly encouraged for Ph.D. students.

11 Annual Review of Student Progress

It is the primary responsibility of the Major Professor and the Graduate Committee to assure that students are making adequate progress. Graduate Committees shall make evaluation annually at the end of the spring semester to judge whether the student is making satisfactory progress. In the event that a student has not met required levels of performance or deadlines, the student will be warned and placed on probation. Students placed on probation at the end of the spring semester will be given very specific instructions for meeting goals of satisfactory progress and given a reasonable deadline by the Graduate Committee. If the student fails to complete tasks or be in compliance with program standards by the following annual review, the student will be judged to be making unsatisfactory progress and the student will be dropped from the program.

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12 Comprehensive Exam (Ph.D. only)

12.1 Description

The Ph.D. student must pass both a written and an oral comprehensive examination that deals with his/her research specialization and cognate areas. Although the examination is designed to test the candidate's readiness to continue with the research phase of his/her graduate studies, examination is to test knowledge broadly across the topic of systems ecology. Testing the student's general mastery of the field is regarded as an essential part of the examination. This exam should represent a breadth of knowledge including knowledge of minor or cognate fields of study.

12.2 Timing

The comprehensive exam must be completed by the end of fall semester of the student's 3rd year in the program or after the student has taken all of the coursework required by the dissertation committee. The conceptual emphasis of the exam must be identified by the student's committee by the end of the student's second year in the program on the basis of the student's major and minor fields of interest.

12.3 Committee composition

The comprehensive exam is conducted by an Examination Committee appointed by the Dean of the Graduate School on recommendation of the Associate Dean of DBS. This committee usually is comprised of the Graduate Committee. However, the Chair of the Examination Committee cannot be the Major Professor. The student and his/her Major Professor are responsible to make arrangements for an Examination Committee Chair. The Examination Committee Chair will construct the written exam based on questions submitted by the committee members and ensure timely progress towards the oral portion of the exam.

12.4 Exam format

The format includes a week-long, written portion, where the student is expected to synthesize information from the literature concerning the questions offered. The written exam will cover detailed Ph.D. level questions related to the student's general area of research interest. The Examination Committee will, in advance, provide the student with a list of topics, journal articles, books, etc., to assist the student in preparing for the exam. These materials may serve to focus the exam, but neither student answers nor faculty questions are rigidly bounded by the provided materials. The purpose of the exam is to specifically evaluate the student's mastery of his/her research focus and generally to evaluate literacy in systems ecology. Faculty will specify whether his/her question(s) is to be open- or closed-book. Prior to the exam, each committee member will submit questions to the Examination Committee Chair. The Chair will compile the questions and attempt to minimize overlap and make sure that the exam has sufficient breadth. The entire exam will be distributed to all committee members for approval before it is administered to the student by the Chair on the arranged dates. The Chair will typically allow the student to have one day to complete the questions from each committee member, although the exact format of the exam shall be determined by the Examination Committee.

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After the Committee has read the written portion of the comprehensive examination, the Chair will poll the Examination Committee members to decide whether the student has passed the written portion of the exam and can therefore proceed with the oral portion. If there is any question or hesitancy by any one member of the Committee, the Chair will hold a meeting of the Committee for clarification, further discussion or additional material may be pursued.

The written exam has three levels of rating; Pass, Marginal, Fail. a) Pass –Student progresses to the oral exam. b) Marginal – The examination demonstrates weakness in one or more areas. The committee will meet to discuss the next step, but it may require that portion of the exam in which performance was determined to be insufficient to be re-written. The committee may postpone for a reasonable time the oral examination until any rewritten components of the exam are determined to receive a Pass rating. c) Fail – A complete failure of the written exam will require that the student retake the exam in its entirety. A second failure of the written exam will result in termination of the student’s program.

Upon successful completion of the written exam, the student will take an oral exam at least three days after and no more than 14 days after completing the written portion of the exam. Students can expect questions on the oral exam that are derived from the material they have been asked to master. The oral examination explores in depth the areas presented in the written questions, but is not restricted to those areas. The oral examination is a minimum of two hours and restricted to no more than three hours in length. By regulation, the examination is open to all members of the UM faculty but only committee members may ask questions. All non-committee members and the student are excused before the vote is taken regarding pass or fail of the oral portion of the exam.

Normally, the vote for admission to Ph.D. candidacy will occur at the end of the oral examination. Each Examination Committee member will rate the student’s performance across both written and the oral portions of the examination in one of three categories: a) Pass – No further work is necessary. Student progresses to candidacy. b) Conditional pass – The examination demonstrates weakness in one area. The student is required to make up for this deficiency before progressing to candidacy. At the examination, the Examination Committee will specify the tasks required for the student to progress to candidacy, and the criteria for evaluating their completion. Typically, students in this category are required to take an additional course or complete additional written work. c) Fail – The examination may be rescheduled if the student fails, but the Examination Committee retains the right to recommend termination of the student’s program upon majority opinion at any time.

A student can pass with one negative vote. If the student fails the examination, one repeat oral examination is permitted. A suitable interval between exams shall be determined by the Examination Committee. Failure to pass the exam after the second attempt will necessitate dropping the student from the program.

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13 Admission to Candidacy

At least six months before the Master's or Ph.D. degree is to be awarded, and after successful completion of the comprehensive exam (for Ph.D. students), the student must submit to the Graduate School three copies of the Application for Graduation Form (available from <http://www.umt.edu/grad/>) and meet other Graduate School requirements.

14 Completion and Defense of M.S. Thesis or Ph.D. Dissertation

14.1 Thesis/dissertation content

The thesis or dissertation must embody the results of independent research by the candidate. It must be an original contribution to knowledge appropriate for publication in a peer-reviewed journal. The difference between a thesis and dissertation is not clear cut, but, generally speaking, lies with the extent to which the effort is a polished product and the degree to which a student is contributing new understanding to an area of research. Many students write their thesis or dissertation as a series of papers, and some submit such papers to journals before graduating. A paper or a series of papers accepted by one or more journals does not, however, ensure that the body of work will be automatically accepted by the committee as sufficient for degree requirements. The Graduate Committee must look at the entire body of work and determine if it meets the programmatic standards.

14.2 Deadlines and approvals

The student shall determine well in advance of a desired thesis or dissertation defense date the deadlines needed by the faculty serving on the Graduate Committee. This may vary due to circumstances affecting faculty workloads. However, as a general guideline, students are advised that six weeks is not uncommon as a needed time prior to the anticipated defense date so that faculty can review the thesis or dissertation prior to approval for defense. The Major Professor of the student shall conduct a Graduate Committee meeting to determine if the thesis or dissertation is ready to be defended. This can be a virtual meeting via conference call. Each committee member must approve the thesis or dissertation for defense, after which it is submitted to the SEIGP faculty for their approval via pdf file at least one week prior to the defense. The signature of the Major Professor and all Graduate Committee members should be on the title page indicating that they have agreed that it is ready for defense. Unless the SEIGP Program Director receives a written objection by one or more faculty, the thesis or dissertation defense can take place on the scheduled day. In the event there is an objection, the Graduate Committee will meet to discuss the nature of the objection, and vote for or against proceeding with the defense. If after discussion two or more objections to proceeding with the defense are recorded in the meeting, the matter will be taken up by the SEIGP Graduate Education Committee. A 2/3 majority of the Graduate Education Committee must approve to proceed with the defense. Public notice of the defense should be posted at least one week prior to the defense, but it is highly recommended that students post their defense title, date, time and place 3-4 weeks in advance to maximize faculty and graduate student participation in the oral presentation of the defense seminar.

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14.3 Defense

Both M.S. and Ph. D. students are required to conduct a public presentation of his/her thesis or dissertation. The public presentation is immediately followed by a public question-answer period. Following the public presentation, the student's Graduate Committee conducts an oral examination, which is open to all faculty members of the University. Students are required to "defend" the approach, methods, analysis, and conclusions related to their research. The oral portion of the defense should consist of a 40-45-minute presentation followed by a 10-15 minute period for questions from the faculty and others attending the defense. A one-hour block of time should be reserved for the public defense. Following the public presentation, the Graduate Committee will meet in "closed session" with the candidate for further examination of the dissertation or thesis. The student should schedule at least 2 hours for the closed session portion of the defense.

In case of failure, one repeat defense at least one month after the initial defense is permitted. A unanimous vote of a satisfactory performance is required by a Master's Graduate Committee for a pass. A Ph.D. student may not have more than one negative vote from the Graduate Committee to pass the defense. However, any SEIGP faculty member, from the Graduate Committee or not, can bring into question the adequacy of the thesis or dissertation. It is the responsibility of the SEIGP Program Director, working with the objector and the Major Professor to evaluate the adequacy of the objection and means of satisfactory completion. Failure to resolve the issue will be taken to the Associate Dean of DBS who, in concert with the SEIGP Program Director will consult with the Dean of CAS and the Dean of CFC for the purpose of final resolution.

Following a successful defense, which often results in required modification to the dissertation or thesis, the student must submit before the deadline set by the Graduate School, electronic copies of the thesis or dissertation, and meet all Graduate School deadlines and requirements. For guidance in preparing a thesis or dissertation, as well as current binding fees and forms required, consult the Graduate School's on-line instructions (<http://www.umt.edu/grad/>). The student is encouraged to have an additional copy of the thesis/dissertation bound by a commercial binding service for his/her Major Professor.

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15 Supplement A

SEIGP DEADLINES FOR GRADUATE DEGREE REQUIREMENTS	
Selection of Graduate Committee	M.S. students: Before end of first semester Year 1 Ph.D. students: Before end of second semester Year 1
Approved Coursework Form	M.S. students: Before end of first semester Year 1 Ph.D. students: Before end of second semester Year 1
Approved thesis proposal, research budget, and research schedule	M.S. students: Before end of second semester Year 1 Ph.D. students: (a) Preliminary research proposal approved before end of second semester Year 1; (b) Final Research proposal approved before end of second semester second academic year
Ph.D. Comprehensive Exam	The comprehensive exam must be completed by the end of the first semester of the student's 3rd year in the program
Admission to Candidacy	M.S. students: Graduation applications must be filed prior to awarding of degree based on Graduate School required timelines Ph.D. students: Application must be filed after completion of the Ph.D. comprehensive exam and 6 months before degree award
Thesis or dissertation draft, approved by major professor, made available to student's Graduate Committee	Students must seek guidance from the Graduate Committee faculty, but may vary so seek guidance early in the semester of intended defense.
Committee-approved thesis or dissertation made available to SEIGP faculty (pdf)	At least one week prior to defense
Committee-approved thesis or dissertation made available to the Graduate School	Follow Graduate School Regulations

16 Supplement B: SE Graduate Student Forms

1. Committee Meeting Report Form
2. Required Coursework Form
3. Student Progress Summary Form
4. Annual Review Form
5. Result Of Annual Review Memo Format

**SE GRADUATE STUDENT
COMMITTEE MEETING REPORT**

STUDENT: _____ PhD MS

Committee Members Present:

(Committee Chair)

DATE: _____

ACTIONS TAKEN:

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SE GRAD STUDENT REQUIRED COURSEWORK FORM

Name

MS PhD

Course Work Approved by Committee:

Committee Signatures:

Date Approved:

SE GRAD STUDENT PROGRESS SUMMARY FORM

Name: MS PhD

Date Entered Program:

Faculty Advisor

Other Committee Members (date appointed _____):

DATE COURSEWORK APPROVED BY COMMITTEE:

THESIS OR DISSERTATION PROPOSAL:

Preproposal title & date approved by committee:

Proposal title & date approved by committee:

COMPREHENSIVE EXAM:

Area of Conceptual Emphasis:

Date completed:

RESULTS OF PREVIOUS REVIEWS:

Yr 1: _____

Yr 2: _____

Yr 3: _____

Yr 4: _____

Yr 5: _____

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SE GRADUATE STUDENT REVIEW

Date:

STUDENT: _____ MS PhD

Major Advisor:

All other committee members:

Dates of committee meetings this academic year:

Date Entered Program:

STATEMENT OF ACADEMIC PROGRESS:

Include the following information (i.e., list by semester: courses completed, courses in progress this semester, and courses required by your committee that need to be taken. Include in () the number of credits for each course. For courses completed include the letter grade received.

Semester	Courses completed		Credits	Grade
	Courses in progress			
	Courses needed			

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SE GRADUATE STUDENT REVIEW –

STUDENT:

ACHIEVEMENTS SINCE ADMITTANCE: (presentations, publications, grant applications submitted, grants received, fellowships, awards, etc.)

STATEMENT OF RESEARCH PROGRESS:

Date approved by committee:

Brief statement of research progress to date (list as bullets please)

Research Goals for the next year:

ANTICIPATED SEMESTER/YEAR OF DEFENSE AND COMPLETION:

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**SE GRADUATE STUDENT REVIEW –
STUDENT:**

FOR PhD STUDENTS ONLY

COMPREHENSIVE EXAM: (Date completed or scheduled to be taken):

RESEARCH ADVISOR'S RECOMMENDATION:

Date:

Advisor Signature

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RESULT OF ANNUAL REVIEW MEMO FORMAT

DATE:

TO:

FROM: _____, Director, SE Intercollegiate Graduate Program

RE: Annual Review of Grad Students

Option 1: The faculty has completed your annual review as required by the SE Graduate Regulations. We evaluate each graduate student to determine if his/her progress in the program is satisfactory or unsatisfactory. I am pleased to tell you that the faculty has concluded that you are making satisfactory progress as a graduate student. Please ask me or your major professor if you have any questions.

Option 2: The faculty has completed your annual review as required by the SE Graduate Regulations. We evaluate each graduate student to determine if his/her progress in the program is satisfactory or unsatisfactory. The faculty has concluded based upon your records that you are making satisfactory progress as a graduate student contingent on your fulfilling the following requirements:

If these conditions are not completed by the specified time then you will be considered to be making unsatisfactory progress. Students who are making unsatisfactory progress are not eligible for financial support from the university. You will have one additional semester to correct the conditions responsible for your unsatisfactory progress. If these conditions are not completed at that time, the faculty will reevaluate your continuation in the graduate program. Please ask me or your major professor if you have any questions.

Option 3: The faculty has completed your annual review as required by the SE Graduate Regulations. We evaluate each graduate student to determine if his/her progress in the program is satisfactory or unsatisfactory. The faculty has concluded that you are **not** making satisfactory progress as a graduate student. You must fulfill the following requirements in order to be considered to be making satisfactory progress:

If these conditions are not completed by _____ the faculty will recommend to the Graduate School that you be dismissed from the graduate program. Please ask me or your major professor if you have any questions.