

PURDUE UNIVERSITY
ENVIRONMENTAL & ECOLOGICAL ENGINEERING

GRADUATE PROGRAM HANDBOOK

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I. Introduction

Welcome to the graduate program in Environmental and Ecological Engineering (EEE) at Purdue University! The purpose of this handbook is to acquaint prospective, new, and current graduate students with information on admissions to and graduation requirements for the EEE graduate program. Useful information about the EEE graduate program, including this document, can be found online at: <https://engineering.purdue.edu/EEE> or by contacting the EEE Graduate Program Office at (765) 496-0545 or emailing eeegrad@purdue.edu.

The mailing address is:

Environmental & Ecological Engineering
Potter Engineering Center, Room 364
500 Central Drive, Purdue University
West Lafayette, IN 47907-2022

Degree Options

The following graduate degrees are awarded:

MSEEE Degree. All students admitted to the Master of Science in Environmental and Ecological Engineering (MSEEE) program are eligible to receive the MSEEE degree from the Graduate School upon completion of all degree requirements. These students may choose either the

thesis option (21 credits of coursework and 9 credits of research leading to a thesis document) or the Professional MS (i.e. non-thesis option, 30 credits of coursework).

Combined BS + MSEE Degree. This non-thesis option is available to Purdue University (main campus) undergraduate students majoring in Environmental and Ecological Engineering (BSEEE), Agricultural Engineering (BSAE), Biological Engineering (BSBE), Chemical Engineering (BSChE), Civil Engineering (BSCE), Earth, Atmospheric, and Planetary Science (BS in Atmospheric Science, Environmental Geoscience, Geology and Geophysics, and Planetary Science), Industrial Management (BSIM), Materials Engineering (BSMSE), and Natural Resources and Environmental Science (NRES). Applicants must have an overall GPA > 3.25 and must apply to this combined degree program before matriculating into their seventh undergraduate semester (i.e., before entering their senior year). Students enrolled in this combined degree program must complete 9 credits of approved graduate level coursework during their senior year, which will be included on both their undergraduate plan-of-study and on their MSEE plan-of-study. The appropriate BS degree will be awarded after satisfactory completion of the respective degree requirements. The student will have graduate status beginning in semester 9. Similar programs at other universities are often referred to as 4+1 BS/MS programs.

Combined MSEE + MBA Degree. This option requires a separate application and admission to the Krannert School of Business (please refer to their website for specific processes and requirements). The combined degree program includes 9 credits of graduate level business coursework applied toward the 30 credit total required to earn the MSEE. Additionally 9 credits of engineering coursework can be applied to the MBA degree requirements.

Ph.D. Degree. All students admitted to the Doctor of Philosophy program are eligible to receive the Ph.D. degree from the Graduate School upon completion of all degree requirements. All Ph.D. students must conduct research, and compose and successfully defend a doctoral dissertation.

II. Admission Process

The general requirements for admission to the graduate program are: (i) satisfactory completion of a baccalaureate degree at a college or university of recognized standing, and (ii) an undergraduate cumulative grade point average of at least 3.0 on a 4.0 scale (or equivalent). For international applicants that are non-native English speakers, there is an additional requirement of documented English language proficiency as stated below. Because of the multidisciplinary nature of the EEE degree program and the diversity of curricular topics and if the associated research conducted by the faculty, no specific undergraduate preparation is stipulated. However, basic deficiencies in math or science may be grounds for denial of admission, or grounds for required completion of remedial coursework during the first year of study. In such cases, the additional coursework requirements may be stipulated in the admissions letter, but ultimately will be stipulated by the student's advisory committee.

Students are referred to the EEE webpage (see above) where all information regarding requirements for admission to the EEE graduate program is posted. It is important that each applicant realize that the requirements for admission stated above are the minimum requirements, and failure to satisfy the minimum requirements may lead to automatic denial of admission. Further, because of capacity limits, fulfilling these minimum requirements does not guarantee admission to the program. Admission is a competitive process based on (i) the student's previous record, as documented in the application materials, and (ii) interests, as they relate to programmatic research, teaching, and outreach interests.

Admission Timeline:

July 15 Applications for combined degree program, including completed form GS-27
October 15 Applications for Spring Admission
December 15 Applications for Fall admission and potential fellowship consideration
May 15 Applications for Fall admission, Professional MS only

Required documents for admission include:

- (i) An online application submitted through the Graduate School at: www.purdue.edu/gradschool
- (ii) Official copies of all transcripts from all prior post-secondary enrollments (initially, unofficial copies are sufficient)
- (iii) A Statement-of-Purpose, which is an essay of approximately 350-500 words that states clearly and succinctly: (1) the reasons for seeking graduate study in Environmental and Ecological Engineering at Purdue University, (2) the applicant's long-term career goals, and (3) for students wishing to conduct research, any past, current, or future research interests.
- (iv) Current resume
- (v) Three recommendation letters
- (vi) For non-native English speaking applicants, English proficiency test scores (TOEFL or IELTS).

English Proficiency

Domestic and Native English Speaking Applicants: No specific admission requirement.

All non-Native English Speaking International Applicants: Either a TOEFL or IELTS Test of English is required, with the minimum scores (before the application is reviewed) provided below:

- TOEFL for Non-Native English Speakers: For unconditional admission consideration, applicants must meet one of the following requirements:
 - Minimum Paper-Based Test (PBT) Score Required: 575
 - Minimum Internet-Based Test (IBT) Overall Score Required: 90, with the following minimum section scores required: Reading: 19, Listening: 14, Speaking: 18, Writing: 18

- IELTS (Academic Module): An alternative to the TOEFL, scores of 6.5 or higher will be accepted

For any non-native English-speaking international student that wishes to be hired as a teaching assistant with sole classroom teaching responsibility, passing Purdue's Oral English Proficiency Test (administered by OEPT), or successfully completing ENGL 62000, is required.

Admission to the Combined BS + MSEE Degree Program

Students are eligible to apply to this program if they are:

- (i) Undergraduate students on Purdue's Main Campus currently in semester 6 (with two additional semesters yet to complete their BS degree) in Environmental and Ecological Engineering (BSEEE), Agricultural Engineering (BSAE), Biological Engineering (BSBE), Chemical Engineering (BSChE), Civil Engineering (BSCE), Earth, Atmospheric, and Planetary Science (BS in Atmospheric Science, Environmental Geoscience, Geology and Geophysics, and Planetary Science), Industrial Management (BSIM), Materials Engineering (BSMSE), or Natural Resources and Environmental Science (NRES); and if they have
- (ii) A cumulative GPA of at least 3.25 at the time of application, and continuance of achieving this minimum index through semesters 6-8.

Combined BS + MSEE degree Application Procedure:

In semester 6, students in the above listed programs interested in the MSEE Combined Degree need to formally apply for graduate admissions to the MSEE program. Information on the application procedure can be found at: <https://www.purdue.edu/gradschool/index.html> and located on this same webpage is an "Apply Now" link for initiating the necessary online application. The application process is identical to the regular graduate application process, except for three additional steps:

1. The student must submit as part of the application the "Purdue University Graduate School Combined-Degree Program Request" form. This is Form GS-27, available from the Graduate School online at: <https://www.purdue.edu/gradschool/faculty/forms.html>. This form must be approved (by signature) by the Heads of the participating Baccalaureate and Master's degree (EEE) programs, before submitting (i.e., uploading) as part of the application. If the student is a BSEEE student, the Head of EEE will sign and date on both approval lines.
2. The Statement of Purpose essay should state clearly that the student is applying to the MSEE Combined Degree program and provide the reason(s) for seeking graduate study under this Program, and any relationship to the applicant's career goals.
3. In requesting Letters of Recommendation from references, it is very important that the student inform the references that the application is for admission to the MSEE Combined Degree Program. Although all letters are solicited during the online application process (by the student providing emails of all references), the applicant is encouraged to

provide all references with a copy of this information sheet, so that they are made aware of the program and process.

Before the beginning of semester 7, the EEE Graduate Program will decide to accept or not accept the student into the Combined Degree Program by acting on the student's Graduate Application. The EEE graduate chair will serve as the default graduate advisor for all combined degree students. The 9 credits which will be dual counted by the BS and MS plans of study must be identified and agreed upon by the student along with the respective graduate and undergraduate advisors no later than the beginning of semester 7. The student's complete record will be reviewed by the EEE Graduate Program at the end of semesters 7 and 8. It is required that the undergraduate cumulative GPA of at least 3.25 is maintained. If all conditions are not maintained, the student will not be permitted to remain in the combined degree program.

Admission to the MSEEE Program

Undergraduate students generally apply for admission to the MSEEE program during their 7th semester of undergraduate study. Information on the application procedure can be found at: <https://www.purdue.edu/gradschool/index.html> and located on this same webpage is an "Apply Now" link for initiating the necessary online application. All minimum requirements stated above for application apply.

Admission to the Ph.D. Program

Admission to the PhD program can occur several ways:

1. Applicants who have earned a M.S. degree from another institution can be admitted to the PhD program directly through the application process outlined above for MSEEE applicants.
2. In some cases, exceptional applicants who have earned a B.S. degree from another institution can be admitted to the Ph.D. program directly, but generally only if this is their stated educational objective, and/or if they are funded through a Ph.D. fellowship, either internal to Purdue (e.g., Ross, Andrews, Purdue Doctoral) or external to Purdue (e.g., NSF, EPA, DOE, DOD, CSC, Fulbright). If this is the case, these students may still earn a non-thesis M.S. degree once they have completed the necessary coursework for the master's degree (i.e., 30 credits, of the required 48 credits necessary for the Ph.D. degree).
3. Students who complete a non-thesis or thesis M.S. degree from the Purdue Graduate School can petition for continued on as a PhD student (including Combined Degree students). In this case, the student and major professor must notify the EEE Graduate Program Office at least three weeks before the end of the semester in which the M.S. degree is awarded.

III. Program Requirements

All rules of the Graduate School apply to students and degree candidates in the EEE program. The “*Policies and Procedures Manual for Administering Graduate Programs*” may be found at: <https://www.purdue.edu/gradschool/faculty/publications.html> and all prospective and current students should refer to this Catalog for basic rules and regulations. Other information on rules regulating graduate student employment at the university, and for preparing a graduate thesis are available at this site. The following information is provided to supplement the information provided by the Graduate School, and to detail the specific requirements of the EEE graduate program.

a. Program Requirements of all EEE Graduate Students

Plan of Study (POS) and Graduation Index. The student, in consultation with the major professor(s) and Advisory Committee (see below), must prepare a “Plan of Study” for approval by the Graduate School, with the Plan consisting of the list of courses that the student plans to complete to satisfy the coursework requirement of their degree. The Plan of Study (POS) should be appropriate to meet the needs of the student’s area of emphasis, as determined by the Advisory Committee. With approval of the Advisory committee, the POS for master’s degree students can incorporate up to 3 credit hours of 300 or 400 level courses (unless the student is a Combined BS + MSEEE degree student), and the POS for Ph.D. degree students can incorporate up to 3 credits hours of additional 300 or 400 level coursework, beyond a maximum of 3 credit hours earned to satisfy their master’s degree course requirement. The POS is prepared and submitted by the student electronically for approval of the advisory committee and the Graduate School. The POS must be approved the semester before graduation for MSEEE students and two semesters before graduation for Ph.D. students. No courses shall be included on the POS for which a grade lower than B- is earned, and the GPA of all courses on the POS shall be 3.0 (B average) or higher.

All students must have at least a non-thesis POS on file by the end of their first full semester in residence. The non-thesis POS only needs 1 faculty member to serve as an advisor and proposed 10 courses. As such, even if a full research committee has not been identified, the POS can be filed.

The Graduate School’s policy on satisfactory performance is: *“A graduate student is expected to always maintain a graduation index representing a B average (3.0/4.0 GPA) or better. Indices below this level are marked “under 3.0 GPA” on the grade reports. The student also is expected to earn 5 grades for research registration. Two consecutive sessions of U grades for research registration mandate that the department take formal action and inform the student, in writing, and the Graduate School with regard to discontinuation or conditions for continuation of the student’s graduate study. In any event, the student’s progress should be reviewed each session by the student’s department. The student’s progress also may be reviewed by the Graduate School. Should the student fail to perform in either coursework or research on a level*

acceptable to the advisory committee, the departmental graduate committee, or the Dean of the Graduate School, he or she may be asked to discontinue graduate study at Purdue.

Major Professor(s) and Advisory Committee. Upon admission, each student is assigned a faculty member as an academic advisor. Unless the student has pre-arranged for a specific faculty member to be their advisor, the Chair of the EEE Graduate Committee will serve as the temporary advisor. Before the end of the first full semester of residence, all those students for whom a Graduate Committee member serves as the temporary advisor are required to select a permanent academic advisor. This selection should be mutually acceptable to both the student and the faculty member. The advisor will act as the Major Professor on the student's Advisory Committee and must have an appointment (i.e., partial or full time) in EEE, or have a courtesy appointment in EEE. Faculty members who do not have an appointment in EEE (full, partial, or courtesy) may serve as a co-chair of a student's Advisory (and examining) committee, if the student, EEE advisor, and non-EEE faculty member deem it appropriate. Until an alternative academic advisor is selected and an appropriate plan of study submitted, students will be assumed to be on a Professional MS track with the Chair of the EEE Graduate Committee as their advisor.

The student may change Major Professors, however, if the student is funded on a research assistantship or fellowship, they must discuss their contractual obligations with the current Major Professor before initiating the process to change advisors. All changes in advisor must be coordinated through the EEE Graduate Program Office and changed on the Plan of Study, filed through myPurdue (mypurdue.purdue.edu). Until the time the Plan of Study is filed online, and after conferring with both the current and new advisor, an email to the EEE Graduate Program Office will suffice for changing advisors. Any student may have one Major Professor, or two co-Major Professors, who then act as co-Chairs of the Advisory Committee. At least one of the two co-advisors needs to have an affiliation with EEE (full, partial, or courtesy appointment). In addition to chairing the Advisory Committee, the purpose of the Major Professor is to: (i) advise the student on course selection, and (ii) supervise the research the student performs to fulfill any thesis or dissertation requirement, as described below. The duties of the Advisory Committee are to assist the student in developing an acceptable Plan of Study, and advise the student during the period of graduate work, including research and thesis preparation when these are required components of the student's degree program.

For non-thesis M.S. students, the Chair of the Graduate Committee will serve as the sole advisory committee member on the plan of study. For thesis M.S. students, the advisory committee consists of the major professor and at least two other faculty members (including any co-Chair) selected by the student and major professor, on a mutually acceptable basis with the other faculty members. For all Ph.D. students, the advisory committee consists of the major professor and at least three other faculty members (including any co-Chair) selected by the student and major professor, on a mutually acceptable basis with the other faculty members. All persons serving on the Advisory Committee must be regular or special graduate faculty, i.e., certified by the Graduate School to serve on the committees of graduate students.

Normally, the members of the student's advisory committee also will serve on the student's Examining Committee, which is responsible for reading the student's thesis and conducting the final exam, except in the case of non-thesis master's students, in which case the oral and/or written final exam is not required and the Graduate School will review the courses taken with respect to the alternate criteria that EEE has provided the Graduate School.

Annual Review Requirement. Every 12 months, each thesis-track student (M.S. and Ph.D.) in EEE needs to meet with their Advisory Committee to ensure that the student is performing the research activities necessary to fulfill all research requirements of their respective degree in a timely manner. For thesis M.S. students, this review should occur no later than the semester prior to graduation. For Ph.D. students, the Preliminary Exam fulfills this annual meeting requirement for the year that the Preliminary Exam is held. During all other annual meetings, the student should give an oral update of the research performed to date, what research is anticipated during the next 12 months (or until graduation), and what research (if any) is necessary to complete during additional years. Written updates may consist of: the POS and current transcripts, research papers published or submitted, research outlines, or other materials requested by the adviser before the annual meeting is held. For additional procedural details, please see the "Annual EEE Research Graduate Student Review" (<https://engineering.purdue.edu/EEE/EEE/InfoFor/CurrentStudents/Graduate/1/Annual%20Student%20Review%20Form.pdf>) evaluation form available online.

Course Requirements for all EEE Graduate Students. Because students in the EEE graduate program have a wide variety of academic, research, and career interests, there are no specified course requirements, other than (i) completion of six credit hours of EEE 560 course modules, and (ii) completion of two semesters of enrollment in the zero-credit seminar course, EEE 690. All students that are engaged in thesis research are expected to present initial results of their thesis research at least once in EEE 690. For Ph.D. students, this may occur during a semester after they have completed formal participation in the seminar course. Regarding EEE 560, for Ph.D. students that have earned an MSEE degree in the EEE program, it is not necessary to earn any additional EEE 560 coursework credits beyond the 6 credits necessary for the MSEE degree. Typically, EEE 560 courses are 1-credit 5-week modules that introduce EEE graduate students to the breadth of topics within environmental and ecological engineering, exposing students to a broad base of fundamental principles, allowing students to explore and expand their knowledge base beyond their primary area of interest. Other courses on the POS generally are selected based on the career and research goals of the student (i.e., knowledge necessary to conduct thesis research) and/or interest in pursuing a specific technical career. Based on discussions with the student, the Advisory Committee has final approval authority regarding the list of courses for inclusion on the POS.

b. Specific Program Requirements for Professional Master Degree (non-thesis) Students

Students admitted to the MSEE degree program, after completing a baccalaureate degree at a college or university of recognized standing, may choose the Professional (non-thesis) Master's degree option, which requires completion of a minimum of 30 credit hours of coursework for

which the student has received a grade of B- or better. The cumulative POS GPA must be 3.0 (on a 4.0 scale) or greater to graduate. The list of courses that comprises these 30 credit hours constitutes the student's Plan of Study, and requires approval of the student's advisory committee. Within the minimum 30 credit hours, 0 to 3 credit hours of independent project coursework can be applied, as well as 0 to 3 credit hours of coursework at the 300 or 400 level. Independent project coursework generally is completed under the supervision of an EEE-affiliated faculty member under the course number EEE 59800. If the student waives the option to include 300 or 400 level credits, the graduate committee will permit an additional 3 credits of independent study to be included in the plan of study. This would bring the total limit of independent study credits to 6. Professional MS students are required to take 9 credits of courses representing practical skills and knowledge related to Project Design, Engineering Management, Policy, and Professional Practice. A partial course list is provided below. The balance of courses should represent foundational knowledge in physical, chemical, and biological aspects of Environmental & Ecological Engineering.

- Courses representing practical skills and knowledge related to Project Design, Engineering Management, Policy, and Professional Practice. Example courses are listed below. Other courses that fit topical criteria are acceptable:

ABE 59100	Understanding Federal Science Policy and Funding
AGEC 52500	Environmental Policy Analysis
CE 52400	Legal Aspects in Engineering Practice
CE 59000	Breakthrough Thinking for Complex Challenges
CE 59600	Entrepreneurship and Business Strategy in Engineering
CE 59700	Advanced Project Management and Analysis
COM 44400	Intro to COMM and Social Entrepreneurship
EEE 59800	Independent Study (Design Project) 6 credits MAX
ENGL 42X	Technical Writing
IE 53000	Quality Control
IE 54500	Engineering Economic Analysis
IE 57000	Manufacturing Process Engineering
IE 57700	Human Factors in Engineering
IE 59000	Policy Analysis Climate Change
ME 55300	Product Process and Design
MGMT 54600	Decision Support and Expert Systems
MGMT 56200	Project Management
MGMT 57100	Data Mining
MGMT 60000	Accounting for Managers

MGMT 61000	Financial Marketing
MGMT 62000	Marketing Management
MGMT 65000	Strategic Management
MGMT 66000	Operations Management
MSE 59700	Lean Manufacturing
POL 52300	Environmental Politics and Public Policy

Combined BS + MSEEE non-Thesis degree Students. Because combined degree students are allowed to “double count” 9 credits of graduate coursework, some additional constraints are placed on the remaining 21 credits that are earned as a graduate student during the 5th year as a graduate student. Specifically,

- During the last 2 semesters of the baccalaureate degree program, 9 credit hours of graduate courses (e.g., three 3-credit 50000 level courses) must be taken and added to both the BS and MSEEE Plans of Study. Similar to regular graduate courses taken in year 5, a grade of B- or better must be obtained in these courses.
- The MSEEE Plan-of-Study must not contain any undergraduate courses (i.e., all courses need to be 500 level or above), and the MSEEE POS must be filed before the end of semester 9 (first semester post-baccalaureate degree) and must be approved by the EEE Graduate Program before registration for the final semester.
- All normal MSEEE non-thesis degree requirements must be satisfied, including (but not limited to) completion of 6 credits of EEE 560 modules.

c. Program Requirements of Thesis MSEEE Degree Students

After having completed a baccalaureate degree at a college or university of recognized standing, students admitted to the MSEEE degree program may choose the thesis Master’s degree option, which requires completion of a minimum of 21 credit hours of coursework (for which the student has received a grade of B- or better) and a minimum of 9 credit hours of thesis research (EEE 69800) through which a Master’s thesis is researched and composed. The 21 coursework credits (i.e., Plan of Study) may include 0 to 3 credits at the 300 or 400 level, but cannot include any independent project coursework (as this is replaced with thesis research credits), and the POS must be approved by the Advisory Committee. Thesis research must be completed under the supervision of the Chair or co-Chairs of the Advisory Committee (i.e., the student’s Major Professor). A three member examination committee (in most cases composed of members of the Advisory Committee) determines whether the student is approved (certified) for graduation, with this typically conducted through an oral final examination in which the student must defend their written thesis to all members of the examination committee. There are typically two parts to the oral exam, which must be completed within a maximum period of two hours. The first part (twenty to thirty minutes) generally is open to the public, during which time the student presents and explains their research goals, methods, and results to the committee and public, followed by a brief open question time; and the second

part is a closed question-and-answer session conducted by the examination committee. Members of the final examination committee also have the option of requiring the student to provide written responses to questions posed to them before the final oral exam. Final approval also is required from the Graduate School.

In addition to recommending (or not recommending) the candidate for the MSEE degree, the major professor and other committee members also may recommend (or not recommend) whether the candidate is allowed to continue study toward the Ph.D. degree.

d. Program Requirements of Ph.D. Degree Students

All students admitted to the Doctor of Philosophy program are eligible to receive the Ph.D. degree from the Graduate School upon completion of all degree requirements. All Ph.D. students must research, compose, and successfully defend a doctoral dissertation.

The Ph.D. degree requires a minimum of 30 credit hours of coursework, 42 credit hours of research, and 90 total credits of coursework and research. The balance of 18 credits may be coursework or research and is left to the discretion of the thesis committee based on the educational needs of the student. Coursework and research credits earned in the completion of a master's degree, earned at Purdue or at another college or university of recognized standing may be included in the 90-credit total. As an example, for students who have earned a non-thesis degree at another university, the Ph.D. Advisory Committee in EEE may allow up to 30 coursework credits, earned at another university, to be included on the Ph.D. Plan of Study, depending upon the suitability of each course in addressing the student's academic goals within the EEE graduate program, as determined by the Ph.D. Advisory Committee. A minimum of 18 credits of coursework applied toward graduation must be from Purdue, so a PhD student who earned an MS from another institution will still have a mix of coursework and research credits earned while a Purdue student. Any coursework credits earned during completion of a thesis master's degree may be included on the Ph.D. Plan of Study, if approved by the Ph.D. Advisory Committee. Similarly, up to 9 credit hours of research credits earned in completion of a thesis master's degree may be applied toward completion of the 42 required research credits. The 30+ coursework credits (i.e., Plan of Study) may include 0 to 6 credits at the 300 or 400 level, but cannot include any independent project coursework earned beyond the master's degree. Any additional research credits, beyond the master's degree, are earned through registration in EEE 69900, with all work completed under EEE 69900 supervised by the student's Major Professor. Coursework earned from one (and only one) master's degree may be used on the Ph.D. plan of study, and only those research credits earned for this one degree may be counted towards the Ph.D. research credit requirement. An official transcript showing the completion of the master's degree must be on file with Purdue University's Graduate School if courses are to be transferred to the Ph.D. POS, or if any associated research credits are to be applied.

Ph.D. Preliminary Exam. After the student's Advisory Committee has approved the student's Plan of Study, and after completion of the course work on the initial Plan of Study (8-10 courses for direct PhD students and 4-6 courses for PhD students with MS from outside

Purdue), the student must successfully pass the Ph.D. preliminary (prelim) examination. The exam is administered by a Preliminary Examination Committee, which generally consists of all Advisory Committee members. The public is not allowed to attend the Preliminary Examination. The Preliminary Examination is an oral examination in which the student describes and defends the research plan that they intend to follow in developing their research dissertation. This research plan must be documented in a written proposal provided to the examining committee at least two weeks before the exam. The student is responsible for making sure the written proposal is in a *format* that is acceptable to the advisor and other committee members before finalizing it and before providing it to the committee. Generally, a 15 page, single-spaced, NSF-style written proposal (that includes an abstract, introduction and significance (broader impacts), list of hypotheses or research tasks, brief methods and/or theory section, and preliminary results) is acceptable. Other materials (including references, draft of papers or published papers, standard operating procedures, or other detailed experimental methods sections) may be attached as appendices. A long proposal, which is essentially an early draft of the dissertation, is not acceptable. The Preliminary Examination committee has the option of requiring the student to provide written responses to questions posed by them to the student before the oral prelim exam. The objective of the Ph.D. preliminary examination is to determine if the student qualifies for admission to candidacy for the Ph.D. degree based on the student's technical knowledge, reasoning skills, creativity in formulating their research plan, and ability to convey each of these in written and oral formats. If the student fails to pass the Preliminary Examination on the first attempt, they must retake the exam during the next semester. If the student fails for a second time, they will be automatically withdrawn from the Ph.D. program. At least two full semesters (of registration) must elapse between the Preliminary Exam and the Final Defense (described below).

Upon satisfactory completion of the Ph.D. Preliminary Examination, and with final approval required from the Graduate School, the Ph.D. student holds the position of "Ph.D. Candidate". One time each year after satisfactory completion of the Preliminary Exam, the Ph.D. candidate needs to schedule the annual review meeting with their Advisory Committee to inform the committee of the student's academic and research progress, and to help identify any major issues or concerns regarding the student's work prior to the Final Examination meetings.

Upon completion of all coursework requirements and the dissertation, a four (or more) member examination committee (in most cases composed of members of the Preliminary Examination Committee) determines whether the student is approved (certified) for graduation, with this typically conducted through an oral final examination in which the student must defend their written dissertation to all members of the examination committee. There are typically two parts to the oral exam, which must be completed within a maximum period of two hours. The first part is open generally to the public (e.g., except in cases such as when proprietary information is discussed), during which time the student presents and explains their research goals, methods, and results to the committee and public; and the second part is a closed question-and-answer session conducted by the examination committee. Members of the final examination committee also have the option of requiring the student to provide written responses to questions posed to them before the final oral exam.

IV. Graduate Program Learning Outcomes (MSEEE and Ph.D.)

The faculty-approved Learning Outcomes for the graduate degree program in Environmental and Ecological Engineering are adapted from the Environmental Engineering Body of Knowledge developed under the auspices of the American Academy of Environmental Engineers & Scientists.

Outcome 1: Basic Environmental Math and Science

Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must have an ability to apply mathematics, physics, chemistry, biology, ecology and earth science knowledge to analyze coupled natural and engineered systems and to design, construct and manage strategies that promote stewardship of the environment and ecosystems.

Outcome 2: Design and Conduct Experiments

An experiment is a procedure to take measurements or model a system in order to test or establish understanding of a process. Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must have an ability to design and conduct experiments necessary to gather data and synthesize information for use in analysis and design.

Outcome 3: Use of Modern Engineering Tools

Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must have an ability to apply measurement, modelling, statistical and risk analysis tools and techniques required for engineering practice.

Outcome 4: Risk, Reliability and Uncertainty

Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must have knowledge of the risks associated with human or environmental exposure to contaminants in our environment and incorporate sound uncertainty and reliability principles into engineered systems that are designed and managed for the protection of ecosystems and human health, welfare and safety.

Outcome 5: Problem Formulation and Analysis

Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must have an ability to assess engineering challenges, effectively communicate complex problems, formulate and evaluate alternative management strategies and recommend professionally acceptable solutions.

Outcome 6: Design

Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must have the ability to engage in creative and critical thinking, incorporation of uncertainties and use of engineering judgment to design a system, component or process to meet desired needs for the protection of ecosystems and human health, welfare and safety.

Outcome 7: Sustainability

Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must integrate the principles of sustainability into analysis and design. Constraints imposed by the long-term sustainability of our natural and social systems must be a critical factor in the design and selection of engineered systems.

Outcome 8: Societal Impact and Environmental Policy

Environmental and Ecological Engineers are regularly involved in the implementation of public environmental policy. Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering should recognize societal impacts of engineering activities, should communicate these impacts to stakeholders, including policy makers, and should consider stakeholder inputs in developing engineering solutions.

Outcome 9: Globalization and other Contemporary Issues

Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must be able to function in a globalized system of development and delivery of professional services, taking into consideration local cultural norms for values, beliefs, communication and technology. Maintaining awareness of emerging contemporary issues and their impact on the profession is required.

Outcome 10: Thrive in Multi-Disciplinary Teams

The solutions of most engineering problems require the expertise and participation of a variety of disciplines. Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must be able to use management and communication skills to create, manage and/or participate in teams composed of professionals from a broad range of disciplines.

Outcome 11: Professional and Ethical Responsibilities

The National Society of Professional Engineers has published a Code of Ethics for Engineers that applies to Environmental and Ecological Engineering. A fundamental canon of this Code is that engineers "Hold paramount the safety, health and welfare of the public." Unique to Environmental and Ecological Engineering is the principle that natural ecosystems support human existence and thus service to the public must include the preservation of species and habitats. In addition, environmental and ecological engineers recognize that all of nature has intrinsic value and that ecological stewardship and preventing the destruction of the natural environment is part of their professional responsibility.

Outcome 12: Effective Communication

The environmental and ecological engineer has a critical role interpreting environmental policy issues and implementing of strategies for protecting public health and the environment. Graduates of the Master's and Ph.D. program in Environmental and Ecological Engineering must effectively communicate in an appropriate and understandable manner when interacting with the non-technical public as well as the technical community.

V. Administrative Details of the Graduate Degree Program**a. Residency Requirements and Transfer Credits**

MSEEE Program Duration. It is expected that no more than three years (and typically two years or less) shall be required for completion of all requirements for a thesis or non-thesis MSEEE degree, even if the student conducts research in absentia or participates in a graduate student coop experience. In the event that more than three years are required, the student and advisor should contact the EEE Graduate Office to discuss plans for completion, as no student will be

permitted to register as a master's degree student beyond three years without the prior review and approval of the Graduate Committee. At least one-half (15) of the total credit hours (30) used to satisfy degree requirements must be earned at the Purdue University, West Lafayette campus. The Combined Degree Option allows students in several undergraduate programs on Purdue's main campus to complete the additional MSEE graduate coursework within one year (i.e., the additional MSEE graduate coursework beyond that earned while still an undergraduate student).

Ph.D. Program Duration. It is expected that no more than six years (beyond the master's degree) shall be required for completion of all requirements for the Ph.D. degree (and typically four years or less), even if the student conducts research in absentia or participates in a graduate student coop experience. In the event that more than six years are required, the student and advisor should contact the EEE Graduate Office to discuss plans for completion, as no student will be permitted to register as a Ph.D. degree student (or Ph.D. candidate) beyond six years without the prior review and approval of the Graduate Committee. At least one-third (30) of the total credit hours (90) used to satisfy degree requirements must be earned at the Purdue University, West Lafayette campus (including research credit hours). At least two full semesters (of registration) must elapse between the Preliminary Exam and the Final Defense.

For all EEE graduate students, credit hours obtained by online or televised instruction initiated at the West Lafayette campus are considered "in residence" credit hours. For students wishing to transfer course credits from another college or university of recognized standing, the transfer process happens when the student submits their POS, as there is no mechanism to approve transfer courses prior to the generation of the POS. It is strongly advised that the student discuss with their major professor the appropriateness of each transfer course before the POS is electronically generated. For courses taken elsewhere, only courses with a grade of B- or better can be used on the POS. An official transcript(s) with the courses to be transferred must be on file with Purdue University's Graduate School, if courses are to be applied to an MSEE or Ph.D. POS, or if any associated research credits are to be applied.

b. Ethical Conduct of Research

All EEE graduate students should be familiar with and adhere to the Purdue University Statement of Integrity and Code of Conduct available at:

https://www.purdue.edu/purdue/about/integrity_statement.php

First year EEE graduate students are required to perform the "Responsible Conduct of Research" for Physical Sciences from the Collaborative Institutional Training Initiative (CITI), available online at:

<https://www.citiprogram.org/>

To do this, click on the "Register" link under create an account. Enter "Purdue University" for Organization Affiliation. Enter your name as written on your Purdue ID. Enter a user name and password of your choice, and set a security question. Enter your gender, ethnicity and race. Select No for CME/CEU credits, and continue to answer the remaining questions.

c. Financial Support

Unless a student receives an official letter from the EEE Graduate Program Office stating that the student will be supported financially, the EEE program has made no financial commitment to the student. Many Master's students invest their own resources to support their education and obtain the knowledge and credentials needed for success in professional practice. However, in order to compete for the very best graduate students, financial support is often provided as an incentive to attend Purdue University. The primary source of these funds is from external research grants that support Graduate Student Research Assistantships (RAs). A limited number of Teaching Assistantships (TAs) in EEE and in other departments on campus, and competitive College and University fellowships are available. Graduate students who are U.S. citizens also may compete for external fellowships, such as those awarded by the U.S. National Science Foundation, the U.S. Environmental Protection Agency, and the U.S. Department of Energy. International students may compete for external fellowships awarded in their country of citizenship, including Fulbright fellowships. Funding is competitive, however for Ph.D. students that are in good standing, good faith efforts are made to financially support the student.

d. Course Registration

For each upcoming semester, course registration begins with a meeting between the student and the academic advisor (major professor) in which Form 23 (list of courses and any research credits to be taken) is completed and signed by the advisor. At this time, the student is provided with a PIN number with which they can register for classes online at myPurdue (<https://wl.mypurdue.purdue.edu/>). The signed Form 23 must be submitted to the EEE graduate office, and any courses requiring overrides (i.e., EEE 69800 and 69900) will be entered by the EEE graduate program office, if the necessary signatures are present on the form. Any change in registration must be accompanied by completing an additional Form 23 (to add or drop a course(s)), so that the academic advisor and EEE Graduate Program Office is aware of any changes in registration.

Students enrolled in 69800 or 69900 need to have a documented agreement of the research expectations and outcomes that justify the enrolled credits.

Thesis students who have completed all necessary coursework, must register for research hours (EEE 69800 or EEE 69900) if they are working on their thesis/dissertation in any way. Students should register for research hours in proportion to their effort. Students are required to register during any semester an exam is held (preliminary exam, MS or Ph.D. defense exam). Rules regarding the necessary credit hours that each student must be registered for at any time are

stipulated by the Graduate School (<https://www.purdue.edu/gradschool>), and must be followed. Rules regarding “research in absentia” also are documented by the Graduate School. It is especially important for international students to understand how course and research credit registration may affect their visa status.

Starting in 2020, there will be an online enrollment option to fulfill the form 23 requirements and agreement of expectations and outcomes.

f. Rules Governing the Student’s Semester of Graduation

All degree-seeking students must have an approved Plan of Study on file with the Graduate School before the first day of classes in the session of anticipated graduation. The form 8 is an electronic form which is located in your myPurdue account.

All students must be registered in the session of graduation. If registering as a candidate using:

- CAND 99100 - the student must register for course or research credits. CAND 99100 is not a registration.
- CAND 99200 - degree only is a stand-alone registration. Students should not register for any additional credits with this registration.
- CAND 99300 - examination only is a stand-alone registration. Students should not register for any additional credits with this registration.

Students with outstanding incomplete grades for courses listed on the plan of study will not be eligible to graduate. Students must complete the course requirements and register for a future session to receive the degree.

g. Conference of the Committee (MSEEE Non-Thesis Option students only)

Non-Thesis Option Master’s Students: EEE has provided the Graduate School with the requirements for a non-thesis MS. No forms need to be submitted.

h. Thesis Preparation (MSEEE Thesis Option students and Ph.D. Candidates only)

Thesis Option Master’s Students: The student must submit a *Form 8: Request for Appointment of Examining Committee* to request the final examination. The Form must be submitted and receive all department signatures at least two full weeks before the requested exam date.

Doctoral Students: The student must submit a *Form 8: Request for Appointment of Examining Committee* to request the preliminary or final examination. The form must be submitted and receive all department signatures at least two full weeks before the requested exam date. Keep in mind that at least two full sessions of registration are required following a successful preliminary exam for the student to be eligible to defend.

General Timeline for Exam Preparation (MS and Ph.D.):

- Infinite weeks in advance:
Student should be in regular communication with advisor and committee about progress toward exam and expected timelines.
- Eight weeks in advance:
If external committee members are included in the thesis or examination committee, this process should start at least eight weeks before a proposed exam date.
- Four weeks in advance:
Student should work with graduate program administrator and coordinate with committee members to schedule exam and book appropriate rooms. Student should submit a title and abstract to the graduate program administrator. The request for examination must be submitted to the Purdue Graduate School.
- Two weeks in advance:
Student submits document (prelim or thesis) to committee members for their review. If two week deadline is not met, exam will be cancelled and must be rescheduled.
- One week in advance:
Committee members inform student of any additional written questions, which must be addressed.

i. Thesis Final Examination (MSEEE Thesis Option students and Ph.D. Candidates only)

At least two complete semesters must elapse between the Ph.D. Preliminary Examination and the Final Examination. Students must be enrolled in thesis research during the semester prior to the Final Examination.

The Ph.D. Final Examining Committee consists of a minimum of four members and is appointed at the request of the student's Major Professor. The Examining Committee is usually (but need not be) the same as the student's Advisory Committee and is responsible for reading the student's thesis and conducting the Final Examination.

PhD final examinations are announced so that interested members of the Purdue faculty and student body may attend. When the student submits the request to schedule the final exam to the EEE Graduate Office, the student also will send an electronic copy of the thesis abstract to the EEE Graduate Office for distribution to the Purdue faculty and graduate students.

j. Thesis Submission

All thesis-option graduate students at Purdue must deposit the final products of their research with the Purdue University Graduate School Thesis/Dissertation Office.

The Thesis/Dissertation Office will help you ensure that all pre-requisites for deposit have been fulfilled and that your thesis or dissertation meets the quality standards established by the Graduate Council Standing Committee on Thesis and Dissertations.

Detailed guidelines on thesis submission, including tutorials and checklists, should be consulted at: <https://www.purdue.edu/gradschool/research/thesis/index.html>

VI. Transferring from another Degree Program at Purdue

A student who: 1) has established a graduate academic record at Purdue University (WL), 2) has current eligibility to register in a graduate degree program, and 3) wishes to transfer to the EEE graduate degree program needs to submit a completed Request for Transfer of Department (G.S. Form 17) to the Graduate School. International students who wish to transfer from one department to another must check with the Office of International Students and Scholars to determine if their visa status will be affected by the transfer. All original admissions packet materials and other records (i.e., student transcripts) held in the initial department must be made available to the EEE graduate program for review (i.e., transcripts, letters of recommendation). EEE will accept transfer students on the following conditions:

- The student is in good standing in their current graduate program.
- The chair of the graduate committee approves the transfer after reviewing the admissions packet and after discussions with the academic unit the student is transferring from.
- A faculty member in EEE is willing to serve as the major professor. If the transfer student is a PhD candidate, good faith efforts will be made to financially support the student.

If a student completes a graduate degree in one department and wishes to seek an additional graduate degree in another department, a new application is required.

VII. Administrative Information

a. Mail. Mail can be addresses to and received by EEE graduate students at the following location. Be sure to check your mailbox often.

The current mailing address is:
Environmental and Ecological Engineering
Purdue University
Potter Engineering Center, Room 364
500 Central Drive
West Lafayette, IN 47907-2022

b. Business Office. Business office services are provided in Potter 364J.

c. Work Space. Office and research space assignments are coordinated through the EEE Office. If a student is assigned office and research space by their major professor in the School or Department in which the Major Professor has a joint appointment, the EEE office should be notified of this. Any keys for buildings, laboratories, offices or other research space necessary

for a student's work must be authorized by the major professor. No laboratory keys will be assigned until safety training is completed.

d. Leave From Campus. Before temporary departure from campus for attendance at an out-of-town conference or workshop, or to conduct research at another location, or for vacation (see e), or any other authorized activity, a graduate student must complete the necessary forms. Such departures require approval by the major professor. In case of an emergency that requires the student to be absent from campus, the student should inform their advisor and the EEE office as soon as possible.

e. Vacation Policy. Any student in pay status (i.e., research assistantships, fellowships, etc.) is allowed vacation days consistent with all applicable laws and University regulations (such as accrual rates). Requests for vacation must be submitted via SuccessFactors.