



Industrial and Systems Engineering

GRADUATE STUDENT HANDBOOK

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I. INTRODUCTION

The purpose of this handbook is to present the rules and policies of the Industrial and Systems Engineering (ISE) Graduate Studies Program. The ISE Graduate Student Handbook is a supplement to The Ohio State University Graduate School Handbook. For complete understanding of the rules pertaining to graduate education in ISE at OSU, both Handbooks are essential references. The web link to the Graduate School Handbook is:

<http://www.gradsch.ohio-state.edu/graduate-school-handbook1.html>

II. PROGRAM OBJECTIVES

The goals of M.S. and Ph.D. programs are as follows:

At the time of MS degree completion, our students:

1. Are familiar with the current state of knowledge in their chosen field of study.
2. Can competently apply what they have learned in the program towards the solution of current Industrial & Systems engineering problems.
3. Can effectively communicate orally and in writing.

At the time of Ph.D. degree completion, our students...

1. Have demonstrated their ability to review and synthesize prior research in their chosen field of study.
2. Have demonstrated an ability to effectively conduct research that has contributed to the theoretical basis of their field of study.
3. Can effectively communicate and disseminate research findings orally and in writing.

III. GRADUATE STUDIES COMMITTEE (GSC)

FOR GENERAL GUIDELINES SEE THE GRADUATE SCHOOL HANDBOOK

- A. The ISE Graduate Studies Committee (GSC) consists of a minimum of three ISE Graduate Faculty members. All members are appointed by the ISE Department chairperson.
- B. The responsibilities of the GSC are enumerated in the Graduate School Handbook.
- C. In the event that special circumstances warrant an exception to any of the guidelines set forth in the ISE Graduate Student Handbook, the student affected may petition the ISE GSC in writing for a waiver of the appropriate guideline. The decision of the ISE GSC will be binding.

IV. FACULTY ADVISORS

A. Assignments of Students to ISE Faculty Advisors

1. The initial assignment of students to ISE faculty advisors is the responsibility of the Graduate Studies Committee Chairman. Criteria for the assignments include:
 - a. Stated student preference for advisor, if any.
 - b. Stated student intellectual interests or career goals.
 - c. Faculty interest.
 - d. Faculty category; e.g., a Ph.D. student cannot be assigned to a Category “M” faculty member.
 - e. Faculty availability.
2. Every graduate faculty member is presumed competent to serve as a temporary advisor to incoming MS students regardless of the stated field of preference of those students.
3. Graduate faculty members are expected to encourage advisor/advisee pairings which are in the best interest of the student before a student reaches the research phase of their program. A change of advisors in no way reflects on the abilities of either the student or advisor, but is expected when the student’s interests change or develop in ways better served by another faculty member. A graduate student may change advisors after obtaining permission from the new prospective advisor and gaining the approval of the Graduate Studies Committee. The Change of Advisor form is for making a faculty advisor change, and is available from the ISE Graduate Coordinator in 210 Baker Systems Engineering Building, or via the ISE website.

B. Advisor Responsibilities

1. All ISE graduate faculty members having graduate advisees are expected to participate in the annual evaluation of graduate students.
2. Every graduate faculty member is expected to serve on Master’s Examination, Candidacy Examination, and Dissertation Committees when asked and qualified.
3. Every graduate faculty member is expected to carry a fair share of advisees as appropriate to their rank and research interests.
4. Graduate faculty members are expected to maintain files for their own advisees that contain Plan of Study forms and quarterly OSU Advising Reports as each student progresses toward their academic objective. Graduate faculty members are expected to inform their graduate student advisees to communicate directly with the ISE Graduate Studies Coordinator, to make certain that their permanent graduate student file in the ISE office contains all current forms and information.
5. Graduate faculty members are expected to maintain reasonable office hours for purposes of student advising. Faculty contact information is available on the ISE website.

V. **ADMISSION**

FOR GENERAL GUIDELINES SEE GRADUATE SCHOOL HANDBOOK

A. Criteria for Admission

1. Preference is given to applicants who are graduates of accredited colleges and universities in the U.S. with undergraduate degrees in engineering, mathematics, statistics or natural sciences with a GPA of 3.2 or greater.
2. Applicants who are engineering graduates of non-U.S. institutions and are clearly outstanding may be accepted as resources and faculty loads permit.
3. GRE General Test is required of all applicants.
4. TOEFL test is required for any international students from countries on the OSU Admissions Office list (typically where the primary language is not English), unless a bachelor's degree was earned in an English speaking country.
5. The above requirements apply to all students who apply to transfer from another graduate program at OSU to ISE. Requests for transfer to ISE are reviewed and decided upon by the ISE GSC; they are not automatically granted.
6. Graduate non-degree admission is generally not granted, but may be granted to qualified students under special circumstances. If a non-degree seeking student later decides to seek regular graduate student status, they must re-apply through the standard admissions procedure. Credit taken in the non-degree program is not automatically accepted for the regular graduate programs. Any credits sought must be petitioned to the ISE GSC on a course-by-course basis up to a maximum of 7 semester hours.

B. Reasons for Denial of Admission

Within the guidelines above, applicants may be denied admission for any of the following reasons:

1. Undergraduate point hour ratios less than 3.2 on a 4.0 scale.
2. Previous graduate point hour ratio less than 3.4 on a 4.0 scale.
3. Undergraduate mathematics and statistics grades less than 3.0.
4. Lack of preparation in mathematics equivalent to an OSU undergraduate engineering program.
5. Letter of recommendation which expresses reservations about the student's ability to perform graduate work at the level sought.
6. Undergraduate degree from a program which in the view of the committee lacks sufficient rigor to adequately prepare the student for academic work in the ISE graduate program.
7. GRE Quantitative score less than 166, Verbal score less than 153, or Analytical Writing score less than 4.5.

8. For those applicants required to submit the results of the TOEFL; a score below 550 on the paper-based (213 on the computer-based) Test of English as a Foreign Language (TOEFL), 82 on the Michigan English Language Assessment Battery (MELAB), 7 on the International English Language Testing System (IELTS) exam, or 79 on the Internet Based TOEFL Test.
9. Inadequate ISE departmental resources and/or excessive faculty loads.

C. Deadlines

Autumn semester is the primary semester of admission. The ISE graduate program deadlines for completed applications are shown in Table 1. Applicants seeking admission for semesters other than Autumn will be considered, but only applicants with exceptionally strong credentials are likely to be admitted. Financial aid is generally not available for non-autumn semester applicants.

Table 1. ISE Application Deadlines

Applicant	Domestic	International
Spring Semester (General Admission)	October 1	October 1
Summer Semester (General Admission)	February 1	February 1
Autumn Semester (Funding Consideration)	December 15	November 30
Autumn Semester (General Admission)	March 1	March 1

D. Conditional Admissions

Conditional and special student admissions to the ISE graduate program are generally not encouraged. Rules relating to these and other categories are listed in the Graduate School Handbook.

VI. REGISTRATION, SCHEDULING, AND PLANNING

FOR GENERAL GUIDELINES SEE GRADUATE SCHOOL HANDBOOK

Course registration and scheduling is done by students via the OSU online registration system. Students are strongly encouraged to communicate with their faculty advisor about their plans for course registration and scheduling prior to each academic semester. The student's Plan of Study form must be approved by the GSC prior to registration for the second semester of study.

International students, and students with 50% GAA, GTA and GRA appointments, must be registered for a minimum of 8 graduate credit hours during Autumn and Spring

semesters; 4 graduate credit hours during Summer semester. Fellowship students must be enrolled in a minimum of 12 graduate credit hours during Autumn and Spring semesters; 6 graduate credit hours during Summer semester. The exception to these minimums are post-candidacy doctoral students. The Graduate School considers 3 semester credit hours as “full-time” status post-candidacy. However, enrollment for more than 3 credit hours post-candidacy is also highly discouraged.

VII. COURSE CREDIT, MARKS AND POINT-HOUR RATIO (PHR)

FOR GENERAL GUIDELINES SEE GRADUATE SCHOOL HANDBOOK

A. Transfer Credit (from another institution)

Transfer credit from another institution for work related to the ISE degree may be granted under the following conditions:

1. No more than 6 semester hours of credit may be transferred for the MS degree.
2. No more than 12 semester hours of credit (in addition to the 30 hours normally credited for the MS degree) may be transferred for the Ph.D. degree.
3. The ISE GSC must approve all transfer credits on a course-by course basis. Course syllabi may be required for the GSC to make informed decisions about course transferability.
4. Credit will be granted only for graduate courses taken with grades of B or better while in good standing in an accredited degree program.

B. Pass/Fail

Credit hours generated via graduate level courses graded S/U are counted toward graduate program credit hour requirements.

VIII. ACADEMIC STANDARDS

FOR GENERAL GUIDELINES SEE GRADUATE SCHOOL HANDBOOK

A student may be denied further registration in the ISE Graduate program for any of the following reasons:

1. At any time after 10 accumulated semester hours of graduate credit at OSU the student’s cumulative record falls below a 3.0 average for two consecutive semesters.
2. The student admits guilt or is determined to be guilty of academic misconduct by the University Committee on Academic Misconduct.
3. The student fails the non-thesis option master’s exam twice.
4. The student fails the thesis option master’s oral examination twice.
5. The student fails an ISE Ph.D. Preliminary examination.
6. The student fails the Ph.D. Candidacy examination twice.

7. The student refuses to follow the educational plan filed by the student and his/her Advisor/Candidacy Committee and approved by the ISE GSC.
8. The student completes the MS degree in ISE and is not admitted to the Ph.D. program by the GSC at the time of completing the MS degree.
9. The student fails to meet the minimum grade standards or time limits established under the rules of the Graduate School.
10. The MS student has accumulated at least 40 semester hours of graduate credit, and it is the judgment of the GSC in its annual evaluation of graduate students that the student is not making reasonable progress.
11. The Ph.D. student has accumulated at least 100 semester hours of graduate credit and has not taken their Candidacy Examination, or 170 semester hours of graduate credit and has not completed their Final Oral Examination, and it is the judgment of the GSC in its annual evaluation of graduate students that the student is not making reasonable progress.

IX. MASTER OF SCIENCE DEGREE PROGRAMS

FOR GENERAL GUIDELINES SEE GRADUATE SCHOOL HANDBOOK

A. Admission Requirements

1. An applicant that has completed a series of Calculus courses through Differential Equations, Linear Algebra, a Probability course, and a Statistics course, may be considered for admission to the MS program.
2. The Graduate Record Examination (GRE) is required of all applicants.

B. Program Requirements

1. Programs:

Students may select the thesis option, or non-thesis option program of study. Students should design a plan of study in consultation with his/her advisor, considering such factors as time to degree, intellectual and professional objectives, educational background, and other factors. The program of study is established via signature approval of the Plan of Study form by the student's faculty advisor and the ISE GSC Chairperson.

2. Thesis Option Program Requirements:

The ISE MS thesis program requires a minimum of 30 total graduate-level credit hours (a minimum of 24 hours must be taken at OSU). A minimum of 22 semester hours of coursework, and a minimum of 4 semester hours of thesis research credit hours are required. The coursework consists of:

- A minimum of 6 semester credit hours of ISE graduate level courses in one selected sub-discipline within ISE (Operations Research, Manufacturing, or Human Factors),
- Students need to take a 3 semester hour "breadth course" that is approved by their advisor, and compliments their program. (Note: this could be from any department that provides a course deemed suitable by the advisor).
- A minimum of 3 semester credit hours of graduate level coursework focused on mathematical, statistical, or numerical methodologies,
- A minimum of 2 semester credit hours of ISE Graduate Research Seminar, and
- Elective coursework.

MS ISE students electing the thesis option must also fulfill the Graduate School thesis examination and thesis document approval requirements.

3. Non-thesis Option Program Requirements:

The ISE MS non-thesis program requires a minimum of 30 total graduate-level credit hours (a minimum of 24 hours must be taken at OSU). The course work consists of:

- A minimum of 6 semester credit hours of ISE graduate level courses in one selected sub-discipline within ISE (Operations Research, Manufacturing, or Human Factors),
- Students need to take a 3 semester hour "breadth course" that is approved by their advisor, and compliments their program. (Note: this could be from any department that provides a course deemed suitable by the advisor).
- A minimum of 3 semester credit hours of graduate level coursework focused on mathematical, statistical, or numerical methodologies,
- A minimum of 2 semester credit hours of ISE Graduate Research Seminar, and
- Elective coursework.

MS ISE students electing the non-thesis option must also fulfill the Graduate School 4-hour written exit examination requirement via the following options:

- Under the supervision of a Category M or P faculty advisor in ISE, the student conducts an independent inquiry into a topic of personal intellectual interest in ISE (typically a topic not currently available in existing courses), and writing a summary (literature review) on that topic. The written document must have required at least 4 hours in its creation. Based on the discretion of the faculty advisor and MS committee member, the student may be required to give an oral presentation of the topic.
- Under the supervision of a Category M or P faculty advisor in ISE, the student conducts an independent project of personal intellectual interest in ISE, and then summarizes the project in writing. The written document must have required at least 4 hours in its creation.. Often the project involves the student doing some laboratory work to design and/or construct hardware devices or computer models. Based on the discretion of the faculty advisor and MS committee member, the student may be required to give an oral presentation of the project activity. This option is often chosen by students in the Manufacturing Processes or Ergonomics sub-disciplines of ISE.

- The student enrolls in, and passes with a B or better, an “upper level” project-based course that is available to graduate students only, and is taught by a Category M or P faculty member in ISE. The project course must involve the application or integration of materials from lower level ISE graduate courses to an ISE engineering problem. Also, a final written summary report of the project is required, along with an oral presentation. This option is often chosen by students in the Operations Research sub-discipline in ISE.
- Alternately, Operations Research students who did not receive a B or higher in a 7000-level OR course with a project requirement may instead take the M.S. Exit Examination. The M.S. Exit Examination is administered annually during the week after Spring final complete. Any ISE graduate student who achieves an overall GPA (including all courses taken at OSU) of 3.00 is eligible to take the exam. Those students who are planning to graduate in Autumn semester should take the exam in the preceding Spring semester. The process to sign-up for the exam will be announced during Spring semester. Students intending to take the exam must sign-up before the announced deadline, so there is sufficient time to check that the grade eligibility requirement is satisfied.

4. Additional Constraints:

A student with a BS degree from OSU may not double count undergraduate courses, that is, no course which was part of his/her undergraduate program may appear in his/her MS program. The only exception to this constraint would be students enrolled in the combined BS/MS program (see section **XI** of this handbook).

C. Other Considerations

Only the Graduate Studies Committee can grant exceptions to any of the above rules.

All decisions and revisions regarding a plan of study are to be made in consultation with the student’s faculty advisor.

A large portion of graduate education occurs outside of the classroom, in informal discussion with faculty members and other graduate students, in attendance at seminars, in research and teaching assignments, and so forth. All graduate students are expected to pursue such opportunities. These factors are considered by the Graduate Faculty and GSC when evaluating a student’s progress and development.

D. MS Examination Committee

The MS Examination Committee consists of the student’s advisor plus at least one additional graduate faculty member. Masters students can be advised by any tenure, clinical, or research track faculty members **with a formal appointment or formal joint appointment** in the Integrated Systems Engineering (ISE) Department that has

the appropriate category M or P status within the department. Masters students can also be **co-advised by a** clinical, tenure or research track faculty outside ISE **that has a courtesy appointment** in ISE and category M or P status within the department and by an ISE clinical, tenure or research track faculty member with M or P status.

A faculty member must have at least Category M status (any program) in the graduate school to serve as a member of a MS examination committee.

For thesis students, this committee is the thesis reading committee and it administers a one-hour oral examination. The oral is not restricted to the thesis topic and may cover any aspect of the student's program of study. It is the final validation of performance for that degree.

For non-thesis students, the committee oversees the Graduate School 4 hour written examination requirement, or equivalent evaluation of the student's knowledge of their field of study. It is the final validation of performance for that degree.

E. Time Limit and Registration

1. No time limit for the completion of the Master's Degree program is imposed.
2. A student must be registered for at least three graduate credit hours the semester of graduation.
3. Students who complete the MS program in ISE must apply for the Ph.D. program, and be accepted, before they can continue as regular Ph.D. graduate students. Application forms are available from the ISE Graduate Coordinator or the ISE website.

X. DOCTORAL DEGREE PROGRAMS

FOR GENERAL GUIDELINES SEE GRADUATE SCHOOL HANDBOOK

A. Admission Requirements

1. Identical to the MS admission requirements; see Section VIII, A, parts 1 and 2 of this Handbook.
2. Entrance preference is given to engineering, math and science graduates with a minimum undergraduate point hour ratio of 3.4 and MS with a minimum graduate point hour ratio of 3.5.
3. Students who complete the MS program in ISE and wish to continue on to a Ph.D., will need to communicate their intention to ISE Graduate Coordinator and obtain approval via the transition form signed by their advisor.
4. In general, no transfer credits earned prior to the granting of a master's degree, except for the 30 credit hours granted by Graduate School rules for a master's degree pertinent to the area of Ph.D. work, will be accepted as part of a student's doctoral program. However, a student may petition for approve of transfer of additional semester hours of course work based on the following conditions:
 - a. If the student is transferring within OSU, the credit transfer will be reviewed by the student's advisor based on the relationship to the student's intended program.
 - b. If the student is applying to the Ph.D. program from outside OSU, the credit transfer will be reviewed by the graduate studies committee.

B. Program Requirements

1. Minimum of 80 graduate semester credit hours beyond the baccalaureate degree is required. 30 semester hours credit will be granted for an appropriate earned Master's degree.
2. Minimum of 30 semester credit hours of graduate level courses beyond the Master's degree. The course work requirement consists of one primary area of concentration (15 hours), two secondary areas of concentration (12 hours: 6 hours for each secondary area), and Graduate Research Seminar (3 credits). To achieve the remaining 20 hours (minimum) of graduate credit hours required for the PhD degree (30 for MS + 30 ISE Ph.D. courses + 20 remaining = 80 total), students may enroll for any combination of research credit hours or additional graduate level course hours.
3. The primary area of concentration consists of at least 15 semester credit hours of graduate level course work. The primary area of concentration is a coherent theme of inquiry and study in support of the student's area of dissertation research.

4. Each secondary area of concentration consists of at least 6 semester credit hours of graduate level course work. A secondary area is also a coherent theme of inquiry and study. At least one secondary area of concentration must consist of courses taken outside of ISE; however, both secondary areas of concentration may be outside of ISE.
5. 3 semester credit hours of ISE Graduate Research Seminar (minimum).
6. For students pursuing a doctorate in Operations Research, a qualifying exam is required. The full description of this exam process can be found in Appendix B.
7. The Doctoral Candidacy Examination is normally administered at the completion of the Ph.D. course work.
8. Public presentation of the dissertation research proposal and work completed to-date. This is also commonly called the ISE Dissertation Proposal Colloquium.
9. Dissertation and Final Oral Examination.

Note: Students entering the PhD program directly from the BS degree typically (although not necessarily) fulfill the requirements for, and acquire, an ISE MS degree while engaged in accumulating the 30 hours of course work to complete the Ph.D. course requirements.

C. Candidacy Committee:

Upon arrival, each student is assigned to a temporary advisor. The student and the advisor examine the student's interests, background and goals in order to determine a primary area of concentration, and possible secondary areas of concentration. This effort will determine course work for the first semester. As soon as possible after arrival, the student should identify a faculty member whose teaching and research philosophy and interests coincide with those of the student. That faculty member will become the student's program advisor.

Ph.D. students can be advised by any tenure or research track faculty members **with a formal appointment or formal joint appointment** in the Integrated Systems Engineering (ISE) Department that has P status within the department. Ph.D. students can also be **co-advised** by a tenure or research track faculty outside ISE, who **has a courtesy appointment** in ISE and category P status within the department, and by an ISE tenure or research track faculty member with P status.

During the student's coursework, the student and the advisor will identify other potential faculty to serve on the student's Candidacy Committee. As a minimum, the Advisory Committee should include the advisor (Committee Chair), one additional faculty member representing the student's primary area of concentration, and one faculty member representing each secondary area of concentration. A minimum of **four** graduate faculty members are required for the Candidacy committee. A faculty member must have ISE Category P status in the graduate

school to serve as the Candidacy Examination Committee Chair. A faculty member must have at least Category P status (any program) in the graduate school to serve as a member of the committee. Those without either of these two qualifications may participate on the committee only with permission of the GSC. At this point a final program plan, which is signed by each committee member, should be submitted to the graduate studies coordinator. The student and his/her advisor must assemble the Candidacy Committee at least one semester prior to that student's Candidacy Exam.

The responsibilities of this Candidacy Committee are as follows:

1. Make recommendations about courses to be taken and assure sufficient depth in the primary and secondary areas of concentration.
2. Assist the faculty advisor in evaluating the student's progress and make recommendations that result from that assessment. (Course work plans may be altered or the program terminated.)

D. Program Plan

The student, with their advisor's assistance, should create an initial plan of study and complete the plan of study form that is available on the department's website. This form must be submitted to the graduate coordinator at the end of the student's second semester.

E. Monitoring of Progress

As the student progresses, the advisor will provide periodic evaluation and, if necessary, make program adjustments.

A Ph.D. student may be denied further registration if they have accumulated at least 100 semester hours of graduate credit and has not taken their Candidacy Examination, or 170 semester hours of graduate credit and has not completed their Final Oral Examination, and it is the judgment of the GSC in its annual evaluation of graduate students that the student is not making reasonable progress.

F. Candidacy Examination

Formal admission to Ph.D. candidacy is achieved through the successful completion of the Candidacy Examination, which is administered by the student's Candidacy Committee, under the rules of the Graduate School. If at all possible, the Candidacy Examination will not be administered until the student has fulfilled the University's residency requirements. When a student is ready to take their Candidacy Examination, they should obtain a Notification of Doctoral Candidacy Examination form through Grad Forms. The student should complete the Notification of Doctoral Candidacy Examination form via Grad Forms prior to commencing their Candidacy Examination. No time limit for the initiation of the Candidacy Examination is imposed, but it is recommended that it take place within one semester of the completion of program course work. Admission to candidacy for the doctoral degree

occurs at the end of the semester in which the Candidacy Examination is satisfactorily completed.

The Candidacy Examination is comprised of two parts: A written exam and an oral exam. Within ISE, the written exam entails the student receiving a set of questions from the committee members representing the major area and sets of questions covering topics pertaining to each of the secondary areas of concentration. Students have between two and four weeks to complete the written part of the exam, depending on their area within ISE. The two-hour oral component of the exam is scheduled approximately two weeks after the conclusion of the written exam. Attendance at the oral portion of the Candidacy Examination is limited to the student and members of the Candidacy Examination Committee.

Voting Procedures: The examination committee takes one or two secret ballot votes. The first ballot is a straw vote conducted immediately after the student leaves the room and before any discussion of his/her performance takes place. If the decision is not unanimous pass, a second and final ballot is taken after the student's performance has been discussed. The student is considered to have successfully completed the candidacy examination when there is no vote of unsatisfactory on the second ballot by the examination committee members

Upon successful completion of the Candidacy Examination, the student's Candidacy Committee is dissolved.

With reference to the Graduate School Handbook regarding Master's Degree on the Basis of Candidacy Examination, ISE doctoral students not having a Master's degree in ISE are not automatically granted a Master's degree in ISE upon completion of the Candidacy Examination.

Upon completion of the Candidacy Examination, the approval of the Candidacy Examination Report is completed by the committee members via Grad Forms.

G. Dissertation Committee

A dissertation committee will be collectively identified by the advisor and the student. This committee is responsible for guiding the preparation of a research proposal, guiding the progress of the dissertation research and conducting the final oral defense of the research. The committee should be identified as soon as there is consensus on the dissertation topic. It will consist of at least three members (one of which is the advisor), at least two of whom should be faculty in the ISE Graduate Program. The committee must be approved by the Graduate Studies Committee. This is accomplished by submitting the **dissertation committee approval form** (available on the website) to the graduate studies chair. If at least two members of the committee are not from ISE, a request for an exception can be made with a cover letter along the form explaining the reason for non-compliance. If at any time a change in dissertation committee membership occurs, including a new advisor, approval of the new dissertation committee needs to be obtained from the Graduate Studies Committee via re-submission of the above mentioned form.

H. Research Proposal

The student and the advisor should utilize the other committee members as resources while the student develops the dissertation research proposal. A final written version of the proposal must be presented to the student's committee for approval. An accompanying oral presentation to the committee is required so there is discussion regarding any outstanding issues. On the basis of the proposal and any comments or concerns raised, the Dissertation Committee **shall**: a) approve the proposal, b) recommend revision or additional proposal work, or c) reject the proposal. When the proposal is approved, the committee members sign part "B" of the Dissertation Committee Approval/Research Proposal Colloquium form. The process should follow the general process outlined in figure 1.

I. Colloquium

The student will develop a two-page structured abstract describing their dissertation proposal per the template that accompanies the **Proposal Colloquium form**. This must be submitted electronically to the graduate studies committee chair along with a hardcopy of the Dissertation Research Proposal Colloquium form, signed by all members of the student's Dissertation Committee certifying that the proposal is acceptable for presentation (Part "B" of the form). The abstract will be reviewed by the Graduate Studies Committee and modified as necessary to obtain approval. Once the Graduate Studies Committee approves the submitted abstract, a 150-word version of the abstract shall be submitted to the graduate studies coordinator for promotional purposes. The student will present the proposed research in a public forum known as the colloquium presentation. This should occur early in the research process. Usually this occurs within the first two semesters following admission to candidacy. This colloquium serves multiple purposes:

- (1) It provides an opportunity for the student to get feedback on their dissertation plans early in the research process.
- (2) It informs the ISE department and other interested individuals about the research being conducted within the department.
- (3) It communicates to future Ph.D. candidates the scope of dissertation research projects conducted within ISE.
- (4) It provides an opportunity for students to demonstrate their ability to present and discuss research concepts (consistent with program objective number 3).

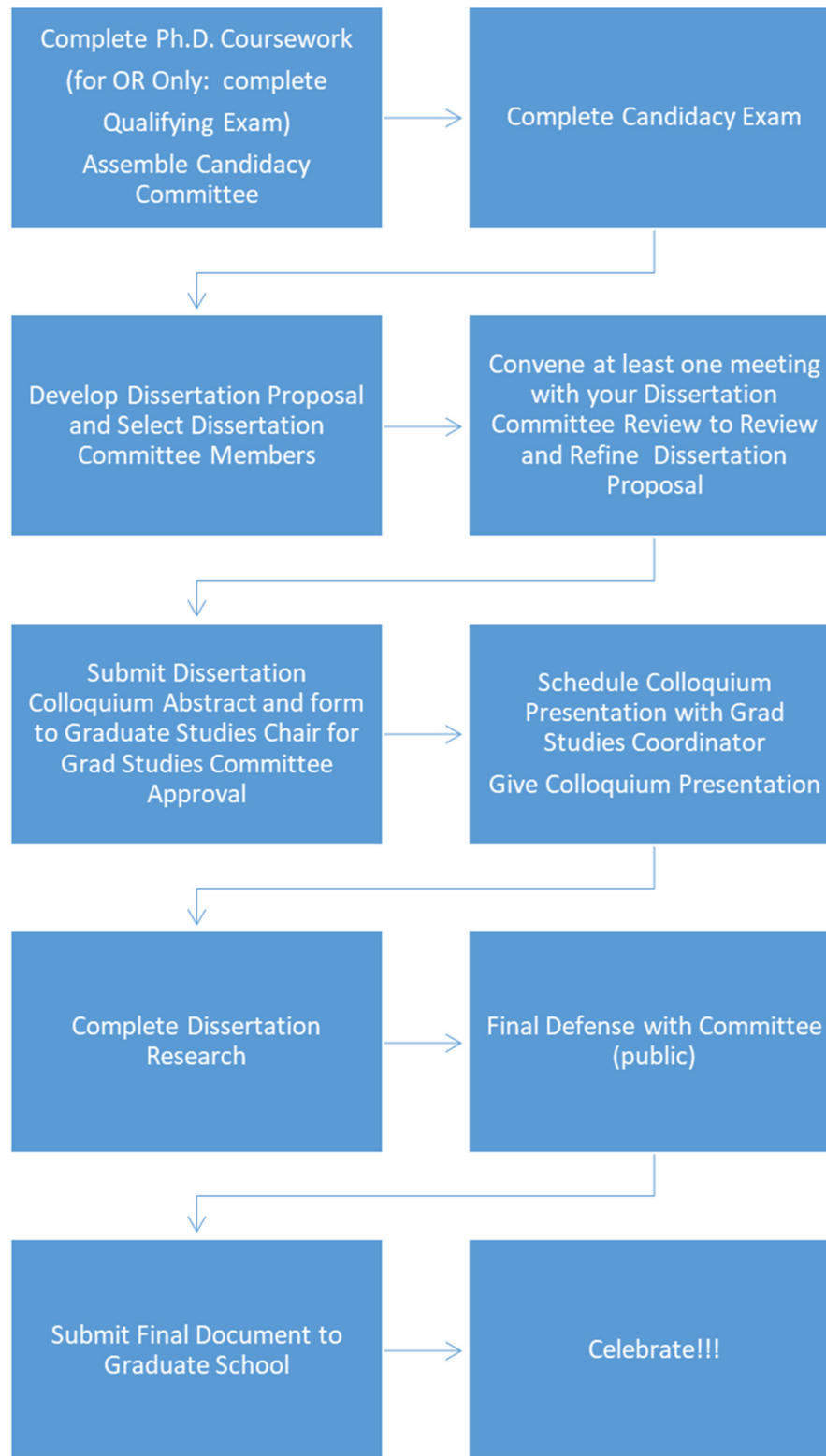


Figure 1. The recommended Ph.D. process map for completing the degree requirements.

This colloquium should occur very early in the dissertation work process. Therefore, it **must** occur at least the semester before, and preferably two semesters before, the final defense. If it does not, a letter requesting an exemption must be submitted and approved by the Graduate Studies Committee.

The graduate studies coordinator will inform the student about potential departmental seminar dates that are available for the student to present their dissertation proposal. There will likely be two or three students presenting during the same departmental seminar session. This means that the total time allocated for each presentation will be 20 to 25 minutes. The student should determine which of the available seminar dates would allow more of their committee members to be in attendance. While it is not required that the student's committee be in attendance, it is strongly recommended. The student's advisor or another committee member must attend. Once the best date is determined, the student should confirm the selected date with the graduate studies coordinator.

J. Final Defense

Upon completion of the research and submission of the final draft of the dissertation to the Dissertation Committee, the student will defend his/her dissertation according to the rules of the Graduate School.

The Final Oral Exam is open to students, faculty of this University, and other interested parties. The student's advisor is expected to post the dissertation topic and the date and time of the exam at least one week prior to the exam. Any such persons in attendance, who are not members of the Final Oral Exam Committee, function as observers only. Observer participation is at the discretion of the advisor.

Voting Procedures: the Examination Committee takes one or two secret ballot votes. The first ballot is a straw vote conducted immediately after the student leaves the room and before any discussion of his/her performance takes place. If the decision is not unanimous pass, a second and final ballot is taken after the student's performance has been discussed. The student is considered to have successfully completed the Final Oral Examination when there is no vote of unsatisfactory on the second ballot by the Final Oral Examination Committee members, including the Graduate School Representative.

K. Time Limits

The Ph.D. degree requirements must be completed within five years after being admitted to candidacy.

L. Graduation Semester Requirements

A student must be registered for three graduate credit hours during the semester of graduation.

XI. BS/MS PROGRAM

FOR GENERAL GUIDELINES SEE GRADUATE SCHOOL HANDBOOK

A. General Description

The ISE BS/MS Program is available to undergraduate students in ISE with very strong academic records. The combined BS/MS program allows undergraduate students to work toward an MS degree while concurrently completing their BS degree. The goal of the program is to encourage high-performing ISE students to obtain an advanced degree, thus furthering their education and academic preparation. If accepted into the program, the student is classified as a graduate student and may enroll in courses that can be simultaneously applied for credit toward both the BS and MS degrees.

B. Minimum Requirements

1. All current graduate admission requirements must be met.
2. All ABET requirements for a BS degree must be met upon graduation.
3. A student must have a 3.5 or higher cumulative GPA to enter the program.
4. A student must have completed a minimum of 90 undergraduate semester hours toward a BS degree prior to starting the program.
5. A student must have completed all GEC's prior to starting the program.

C. Timing

In most cases, the student enters the program at the start of their senior year. Application for the program is made by submitting a regular application to the Graduate School during the year prior, usually the Junior year. This requires that a graduate school application form be submitted with supporting documentation as detailed in the application instructions. Although applications can be accepted anytime, it is recommended that materials be submitted no later than the end of May.

D. Advantages

Technical elective courses (available for graduate credit) taken for the BS degree after admission to the BS/MS program can be applied simultaneously as credit for the MS degree in ISE. The combined BS/MS program allows as many as 10 semester hours of BS technical elective credit to be applied to the course credits required for the MS degree. *Retroactive credit for technical electives cannot be given.* Upon completion of the BS degree participating students should inform the ISE Graduate Studies Chair regarding the technical elective credits they intend to apply to their MS program of study.

E. Funding

A potential disadvantage of the BS/MS program is that graduate school tuition is higher than undergraduate tuition. This may be a factor if the student is not successful in obtaining a graduate fellowship or graduate associate position which covers tuition and fees. Inquire with the ISE Undergraduate Coordinator about the availability of scholarship support to make up the difference between graduate and undergraduate tuition costs. Students in the combined BS/MS program are eligible to compete for Ohio State University Fellowships, research, teaching, or administrative associate positions. Graduate fellowships and associate positions typically pay tuition and fees as well as a monthly stipend. Interested students are encouraged to confer with ISE faculty members during the application process and the pursuit of a graduate associate position. After the completion of the senior year and all undergraduate requirements, the student may leave the program with the BS degree or continue on to complete the MS degree.

APPENDIX A: COMMON FORMS FOR MS STUDENTS

Checklists concerning degree procedures and graduation requirements are listed in the Graduate School Handbook. Please note that forms related to graduation and final examinations should be accessed electronically at GRADFORMS.OSU.EDU.

1. ISE MS Plan of Study Form – A Plan of Study is a paper form that must be filed with the ISE Graduate Program Coordinator prior to registration for the student's second semester of study. The completed Final Plan of Study (same form) must also be submitted concurrently with the student's Application to Graduate form. Available on ISE website.
2. Application to Graduate (Master's Degree) – Application is valid for one semester only. Go to GRADFORMS.OSU.EDU.
3. Master's Examination Report – Go to GRADFORMS.OSU.EDU.
4. Thesis Approval Form – Go to GRADFORMS.OSU.EDU.
5. Application for Admission to the Ph.D. Program – Paper form that must be filed with the ISE Graduate Program Coordinator at the same time as the Master's Examination Report for those who wish to continue enrollment toward the Ph.D. degree. Available on ISE website.

APPENDIX B: OPERATIONS RESEARCH QUALIFYING EXAM

This section outlines the policies and guidelines for the PhD qualifying exam for PhD students in the Operations Research program. Exceptions are described at the end of the section for students who needed to retake the old format, i.e., written qualifying exam.

Overview

The goal of this oral exam is to ensure PhD students have:

- 1) Sufficient core background in Operations Research in order to make good progress towards the Candidacy Examination.
- 2) Some preliminary experience with an ISE faculty research advisor, demonstrating a basic ability to identify and explore a research area.

The exam material is based on all courses listed as Fundamentals for Ph.D. Students in the [OR grad curriculum sheet](#).

Exam timeline and scheduling

Scheduling timeline

Students must take their qualifying exam before the end of the **1st semester of their 2nd year in the PhD program**. For students starting in Autumn, this is the autumn semester of their second year in the program. For students starting in Spring, this is the spring semester of their second year in the program. It is suggested that the exam is scheduled during the 2nd semester of the 1st year, if possible, for timely progress. Exceptions will be considered on an individual basis.

Two qualifying exam attempts are allowed. If asked to retake the exam, the second attempt must be scheduled in the semester following the first attempt. Failure to schedule the exam according to this timeline will be counted as a failure. Students are allowed to take their exams ahead of this timeline with their advisor's approval.

Exams can take place at any time during the year subject to the approval of the Qualifying exam committee.

All PhD students, who have not passed the exam by the 2nd week of the 3rd semester, should file an application to graduate for an MS degree with the graduate school prior to the deadline in their third semester (3rd Friday), assuming they will have completed the 30 credit hours required for a MS degree at the end the third semester. This will allow them to receive a MS degree that semester, assuming they complete the MS degree requirements, even if they don't pass the exam. Students entering with a MS degree, which is supplying 30 credit hours towards their PhD degree, will need to cancel their application to graduate when passing the exam so that their prior MS degree will still count towards their PhD credits hours.

Scheduling procedure

Students should fill out the "ISE OR Request for the PhD Qualifying Exam" form by the third Friday of the semester in which their exam is to be scheduled. This form, along with the student's advising report, should be emailed to the ISE graduate program coordinator. The advising report

should show that the student has already taken, or is currently taking, all the OR PhD required courses (see also the “Results” section below for more information).

Exam format and guidelines

Oral exam committee members

The Qualifying exam committee will consist of three ISE OR faculty members. The student’s advisor will be on the committee. One of the other two members will come from the “Probabilistic” area and the other will come from the “Deterministic” area. Both will be selected by a person designated by the OR faculty. These committee nominees will be to the Graduate Studies Chair for final approval. Currently, the person designated by the OR faculty is the liaison between the department chair and the OR faculty. If there is some faculty member who is considered unacceptable to the student or advisor, this fact along with justification should be communicated to the designated OR faculty member who is making the selections.

Oral examination procedures

The exam will be a 90-minute oral exam. It consists of a 10-minute presentation by the student, followed by 80 minutes of questions/answers from the committee.

The 10-minute presentation will be an uninterrupted presentation on a research problem chosen by the student and their advisor. The student may present their ongoing research work, if any. Alternatively, the student will start working on a research problem with their advisor at the beginning of the semester in which they are taking the oral exam, and present their progress (e.g., problem statement, brief literature review, and/or a proposed solution approach) during the 10-minute presentation.

The presentation will be followed by 20 minutes of questions by each committee member, followed by a second round of questions by any committee member. These will be on fundamental knowledge and basics from the ISE OR coursework and will cover all the three main areas (i.e., Statistics, Stochastics, and Optimization). The questions need not be on or related to the presentation.

Scoring

Upon completion of the oral exam, each committee member will provide one of the following three scores:

- 2 (pass): Student shows good knowledge of fundamental concepts covered in the ISE OR coursework, as well as ability to apply this knowledge and propose solutions to (open-ended) research problems.
- 1 (marginal): Student shows overall knowledge of fundamental concepts from coursework and some ability to solve research problems. However, student has difficulty when solving questions posed from coursework and/or extending this knowledge to propose solutions to research problems.
- 0 (fail): Student has difficulty in recalling fundamental concepts and/or answering questions from the ISE OR coursework and/or approaching research problems.

Results

To pass the qualifying exam, the student should receive (a) a cumulative score of 4-6 in the oral exam, and (b) satisfactory grades on the OR PhD required courses. Failure to meet either of these two criteria (i.e., a cumulative score of 0-3 in the oral exam, and/or subpar performance in the required courses) will lead to failing the qualifying exam.

Individualized recourse plans will be proposed by the committee for students who fail to pass the exam. This may include taking additional courses in one or more of the three exam areas and obtaining a minimum grade of B+ in each course or retaking the exam in the next semester.

If a second exam is required, it is expected that all members of the new Qualifying exam committee will be different, except for the advisor.

Exceptions for Students Who Have Taken the (Previous) Written Exam

Exception: students with a conditional pass during previous Qualifying Exams will not be required to do the 10-minute presentation. They will only answer questions to a (smaller size) committee in the area in which they received a conditional pass. For instance, if the student had already passed optimization in Spring 2022, then the optimization section will be removed from the exam: 20 minutes will be removed from the exam length, and the committee will have 1 less member assigned.

Such students are expected to complete the new qualifying exam by Autumn 2023.

APPENDIX C: COMMON FORMS FOR PH.D. STUDENTS

Checklists concerning degree procedures and graduation requirements are listed in the Graduate School Handbook.

1. ISE Ph.D. Plan of Study Form - A Plan of Study is a paper form that must be filed with the ISE Graduate Program Coordinator prior to registration for the student's second semester of study. The completed Plan of Study (same form) must also be submitted concurrently with the student's Notice of Candidacy Examination form. Available on ISE website.
2. ISE OR Request for the PhD Qualifying Exam" form (on department's website)
3. Notification of Candidacy Examination – Go to GRADFORMS.OSU.EDU.
4. Candidacy Examination Report – Go to GRADFORMS.OSU.EDU.
5. Dissertation Committee Approval/Research Proposal Colloquium – This is a paper form that should be submitted to the ISE Graduate Program Coordinator by the end of the semester following the semester in which the Candidacy Examination is passed. Available on ISE website.
6. Application to Graduate (Doctoral Degree) – Go to GRADFORMS.OSU.EDU.
7. Draft Approval/Notification of Final Oral Examination – Go to GRADFORMS.OSU.EDU.
8. Final Oral Examination Report – Go to GRADFORMS.OSU.EDU.
9. Final Approval –Ph.D. Dissertation – Go to GRADFORMS.OSU.EDU.

APPENDIX D: MISCELLANEOUS FORMS

1. Senior Petition – Used by undergraduate students who wish to earn graduate credit for courses taken before receipt of a baccalaureate degree. <http://www.gradsch.ohio-state.edu/graduate-school-handbook1.html>
2. Request for Transfer of Academic Unit – Used to change department in which a student is registered. <http://www.gradsch.ohio-state.edu/graduate-school-handbook1.html>
3. Student Advisor Form – ISE Graduate Program paper form used to assign or change advisors. Must be submitted to the ISE Graduate Program Coordinator. Available on ISE website.