USC Viterbi
School of Engineering
Daniel J. Epstein Department of Industrial and Systems Engineering

www.usc.edu/dept/ise

Ph.D. Handbook
2025-2026

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DISCLAIMER

This handbook is produced by the Daniel J. Epstein Department of Industrial and Systems Engineering as an unofficial guide to graduate studies in the department. The source for much of the information in this booklet is the *USC Catalogue*, the document of authority for all students of the University of Southern California. Degree requirements listed in the *USC Catalogue* supersede any information which may be contained in any bulletin of any school or department. The *USC Catalogue* is updated and published annually by the University of Southern California.

Although the University of Southern California, the School of Engineering, and the Daniel J. Epstein Department of Industrial and Systems Engineering have many resources to help each student achieve his/her desired education and training goals, it is ultimately the student's responsibility to see that all requirements for graduation are satisfied.

"Students are expected to be familiar with university policies and to monitor their own academic progress. They should keep all records of official grades earned, degree requirements met, transfer credits accepted and actions taken on requests for substitutions or exceptions to university policies and regulations."

--USC Catalogue

For additional information on USC or the Daniel J. Epstein Department of

Industrial and Systems Engineering,

go to www.usc.edu/dept/ise

Faculty Advisor

Upon admission to the program, the student will be assigned a Faculty Advisor, a research active member of the ISE Faculty. The Faculty Advisor will help the student select courses and develop the study plan. Students are required to obtain advisor approval before enrolling in courses and prior to selecting courses for the PhD screening exam.

Study Plan

At least two weeks prior to the screening exam, the student must submit a *proposed* study plan[1] that has been approved by the Faculty Advisor. This plan will identify all courses that are intended to satisfy the various requirements of the degree, and the semesters in which they will be taken. The study plan should form a coherent body of coursework fulfilling the student's academic and professional objectives. The study plan will be reviewed as part of the screening process, and the Faculty will have the opportunity to suggest changes in the study plan. Subsequent to screening, the Graduate Committee will be responsible for approving the study plan and any changes to the study plan. Until approval is granted, the study plan will be considered tentative.

The study plan will include all courses that satisfy prerequisite deficiencies, which are not counted toward the degree. In addition, the study plan will include courses taken in preparation for the screening examination, as well as courses taken in preparation for dissertation research.

[1] The PhD Study Plan Form can be found at the end of this handbook.

The ISE Ph.D. requires 60 units of coursework, which meet the following requirements:

PhD Seminar: ISE 651, 1 unit each for three semesters	3 units
ISE-790 Directed Research Including 1 or more units prior to screening exam	2 units
Core Courses: Minimum of three core courses from the USC ISE Department (refer to list on pages 12 & 13 within this handbook; substitutions not allowed)	12 units
Concentration: Minimum of three courses from selected ISE concentration, defined as: Optimization Stochastics Modeling Data Science (Refer to list in Appendix on pages 12 & 13 within this handbook of acceptable courses; substitutions allowed with prior advisor approval)	12 units
Dissertation: ISE-794, 2 units per semester, for 2-4 semesters Enrollment begins after passing the qualifying exam	4 units
Electives: All electives must be approved by advisor prior to enrollment in courses	27 units
Other Course Requirements:	
USC Course Minimum No more than 30 previously earned graduate units at USC or elsewhere may be applied toward the PhD.	30 or more units
ISE Course Minimum: Minimum of 24 graduate units must be completed in the ISE department, other than 651, 790, or 794 (transfer of graduate ISE credits from elsewhere permitted with advisor approval)	24 or more units
Independent Study No more than 13 units of 790 and 794 may be applied toward the PhD.	13 or fewer units
Dissertation Maximum No more than 8 units of 794 may be applied toward the PhD	8 units

Satisfactory Academic Progress

Students pursuing a Ph.D. must maintain an overall cumulative grade point average of at least 3.5[2]. If a student's cumulative GPA falls below 3.5 at the end of any semester, the overall average must be raised to at least 3.5 by the end of the following semester; otherwise the student will be dismissed from the program.

Screening Examination

The Ph.D. screening examination must be taken within three semesters of admission to the PhD program, and prior to the completion of 24 units. The examination is intended to provide an opportunity for the faculty to assess the student's intellectual and creative capabilities, knowledge of industrial and systems engineering, and likelihood of completing the Ph.D. program.

The core courses associated with the screening exam involve one specific course in each of the following topical areas:

ISE 610: Advanced Design of Experiments and Quality Engineering
ISE 620: Foundations of Stochastic Processes
ISE 631: Linear Programming
ISE 662: Advanced Decision Theory

All PhD students are required to complete at least **3** of the specified courses. A student who has achieved a GPA of at least 3.3 in the core courses is eligible for screening. A student who has not achieved at least a 3.3 in the core courses may petition the Graduate Committee for permission to be screened. Students who can document that they have completed similar courses elsewhere may petition the graduate committee regarding the substitution of these courses for screening purposes. As part of the screening process, written examinations will be offered in each of the four topical areas. Students are required to take two of these examinations, and are free to choose the exams that they take.

In addition to the core courses, students are required to complete at least 1 unit of ISE 790 (Directed Research). This research experience is intended to examine the student's capacity for independent and creative inquiry, and must be completed prior to the date on which the written exams are offered. The output from this research experience will include a written document (**three to five pages**) which serves as a report of their findings, and a **20-30 minute** oral presentation to the faculty. The Faculty intends for the research component of the screening process to be highly individualized, and recognize that it may vary greatly among student-advisor pairings. The DR may involve activities such as:

- Design and verification by experimentation (hardware and/or software based)
- Critical review and/or analysis of a small number of paper (e.g., 1-3)
- Survey or review of a body of literature.

Students who pursue an alternate form of the directed research are advised to seek feedback from the Graduate Committee regarding the suitability of the project for screening purposes.

[2] This is calculated based on grade points earned in all post-baccalaureate courses taken at USC that are number 400 or higher.

The screening exam will be offered at the start of each fall semester, and may be offered during the spring semester as well if there is a sufficiently large group of students who request screening at that time. The sequence of events associated with the screening process is as follows:

1. Students complete at least three core courses and the directed research requirement within the first year of their PhD studies.
2. Thirty days prior to the examination date, the student submits to the ISE Graduate Committee a formal request to be screened. This request must include a statement from the student's Faculty Advisor stating that (a) the student has met all the requirements to take the screening examination and (b) he/she is willing to continue guiding the student through the completion of the degree program. The advisor will also approve/confirm which written exams the student is to take.

   If the request to be screened is denied by the Graduate Committee, an explanation of the basis for the denial will be provided.

3. The written exams will be open book / open note / open course materials. The exams will be constructed such that they can be completed by a well-prepared student within one hour. The student will be required to complete the two exams that he/she selects within a three hour block of time; the student will receive both exams simultaneously and will allocate his/her time as necessary. **Computers, laptops, and handheld devices are not allowed during the exam.**

   The exams will not be released to any student, either before or after the exam takes place, although a student may review his/her exams after the screening process has been completed.

4. The written exams will be graded by a faculty team. The results of the Directed Research component of the screening process (i.e., the written and oral portions) will be determined by the faculty member who guides the Directed Research.

5. The result of the screening examination is determined by the faculty present at a faculty meeting following the completion of the doctoral screening examination. The faculty will take into account the student's performance on the examination, compatibility of research interests with the faculty, the summary of each student's academic performance to date, and any additional relevant information. The result of the examination will be one of the following: (a) pass, (b) fail, or (c) repeat screening. A pass or repeat requires majority approval of the faculty present.

   - A passing grade signifies that the student has successfully completed the screening examination and is invited to continue the doctoral program on a full-time basis.

   - A failing grade signifies that the student has not passed the screening examination and is not eligible to continue in the doctoral program.

   - A repeat grade indicates that the student, although not having passed the examination, is invited to undertake a second attempt at screening. Students given a repeat grade will be expected to take the examination a second time in the following semester. In this case, students must successfully complete the screening process the next time it is offered. The student will not be eligible for screening beyond that time.

Guidance Committee

After successful completion of the screening process, the student should begin to identify faculty members to serve on his or her Guidance Committee. The qualifying committee consists of 5 members including your faculty advisor; at least 3 must have primary appointments in the ISE department. At least 1 member must be from outside of the ISE department. A non-USC faculty member may serve on the committee but will not count as an "outside member". The Guidance Committee is not considered official until the Request for Qualifying Examination is filed with The Graduate School.

Qualifying Examination

The qualifying examination is taken after passing the screening examination and completion of at least 24 units within the Ph.D. program. It is to be taken by the end of year 3 or 6 semesters of the Ph.D. program. The Appointment of the Qualifying Committee form must be initiated through DocuSign at least 30 days before qualifying exam. The examination is intended to determine the student's ability for original and scholarly research and the student's ability to successfully complete a Ph.D. dissertation.

The examination can be scheduled at any time during the semester provided that all members of the Guidance Committee are available. All portions of the examination must be passed within 60 days of the start of the written examination. After passing the qualifying examination the Ph.D. student is admitted to candidacy by the Dean of Graduate Studies and the Dissertation Committee is established. After qualifying, students will normally engage in at least one year of full-time graduate study and research on campus.

Students who fail the qualifying examination may be allowed, at the discretion of the Guidance Committee, to retake the examination. In such cases, the second attempt will be made no sooner than 6 months and no later than 12 months after the failed attempt. Students who are not allowed to retake the qualifying examination, fail to qualify on the second attempt, or fail to retake the qualifying examination within the allotted timeframe will not be eligible to continue the Ph.D. program.

Structure of the Examination

At least 28 days prior to the oral examination, the student must submit a written proposal for his or her dissertation research to the chair of the Guidance Committee aka Faculty Advisor. Failure to submit on time will cause the oral examination to be postponed.

The proposal should include a statement of the research topic and intended research contribution, a review of relevant literature from archival journals, the proposed methodology for addressing the research topic, and a research plan. The chair of the Guidance Committee must then distribute the proposal to all committee members at least 25 days in advance of the oral examination.

The oral examination consists of two parts. In the first part, lasting up to 45 minutes, the student will give a presentation on his or her proposed research. Committee members will have the opportunity to ask questions for the purpose of clarification during the presentation. These

questions are not intended to test the student. The second part of the oral examination may last up to 60 minutes. During this time, committee members will ask questions pertaining to the presentation, and the written proposal. The objective of the questions is to assess the student's abilities within the proposed area of research and abilities for dissertation research.

After the student completes the second part of the oral examination, the committee will meet in private to discuss the student's performance in the examination. The outcome of the exam is based on the student's total performance in the examination, combined with the student's academic record. A student who is retaking the exam and fails to qualify will not be offered any additional opportunities to qualify. In the case of either a retake or a fail, the committee chair will be responsible for explaining the basis for the decision to the student and for summarizing the performance that is expected to pass a retake (if applicable).

Qualifying Examination Timeline

Deadline	**Action**
30 days prior to proposal submission	Student initiates Qualifying Committee form Student's proposal should be complete or nearly complete
28 days prior to oral examination	Student submits written proposal to chair of committee*
25 days prior to oral	Committee chair distributes proposal to Guidance Committee
Oral examination day	Student presents proposal, responds to questions Committee meets in private to make decision
60 days after start of written examination	Qualification examination must be completed no later than this day

* Failure to meet deadline will cause the oral examination to be postponed.

Dissertation

Upon passing the qualifying examination, the student may form the Dissertation Committee. Please see the *Catalogue* for regulations pertaining to the Dissertation Committee. To obtain the Appointment of Committee form, go to https://viterbigrad.usc.edu/academic-services/forms/. Signatures obtained through DocuSign.

Students must register for ISE 794a in the first semester after passing the qualifying examination, and may register for ISE 794a in the summer if qualifying occurs in the spring.

Dissertation guidelines are available from The Graduate School at https://www.usc.edu/schools/GraduateSchool/current_thesis_dissert_02.html

The student is advised to keep all members of the Dissertation Committee apprised of his or her progress toward completing the research and the dissertation. This can be accomplished by periodically providing the committee members with drafts of the dissertation, or by other means agreeable to the student and to the committee.

A draft of the dissertation that is sufficiently complete to be used as a basis for the defense is due to the Dissertation Committee at least 60 days prior to the defense.

It is highly recommended that the student obtain all the necessary forms from The Graduate School for completing and submitting the dissertation. The Appointment of Dissertation Committee form MUST be submitted to the department at least 30 days before the defense date. DO NOT wait until the last minute as this could delay your defense date. The form must be signed by all committee members, department chair, and the Dean before the defense can take place.

Time Limit for Degree Completion

Most Epstein ISE doctoral students are admitted to the doctoral program only after completing an applicable master's degree, normally an MS degree. For students who earned an applicable master's degree within five years prior to admission to the Epstein ISE doctoral program, the time limit for completing the doctoral degree is six years from the date of admission to the doctoral program.

The Epstein ISE faculty expects that most students will be able to complete their doctoral program within five years from the date of admission to the program. The Department tracks student progress in this dimension. At the end of a student's fifth year in the program, he or she will be notified that one year remains for him or her to complete the requirements for his or her degree, and the student will be required to submit a progress plan for the remaining year to the Department Chair and his or her advisor.

If the student expects to require more than one year to complete his or her program, and the student's advisor attests to the student's progress and likely success, the student will be instructed to petition for a one-year extension in the time permitted to complete the degree. The Department will normally permit a single one year extension beyond the standard six-year time limit. The Department will not normally grant requests for a second, one-year extension.

Leave of Absence

All graduate students must be continuously enrolled at USC, except for summers. Registration at other institutions without prior department approval is prohibited. See the *Catalogue* for specific residence requirements.

Students who cannot comply with the continuous enrollment requirement may petition to The Graduate School of a leave of absence of up to one year. The student must report the reason for the petition and obtain endorsements from both the Guidance Committee chair and the ISE Department Chair.

The period during which a leave of absence is in effect does not count against the time limit for degree completion.

The Epstein Institute

APPENDIX: List of Courses Satisfying Concentration and Core Requirements

Course	Optimization	Stochastics	Modeling	Data Science	Category	Department Research Areas
ISE 610 Advanced Design of Experiments and Quality Engineering				**Spring**	**CORE (3 of 4)**	
ISE 620 Foundations of Stochastic Processes		**Fall**				
ISE 631 Linear Programming	**Fall**					
ISE 662 Advanced Decision Theory			**Spring**			
ISE 612 Quantum Algorithms	x				**Optimization**	**Optimization and Systems Modeling**
ISE 616 / CSCI 616 Interdisciplinary Approaches to Data-Driven Decision Making	x	x	x	x		
ISE 617 / CSCI 617 Machine Learning for/win Mixed-Integer Optimization	x		x	x		
CSCI 619 / ISE 619/DSO 619 End-to End Learning and Optimization	x	x	x	x		
ISE 630 Foundations of Optimization	x		x	x		
ISE 632 Network Flows and Combinatorial Optimization	x		x			
ISE 633 Large Scale Optimization for Machine Learning	x		x	x		
ISE 635 Mixed-Integer Optimization	x		x			
ISE 637 Equilibrium Programming	x					
ISE 638 Stochastic Programming	x	x	x			
CSCI 659 Introduction to Online Optimization	x					
CSCI 699 Trustworthy Machine Learning from an Optimization Lens	x					
CSCI 671 Randomized Algorithms (ISE 671)	x	x				
CSCI 672 Approximation Algorithms	x					
ISE 615 Reinforcement Learning and Control Theory		x	x	x	**Stochastics**	**Statistics and Machine Learning**
ISE 616 / CSCI 616 Interdisciplinary Approaches to Data-Driven Decision Making		x				
ISE 626 Advanced Topics in Stochastic Models		x				

ISE 638 Stochastic Programming	x	x	x		
ISE 505 Modeling Health Policy		x	x		
CSCI 671 Randomized Algorithms (ISE 671)	x	x			
DSO 677: Dynamic Programming and Markov Decision Processes		x			
DSO 699: Modern Statistical Inference		x		x	
DSO 699: Fundamentals of Probability for Data Science and Operations Research		x			

ISE 505 Health Policy and Medical Decision Making		x	x		Modeling	**Operations, Supply Chains and Transportation** **Risk, Economics and Decision Analysis** **Healthcare Policy and Economics**
ISE 513 Logistics and Inventory Systems			x			
ISE 514 Advanced Production Planning and Scheduling			x			
ISE 537 Financial Analytics			x			
ISE 563 Financial Engineering			x			
ISE 615 Reinforcement Learning and Control Theory		x	x	x		
ISE 632 Network Flows and Combinatorial Optimization	x		x			
ISE 633 Large Scale Optimization for Machine Learning	x		x			
ISE 635 Mixed-Integer Optimization	x		x			
ISE 638 Stochastic Programming	x	x	x			
DSO 671: Inventory Models and Supply Chain Management			x			
ISE 615 Reinforcement Learning and Control Theory		x	x	x	Data Science	**Computational, Data-Centric and Technological Systems** **Statistics and Machine Learning**
ISE 625 Analytics for Social Impact				x		
ISE 633 Large Scale Optimization for Machine Learning	x		x	x		
CSCI 678 Theoretical Machine Learning Units				x		
DSO 604: Causal inference with Modern Machine Learning Methods -				x		
DSO 699: Modern Statistical Inference		x		x		
EE 546 Mathematics of High-Dimensional Data				x		
MATH 547 Mathematical Foundations of Statistical Learning				x		