Graduate student handbook
Systems Engineering, PhD

2022-2023
School of Manufacturing Systems and Networks
msn.engineering.asu.edu/graduate
# Systems Engineering, PhD

## 2022-2023

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PhD Systems Engineering

Program Overview
The Doctor of Philosophy (PhD) in Systems Engineering is a trans-disciplinary graduate program offered by The School of Manufacturing Systems and Networks. The program is aimed at advancing the understanding of complex engineering systems, where these systems are inclusive of technological aspects as well as social, cultural, environmental, and other interacting components that impact the input, output, and interactions within a system. The program will prepare students to identify, model, analyze, interpret, optimize and manage the multidimensional interactions of the ever-increasing complexity of modern societal and technological challenges. A typical incoming student in this program would have a master's degree in engineering or related discipline. Students will be required to complete a core of three courses of three credits each. The core provides the foundation for systems thinking, systems identification, systems modeling, systems design and analysis, and perspective taking using diverse disciplinary methodological approaches. Students graduating from this PhD degree program will possess the necessary expertise to advance systems integration of key industry and government sectors, and to contribute to the body of knowledge on interdisciplinary methods, techniques, and strategies for designing and managing complex systems over their life cycle.

Possible discipline areas include:

- Automotive Systems Engineering
- Energy Systems Engineering
- Environmental Systems Engineering
- Manufacturing Systems Engineering
- Robotics Systems Engineering
- Software Systems Engineering

This handbook has been developed for students that are enrolled in or considering applying for admission to the PhD in Systems Engineering degree program in the School of Manufacturing Systems and Networks. The objective is to provide program specific information regarding admissions, curricular requirements and both university and programmatic policies and procedures. As such, this handbook is complimentary to the School of Manufacturing Systems and Networks Graduate Handbook and to the ASU Graduate College Policies and Procedures Handbook. It is the responsibility of the student to obtain and familiarize themselves with these documents.

The program is in the School of Manufacturing Systems and Networks, one of the seven Fulton Schools of Engineering. The program webpage can be found at: [https://msn.engineering.asu.edu/degrees/systems-engineering-phd/](https://msn.engineering.asu.edu/degrees/systems-engineering-phd/).
Admission Requirements
Admission to the PhD in Systems Engineering program requires the completion of all general admission requirements and procedures set forth by Graduate Admission Services. For general information on applications, deadlines, international requirements, application requirements, and other information, please see Graduate Admission Services. Prior to submitting an application to Graduate Admission Services, applicants should review the information provided in this handbook regarding the degree program, including specific application requirements and deadlines.

Submission of an Application
For admission information and procedures, review the How and When to Apply For Graduate Admission website. Applications for all graduate degree programs and non-degree status must be submitted via the application website.

Admitted students who are unable to start their programs in their admitted term can request to defer their start to the next admissible semester. Deferrals may impact student funding and are subject to faculty approval. Students may submit a request to defer through their MyASU.

Application Deadlines
Complete applications must be received by the application deadline for full consideration.

<table>
<thead>
<tr>
<th>Fall semester (August)</th>
<th>January 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring semester (January)</td>
<td>August 1</td>
</tr>
</tbody>
</table>

Admission and Eligibility
Admission to the PhD in Systems Engineering program requires completion of a Bachelor or Master of Science degree in an Engineering discipline or a closely related field from a regionally accredited institution or the equivalent from an international institution that is officially recognized by that country in engineering, physical sciences, mathematics or a similar field. In addition to an applicable Master’s degree, admission requires a minimum of a 3.0 cumulative GPA (scale is 4.0 = A) in the Master’s degree program. The number of students admitted to the program is limited, and admission is, as a consequence, competitive.

In addition, students that have demonstrated exceptionally good performance in their undergraduate programs can, upon completion of their BS in Engineering, be admitted to the direct BS to PhD program. This track requires a cumulative undergraduate GPA of 3.50/4.0 or better coupled with a record of research and/or leadership accomplishments.

Applicants must meet the following admission requirements:
- A bachelor’s and/or master’s degree in engineering, physical sciences, mathematics or a similar field.
• Minimum of a 3.00 cumulative GPA (scale is 4.0=A) in the last 60 hours of a student’s first bachelor’s degree program.
• Minimum of 3.00 cumulative GPA (scale is 4.00=A) in graduate work, if applicable
• Official transcripts from undergraduate and graduate programs
• Official GRE general exam scores
  o A GRE Waiver may be requested for PhD Systems Engineering applicants with a completed undergraduate engineering degree from a U.S. ABET accredited undergraduate program with 3.0+ cumulative GPA, or applicants with a completed MS degree from a U.S. ABET accredited undergraduate program.
• Two (2) letters of recommendation (at least one of which must be a faculty member at an institution attended by the applicant)
• A professional CV/resume
• Statement of research interests as part of the online admissions application
• International applicants must also meet the English proficiency requirements, as defined by Graduate Admission Services. Please be sure to review the TOEFL, IELTS, Duolingo, or PTE score requirements, as your application will not be processed without valid proof of English proficiency.
• For students with a BS applying for PhD program directly, a letter of support from the Engineering faculty interested in supervising/chairing the committee is required.

A complete PhD Systems Engineering application for admission includes the following items:
• An online Graduate Admission application, including attachments of the following documents:
  o Resume or CV
  o 300-500 word Statement of Research Interests (more details in online application)
  o Writing Sample (more details in online application)
• Transcripts from each college and/or university attended
  o Unofficial transcripts can be uploaded directly to the online application. Official transcripts will be required if admitted.
• Official GRE general exam scores
• International applicants must also meet the English proficiency requirements, as defined by Graduate Admission Services. Please be sure to review the TOEFL, IELTS, or PTE score requirements, as International applications will not be processed without valid proof of English proficiency.

**Evaluation of Applications**
There are many factors that will be considered in evaluation of applicants for this program. These include cumulative GPA, institutions the applicant has attended, the Statement of Research Interests, writing sample, research experience, letters of recommendation, performance on the GRE and other standardized tests, performance in individual courses, and the number of positions available in the program.
Academic units submit recommendations regarding admission decisions to Graduate Admission Services; only the Dean of Graduate Admission can make formal offers of admission. Applicants are able to monitor the status of their application through My ASU. If admitted, the formal letter of admission can be downloaded from My ASU. If denied admission, letters are sent via email to the address on record.

**Financial Aid + Funding Opportunities**
Several resources are available to help students understand how to finance a graduate degree. We recommend visiting Pay for your Graduate Education via Graduate College, and Paying for College via Financial Aid and Scholarship Services. For an estimated cost of enrollment, visit: Standard Cost of Attendance.

The Funding Opportunities page within the School of Manufacturing Systems and Networks site is intended to be a resource for doctoral students to learn more about funding and fellowship opportunities. Additionally, students may also review the Fellowships and Funding page for the Fulton Schools of Engineering.

Research Assistantships (RA) and Teaching Assistantships (TA) may be available but are not a guarantee with admission. If assistantships are available, the positions are managed within the program’s department. Interested students should discuss their research interests with the Systems Engineering faculty members.

**Program Requirements**
The PhD degree is the highest academic credential conferred by the University. Attainment of a PhD requires that a student demonstrates the capacity to produce and sustain original independent research in the chosen field and that this research be validated through at least two examples of respected external endorsements indicating that the research has produced significant results. Examples include two or more publications in reputable peer reviewed journals, publication in two or more highly reviewed and exclusive conference proceedings, issuance of patents based on the research, or a combination of these measures. It is the responsibility of the student and the committee chair to establish the efficacy of the research within the broader academy before the final oral defense is scheduled. The process and curriculum described below is designed to lead students through the attainment of a high degree of technical maturity, into candidacy, and finally to the production and oral defense of a written dissertation.

The PhD degree requires a minimum of 84 credit hours beyond the bachelor’s degree, not including deficiency courses. A maximum of 30 credits can be transferred from a Master’s degree. Credits transferred from an accelerated Master’s degree may only include those that were not used as part of undergraduate degree requirements.

All students enrolled in the PhD in Systems Engineering must complete the core courses as early as is reasonable in their program. Students pursuing the PhD straight from the bachelor’s program need to delay taking EGR602 until majority of electives have been taken (i.e. second fall semester).
If the faculty committee determines that a student needs additional preparation before taking one or more of the core courses, they may be assigned required deficiency courses. The required deficiency courses may not be used as part of the Plan of Study, although the grades received in these courses will be used in computing the overall GPA.

These 84 credit hours must include the following:

**Core Requirements (9 credits)**
- EGR 602: Principles of Independent Research
- EGR 608: Advanced Simulation
- EGR 611: Complex Engineering Systems

**Foundation Area Course Requirements (3 credits)**
Students are required to complete 3 credit hours of coursework from within one of the foundational areas. Coursework must be from an approved list and have the approval of the student’s faculty advisor.

**Automotive Systems Engineering**
- EGR 560 Vehicle Dynamics and Control
- EGR 598 Connected and Automated Vehicles

**Energy Systems Engineering**
- EGR 598: Microgrid Design and Operation
- EGR 598: Power Management
- EGR 598: Alternative Energy
- EGR 598 Power Electronic Converters and Systems

**Environmental Systems Engineering**
- ERM 523 Soils and Groundwater Contamination
- ERM 533 Water and Wastewater Treatment
- ERM 527 Environmental/Resources Regulations Concepts

**Manufacturing Systems Engineering**
- EGR 581 Simulating Manufacturing Systems
- MFG 598 Design for Additive Manufacturing
- MFG 598 Scalable Nano-Manufacturing
- EGR 598 Manufacturing Systems Management
- MFG 598 Micro/Nano Additive Manufacturing
- MFG 598 Polymer Science and Additive Manufacturing
- EGR 522 Statistics for Quality Control
- MFG 598 Metal Additive Manufacturing
Elective Course Requirements (0-48 credits)
Elective course selection should be based on the student’s research area. These courses must be chosen in consultation with the research faculty advisor and should be designed to develop a depth of expertise in the research area of interest.

Students entering the PhD program with a master’s degree in a related field will have a maximum of 18 credit hours within the elective category.

Students entering the PhD program directly from their BS/BSE program must complete a minimum of 30 credit hours of electives. We recommend students review the Master in Passing (MIP) option as well.

Research Requirements (12-30 credits)
Students are required to complete a minimum of 12 credit hours of EGR 792 Research as part of their research coursework.

Dissertation Credits (12 credits)
Students are required to complete 12 credit hours of EGR 799 Dissertation. Students require an override to enroll and must have successfully completed the comprehensive exam prior to enrollment in EGR 799 Dissertation hours. Consideration can be made for EGR 799 Dissertation enrollment for students planning to complete the comprehensive examination in that term with faculty advisor approval.

Example of credit hour breakdown based on pathway

<table>
<thead>
<tr>
<th></th>
<th>BS to PhD</th>
<th>MS to PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s Degree in related field</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Core Credits</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Foundational Course</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
**Mathematics Requirements**

All PhD students must complete at least nine (9) credits of approved mathematics courses after the completion of their Bachelor’s degree. No more than six of these credits may be transferred from a Master’s degree program. Approval of courses that include sufficient mathematical rigor is the responsibility of the Graduate Program Chair. Students who need to complete engineering mathematics coursework should complete EGR 520 Engineering Analysis and one additional course. A sample list is included below.

- EGR 501/598 Applied Linear Algebra for Engineers
- EGR520 Engineering Analysis
- EGR521 Engineering Analysis II
- EGR 522 Statistics for Quality Control in Manufacturing
- EGR545 Robotic Systems I
- EGR 598 Finite Element Modeling and Analysis
- EGR 598 Microgrid Design
- APM560 Applied Dynamical Systems
- MAE501 Linear Algebra in Engineering
- MAE502 Partial Differential Equations in Engineering
- MAE 598 Design Optimization

Students entering into the program with a completed Master’s degree wishing to request 6 credits of mathematics coursework from their MS to apply towards this requirement should meet with the academic advisor early on in the program, preferably before the end of the first semester. The petition to request prior mathematics courses towards the 9 credit requirement must include a copy of the syllabus for each course in which the student is requesting an evaluation.

If the faculty committee determines that a student needs additional preparation before taking one or more of the core courses, they may be assigned required deficiency courses. The required deficiency courses may not be used as part of the Plan of Study, although the grades received in these courses will be used in computing the overall GPA.

**Master in Passing (MIP)**

Students who enrolled in the PhD directly from their bachelor’s degree without earning a master’s degree may apply for the Master in Passing (MIP) in Systems Engineering if the following are met:
1. Completion of 30 credit hours of graduate coursework including at least nine (9) credits of approved mathematics coursework.
2. Successful completion of the qualifying exam or waiver of qualifying exam.
3. An approved MIP iPOS on file with all grades entered. Please note that this is a separate iPOS from the one submitted for the PhD. Both iPOS need to be up-to-date and in ‘approved’ status.
4. Successful completion of the MS Portfolio. See the MS Engineering handbook or graduate academic advisor for the outline of requirements and deadlines for each term.

Students should work closely with the PhD advisor (Meghan Vaughn) to ensure that the approved iPOS and graduation application is on file for the MIP.

Milestones for Obtaining the PhD Degree
The PhD in Systems Engineering will be awarded to candidates that complete the curriculum and demonstrate the capacity to produce independent and relevant research. For full-time students entering the program with a master’s degree, this process is nominally about four years long. However, the evolution of a research project is difficult to predict and the time required to finish the degree can vary substantially among individuals. This process involves several milestones, some of which are themselves processes while others are discreet events.

Details of these milestones are discussed below this short outline of the process:

1. Interview faculty and identify research topics of interest prior to or in the first semester of attendance.
2. Identify a faculty member that agrees to serve as the PhD research advisor, and establish a Faculty Committee prior to or in the first semester of attendance.
3. Complete the PhD qualifying examination for Systems Engineering within the first two semesters of enrollment for MS to PhD, within the first four semesters for BS to PhD.
4. File a Plan of Study (iPOS) and schedule appointment with academic advising to review processes.
5. Complete the required coursework.
6. Pass the Comprehensive Exam and obtain approval of the dissertation prospectus, thus advancing to candidacy.
7. Complete two forms of external papers to reference a completed patent, journal paper, or conference paper.
8. Write the Dissertation and successfully defend the work.

1. Faculty Advisor
The faculty research advisor plays the central role in the student’s maturation into an independent scholar, and this relationship is of paramount importance to the success of candidates. Consequently, in the first semester of enrollment students that are not already involved in a research program should begin to interview and identify faculty whose research interests align with their own and with whom they are interested in working. As this process unfolds students may directly ask
faculty to serve as their advisor and the faculty member may or may not agree to do so. If the interview process does not result in identification of a research advisor, students must submit a short document detailing their research interests along with a ranked list of four potential faculty advisors to the Graduate Programs committee, who will assign an advisor. As soon as the research advisor is identified, students should begin discussing and investigating potential research topics with their advisor.

2. PhD Supervisory Committee
In the Systems Engineering program, the PhD supervisory committee implies both the program committee and the Dissertation committee. The faculty chair, in consultation with the student, will establish the program committee. The committee shall consist of at least three members, the majority of which are faculty approved to supervise PhD committees in the EGR program. The Graduate Program chair for the EGR program must approve any members that are not in this category, or that are from outside of ASU.

The responsibilities of the Faculty chair and the PhD Supervisory committee are:

- Approve the Plan of Study.
- Provide guidance for the student’s research program.
- Administer the comprehensive exam and evaluation of the dissertation prospectus.
- Administer and evaluate the Dissertation defense.

3. Qualifying Examination
Within the first two semesters of enrollment, all MS to PhD students in Systems Engineering must pass a Qualifying Examination. BS to PhD students must pass the Qualifying Exam within the first four semesters. The purpose of this examination is to ensure that students have the capacity to conduct independent research before they have invested too much time in the program. In consultation with student’s faculty advisors, members of the graduate programs committee will administer the qualifying examination once each semester, and will also be responsible for advising students regarding the expectations for the exam. There are three possible outcomes of the first attempt at the qualifying exam:

1. Pass with no restrictions
2. Fail, with an option of one re-examination
3. Fail, dismissal from the program.

Students that fall into the second category will be advised with respect to actions they should take before the second attempt at the qualifying exam. (This advice may include recommendations for deficiency courses, but if such a recommendation is made, these deficiency courses may not be used as part of the PhD iPOS.) Students that are seriously deficient on the first attempt at the exam and those that fail the exam a second time will be dismissed from the program.
Note: As of now, successful completion of “EGR 602: Principles of Independent Research” is considered an option for Qualifying Examination. Students earning a B or better are considered to have ‘Passed’ the exam.

4. **PhD Plan of Study (iPOS)**
Before the beginning of the third semester in attendance, all PhD students in Systems Engineering are required to file a Plan of Study (iPOS) though MyASU. A minimum of 84 semester credit hours are required for the PhD degree, distributed as follows:

- A maximum of 30 credit hours of coursework from a previous Master’s degree in Engineering or a related field may be applied to the PhD. Credits transferred from an accelerated Master’s degree may only include those that were not used as part of undergraduate degree requirements.
- Three core courses, totaling 9 credit hours
- One foundational course in the student’s focus area, totaling 3 credit hours. The course is chosen with advisor input and within the desired focus area: automotive, energy, environmental, manufacturing, robotics, and software.
- Additional coursework that is directly in support of the research area as required by the advisor or program chair. Will include applicable mathematics coursework, if required. BS to PhD will complete between 30-48 credit hours; MS to PhD will complete 0-18 credit hours.
- 12-30 credit hours of EGR 792 Research
- 12 credit hours of EGR 799 Dissertation

5. **Complete all coursework.**
See the Plan of Study Outline in Appendix A and B for reference.

6. **Comprehensive Examination and Defense of Dissertation Prospectus**
No later than one semester after completion of coursework, all students enrolled in the PhD in Systems Engineering program are required to pass a comprehensive examination that will be administered by the supervisory committee. This exam is a rigorous process that, upon successful completion, elevates the student’s status to that of PhD candidacy. The detailed format of the exam is at the discretion of the PhD supervisory committee, but will occur with the full committee. It is the responsibility of the student, in consultation with the research advisor, to schedule a two hour meeting that is convenient for the supervisory committee to administer the exam. The typical format of the meeting will include a 45 minute presentation by the student, 15 minutes of questions, and one hour discussion on the path forward with the research and dissertation work. The comprehensive examination will consist of:

- Submission and defense of a written Dissertation Prospectus.
- A general knowledge exam related to the proposed research area.

With respect to the Dissertation prospectus, students will submit a detailed research proposal to the supervisory committee at least one week before the exam is scheduled to begin. This prospectus should be a formal document that, at a minimum, includes:
• Discussion of the research area
• Statement of the proposed research
• Discussion of the significance of the research
• Comprehensive review of the relevant literature.
• Discussion of the research methodology that will be followed in course of research
• Discussion of the resources that will be required to complete the research
• Schedule for completion of the research
• Discussion of forums in which the proposed research may be published/presented.

The Dissertation prospectus is considered the written portion of the comprehensive exam. Within one week of submission of this document, the oral portion of the comprehensive examination will be administered. The detailed format of this examination is at the discretion of the supervisory committee. However, at a minimum, the process will include:

• Examination of the student’s responses to questions submitted by the supervisory committee.
• Additional questions regarding the both technical aspects of the research prospectus and the student’s plans for completing the research.
• An oral exam that covers general knowledge relevant to the research area.

Passing this examination elevates the student to the status of candidacy for the PhD degree. This process is documented with Report of Doctoral Examination and the Approval of Dissertation Prospectus forms available on the EGR program website. When completed, these forms are submitted to the School of Manufacturing Systems and Networks graduate advising office for processing.

If a student does not pass the examination, the supervisory committee will decide whether or not a re-examination is warranted. If a second attempt at the examination is offered, that attempt must take place within two semesters. Only one retake is possible.

**Checklist before scheduling your Comprehensive Exam**

- Completed/waived Qualifying Exam
- Completed core, foundational & elective classes
- Approved iPOS with current faculty committee
- Successfully meet GPA criteria
- Discussed level of preparation with faculty advisor

7. **Completion of External Papers**

Research should be validated through publication in reputable peer reviewed publication venues. All Systems Engineering PhD students are expected to contribute to the greater community of scholars prior to graduation through publication of research. Students are highly encouraged to attend and submit their work for publication in conference proceedings during the course of their program with no set expectation for number of proceedings.
All students, regardless of dissertation format, must submit at least two completed patents, journal papers, or conference papers, based on the dissertation research to a relevant and impactful peer reviewed journal. The manuscript need not be published before graduation. Evidence of this submission should be provided to the faculty advisor prior to the dissertation defense.

8. Research and Dissertation Defense

The completion of a PhD coincides with entry into the community of scholars, and publication of the research conducted in preparing the dissertation in peer-reviewed forums is considered a strong indication of the quality of the work and the capacity of the candidate to contribute to this community as their career unfolds. Students are encouraged to attend and submit their work to conference proceedings during the course of their program and, in consultation with their research advisor. The research must be validated by at least two examples of respected external endorsements indicating that the research has produced significant results. Examples include two or more publications in reputable peer reviewed journals, publication in two or more highly reviewed and exclusive conference proceedings, issuance of patents based on the research, or a combination of these measures. It is the responsibility of the student and the committee chair to establish the efficacy of the research within the broader academy before the final oral defense is scheduled.

The oral defense of the dissertation is a public examination that is administered by the supervisory committee. Students are responsible for working with their research advisor and supervisory committee to schedule the defense such that all necessary deadlines and requirements established by the Graduate College are met, including submission of the completed dissertation to Graduate College for format review at least 10 days before the oral defense. (Please see the 10-Day Working Calendar to identify permissible defense dates.) Students are also responsible for reserving a room for the defense, and ensuring all necessary equipment is available. In addition, the dissertation must be delivered to all members of the supervisory committee at least 10 working days before the oral defense. The format of the oral defense will be established by the supervisory committee subject to the constraint that the defense includes both a public forum followed by a closed session limited to the supervisory committee.

The dissertation defense is an opportunity for the candidate to present and explain the relevance of the results of their research to the academy and to offer the community the opportunity to evaluate and comment on both the quality of the research and the qualifications of the candidate. At the completion of the exam, the supervisory committee will meet in closed session to further discuss the performance and qualifications of the candidate and cast their vote on whether or not the candidate has passed the exam. The possible outcomes of the defense are Pass, Pass with minor revisions, Pass with major revisions, or Fail. The committee will discuss the results of their decision with the candidate, including all subsequent steps that are necessary.

After the defense, the student must deliver a copy of the Doctoral Defense Report to the graduate advising office of the School of Manufacturing Systems and Networks, and, when all revisions are complete, upload the final version of the dissertation through the My ASU and ProQuest.
### Milestones and Timeframes for BS-to-PhD and MS-to-PhD

<table>
<thead>
<tr>
<th>Milestone</th>
<th>BS to PhD</th>
<th>MS to PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete EGR602 with B or better (Qualifying Exam)</td>
<td>Within first four semesters (not to be taken in first semester)</td>
<td>Within first two semesters</td>
</tr>
<tr>
<td>Complete all 9 credits of mathematical coursework from defined list</td>
<td>Within first four semesters</td>
<td>A maximum of 6 credits of mathematical courses can be taken from the MS. A review of completed courses will be conducted. If additional math courses are necessary, the student will be required to complete them prior to comprehensive exam.</td>
</tr>
<tr>
<td>Complete all core courses and foundational courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify Faculty Advisor</td>
<td>Before start of second year (before enrolling in EGR602)</td>
<td>Prior to or during the first semester</td>
</tr>
<tr>
<td>Submit PhD Plan of Study (iPOS)</td>
<td>By end of first year</td>
<td>By end of first year</td>
</tr>
<tr>
<td>Apply for Master in Passing (MIP)</td>
<td>Complete 30 credit hours of coursework and MS Portfolio, meet with Academic Advising for process details</td>
<td>n/a</td>
</tr>
<tr>
<td>Comprehensive Exam (also referred to as Prospectus)</td>
<td>Typically during third year, no later than fourth year</td>
<td>Typically during second year, no later than end of third year</td>
</tr>
<tr>
<td>Discuss topics for comprehensive exams with faculty advisor and draft prospectus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review Checklist for Comprehensive Exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schedule Prospectus with full committee, notify graduate academic advisor.</td>
<td>Prior to scheduling comprehensive exam with committee.</td>
<td>Prior to scheduling comprehensive exam with committee.</td>
</tr>
<tr>
<td>Submit written Prospectus to full committee</td>
<td>Typically by end of third year, no later than fourth year</td>
<td>Typically by end of second year, no later than end of third year</td>
</tr>
<tr>
<td>One week prior to scheduled comprehensive exam/presentation</td>
<td></td>
<td>One week prior to scheduled comprehensive exam/presentation</td>
</tr>
</tbody>
</table>
Complete Comprehensive Exam by submitting a dissertation proposal prospectus and present Oral/Written presentation.

Ensure committee completes the Comprehensive Exam Results form at time of exam. Form is found in Appendix B of this document.

Dissertation Defense

Schedule your Dissertation Defense through MyASU > Defense

Complete the Graduate College Formatting and ProQuest Submission Processes

Apply for Graduation

Faculty

Systems Engineering Executive Committee (EC)

Tom Sugar (Executive Committee Chair)
Daniel Aukes (Robotics)
Dhruv Bhate (Manufacturing Engineering)
Yan Chen (Automotive Engineering)
Kevin Gary (Software Engineering)
Kiril Hristovski (Environmental Engineering)
Nathan Johnson (Renewable Energy Engineering)
Systems Engineering Graduate Faculty
A current list of graduate faculty within the Systems Engineering program is available below. As this list changes during the academic year, a more comprehensive list can be found at:
https://graduateapps.asu.edu/graduate-faculty/degree/ESSYSPHD

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<tr>
<th>Faculty Name</th>
<th>Faculty Department (if not same as PhD program)</th>
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<th>Co-chair</th>
<th>Member</th>
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**Abbreviations:**

*FSE: Fulton Schools of Engineering*
Other Affiliated Faculty
There may be faculty who may be appropriate for your PhD committee but are not yet approved by Graduate College. To request to include them, they need to apply to be on the Systems Engineering graduate faculty (involves sending a CV to the Systems Engineering Executive Committee). Contact Graduate Academic Advising for details.

Academic and Faculty Advising
The School of Manufacturing Systems and Networks Graduate Advising Office is responsible for advising all PhD Systems Engineering students with respect to progress toward the degree as well as program, school, college, and university-wide ASU Policies and Procedures. Questions involving details of academic content in courses, professional practice, and research can be discussed with faculty advisors or the Graduate Program Chair.

Graduate Academic Advising
Sutton Hall, Second Floor
msngrad@asu.edu
480-727-4723
Schedule an appointment

Graduate Program Chair
Dr. Tom Sugar
Professor and Program Chair, Engineering
TECH101A
thomas.sugar@asu.edu
480-727-1127

Policies for Evaluation and Dismissal
Students should familiarize themselves with the ASU Graduate College policies: https://graduate.asu.edu/current-students/policies-forms-and-deadlines/policy-manuals especially regarding degree requirements, academic integrity, maintaining progress, and appeals. Satisfactory academic progress will be defined by the quality of the student’s work (classroom, research, service) in the Systems Engineering program and the student's ability to achieve milestones in a timely fashion, as judged by the advisor, Executive Committee, and eventually the student’s PhD committee.
Recommended Campus Resources
The Polytechnic campus has various resources for students. Because hours, services, and student needs vary, it is up to students to investigate all application options. Some noteworthy resources are as follows:

Graduate and Professional Student Association (GPSA)
The GPSA is the graduate student government organization at ASU. They offer a variety of services including limited funding opportunities for research and traveling to conferences. The GPSA at Poly is located in the Admin Building. For more information, visit their website: http://gpsa.asu.edu/.

Polytechnic Library
The library on our campus is located on the lower level of the Center Building.

Student Financial Aid Office at Polytechnic campus
The Polytechnic Financial Aid Office is located in the Administration Building. For more information, visit their website: https://students.asu.edu/contact/financialaid.

Student Organizations
There are various student organizations at ASU. Students can join as many as desired and are not bound by campus affiliation. If a student(s) does not see a club of interest, they are able to start their own. For details and a list of organizations, go to https://students.asu.edu/clubs.
About the School of Manufacturing Systems and Networks
The School of Manufacturing Systems and Networks is making a new higher education experience, one that focuses on learning through making things and solving real-world challenges through collaboration. At the School of Manufacturing Systems and Networks, we believe how you learn and teach is as important as what you learn and teach. We are committed and contributing to ASU’s vision of the New American University – an institution that is committed to excellence, access, and impact.

The School of Manufacturing Systems and Networks is located in Mesa, which is the state’s third-largest city and part of the Greater Phoenix area. The 600-acre ASU Polytechnic campus is built in a beautiful desert arboretum and is home to more than 6,000 students studying in undergraduate and graduate majors. The School of Manufacturing Systems and Networks is home to some of the most innovative engineering and technology programs in the country and some of the most advanced learning laboratories available to students on any university campus.

The programs thrive under the guidance of outstanding faculty members with deep expertise in many of the most important challenges that society faces.

Visit the School of Manufacturing Systems and Networks website at https://msn.engineering.asu.edu/. For more in-depth information about the programs offered through the School of Manufacturing Systems and Networks as well as the application process and other pertinent information, you are encouraged to explore the overview of the graduate programs.

Graduate Programs
The School of Manufacturing Systems and Networks’ graduate students learn in an environment that blends management, applied sciences, and engineering and technology fields to create applications, systems, and solutions that meet real-world needs. We engage in research that matters. As part of the School of Manufacturing Systems and Networks masters programs, applied projects, theses, and research are degree components and complement students’ theoretical and practical understanding. The Manufacturing Systems and Networks doctoral program include separate degree components, all of which are outlined in each program’s handbook.

Masters Degrees
Manufacturing Engineering, MS
Doctoral Degrees
Systems Engineering, Ph.D

Purpose of this Handbook
The purpose of this handbook is to provide guidance and information related to admission, degree requirements, and general policies and procedures for graduate students in the School of Manufacturing Systems and Networks. Students must adhere to policies of both the School of Manufacturing Systems and Networks and the Graduate College. Policies and this handbook are subject to change at any time; students will be notified.

Student Responsibility
Graduate students are responsible for familiarizing themselves with all university and graduate policies and procedures as well as applicable deadlines. Each student should also communicate directly with his/her academic unit to be clear on its expectations for degree completion. Graduate students are responsible for frequently checking their My ASU account and asu.edu email for the most up-to-date information regarding their status, holds, items to attend to, and other important information.

Diversity and Inclusion Initiative at the Ira A. Fulton Schools of Engineering
In January 2019, the Ira A. Fulton Schools of Engineering launched a new initiative focusing on diversity and inclusion — core values to the Fulton Schools and ASU, as exemplified in the university charter. This initiative is called DII@FSE.

Our DII@FSE task force has articulated a vision to follow strategies and practices that support environments where individuals feel included, valued and respected and where different kinds of people can succeed.

The DII@FSE has submitted a proposal to the American Society for Engineering Education’s (ASEE) Diversity Recognition Program. That proposal was awarded bronze status (the highest entry status a university can be awarded). Next steps for the initiative will be working together to realize the plan’s goals.

Goals
1. Create and maintain a student body and workforce across the Fulton Schools that is diverse in multiple dimensions and inclusive for all.
2. Empower faculty, staff, students and academic associates at the Fulton Schools to embrace the core values and practice of diversity, equity and inclusion.
3. Be a global leader in diversity, equity and inclusion in engineering.

Facilities and Labs
The core facilities, laboratories, and centers in the School of Manufacturing Systems and Networks provide the ideal environments for teaching, research, and discovery. State-of-the-art equipment and technologies help students increase their knowledge and experience and provide support for the use-inspired research conducted by the school’s faculty and students. Learn more by visiting: Labs
Faculty
Faculty members have significant expertise in many of the most important challenges that society faces. Many members of the faculty bring considerable industry experience to bear on their teaching and research. To learn more about the faculty, you may refer to the Polytechnic School Directory.

Assistantships
Graduate students may apply for teaching or research assistantships. Assistantships are competitive and not guaranteed with admission. Shortly following admission, doctoral students will receive an opportunity to apply for a teaching assistantship (TA).

Research assistantships (RA) are awarded by the individual faculty members. Students interested in a research assistantship should review the faculty areas of research and contact faculty based on their interest in those areas to discuss the possibility of funding further.

Students awarded an assistantship within the Ira A. Fulton Schools of Engineering are required to register for 12 credits each semester in which the assistantship is held. Research hours may be used towards the 12 credit requirement.

International students are required to meet English proficiency requirements in order to be eligible for a teaching assistantship.

For more information regarding TA/RA policies, tuition remission and benefits associated with an assistantship, please review the ASU Graduate College TA/RA handbook.

Graduate Advising
Graduate student advising is located on the Polytechnic campus in Sutton Hall on the second floor. For more information about the School of Manufacturing Systems and Networks graduate programs or the policies in this handbook, contact the graduate advising office at msngrad@asu.edu or 480-727-4723.

Academic Standards and Policies

Grades
To be eligible for graduation and the completion of a graduate degree, a student must achieve a cumulative grade point average (GPA) of 3.0 or better in three different grade point average calculations. The three different grade point averages that are considered by Graduate College and the School of Manufacturing Systems and Networks are as follows: (1) the grade point average in all courses numbered 500 or higher that appear on the transcript, except those that were listed as
deficiencies in the original letter of admission, (2) the grade point average in all coursework that appears on the approved program of study, and (3) the grade point average in all coursework taken at ASU post baccalaureate.

Transfer credits are not calculated on the Plan of Study (iPOS) GPA or the Graduate GPA. Courses with grades of “D” (1.00) and “E” (0.00) cannot appear on the iPOS but will be included when calculating the Graduate GPA. Courses with an “I” grade cannot appear on the iPOS.

A student who is not progressing satisfactorily toward a degree will be withdrawn from the program by the Dean of the Graduate College upon recommendation by the Fulton Schools of Engineering Dean’s office. The policy of the School of Manufacturing Systems and Networks for academic probation and dismissal of graduate students is outlined below.

Satisfactory progress is defined by the quality of the student’s work, that it does not have any academic and progress probationary issues, and that the student is meeting all requirements and/or milestones applicable to their program. Specifically for Doctoral students, this also includes the successful completion of the qualifying and comprehensive exams, as determined by their program. In addition to the probationary rules, satisfactory progress includes appropriate communication each semester with the student’s Committee Chair regarding his or her progress, if applicable.

Students in the accelerated degree programs (4+1) will have separate requirements to meet while completing their undergraduate degree. See accelerated bachelor’s + master’s degree program (4+1) section above for more information. Once students are in the graduate portion of the program (and have completed their undergraduate degree), they must meet the graduate academic expectations outlined in this section.

**Academic Performance Standards**

To meet the School of Manufacturing Systems and Networks academic performance requirements, all students admitted to a graduate degree program in the School of Manufacturing Systems and Networks must adhere to all of the following:

All students admitted to a graduate degree program in the School of Manufacturing Systems and Networks, either on a regular or provisional admission status, must maintain a 3.0 or higher grade point average (GPA) in:

1. All work taken for graduate credit (courses numbered 500 or higher),
2. Coursework in the student’s approved plan of study (iPOS), and
3. All coursework taken at ASU (overall GPA) post baccalaureate.

Earn a “C” or better in all iPOS (plan of study) courses. Grades of “W” and “I” are not acceptable on the iPOS and may be considered lack of satisfactory progress if more than one occurrence during the students’ graduate program of study. Programs may invoke a higher standard, e.g., no courses with a C may be included on the iPOS.
Meet the terms of the ASU Graduate College satisfactory progress policies as outlined at: ASU Graduate Policies and Procedures.

Evaluation of Academic Performance Requirements

After each semester, the academic unit reviews students’ files for satisfactory progress towards completion of the degree. All students are placed under one of the three categories:

- **Satisfactory Progress** means that the student does not have any academic and progress probationary issues. In addition to the probationary rules, satisfactory progress includes appropriate communication each semester with the student’s Committee Chair regarding his or her progress, if applicable.

- **Academic Probation** pertains to grades that fall below those required by Program and University policies, including graduation requirements. The following are notices/letters the student will receive if one of these pertains to their academics:

  **Grade Point Average**
  - GPA below 3.0 in approved iPOS courses
  - Overall post baccalaureate GPA below 3.0
  - Overall graduate (500 level or above) GPA below 3.0

  Students placed on academic probation will have nine (9) credits or one year, whichever comes first, to meet GPA requirements as outlined above. Students placed on academic probation for Satisfactory Academic Progress will be provided a deadline within their probationary notice in which the requirements are to be met.

- A student will be recommended for **Withdrawal** from the program if she or he fails to meet the probationary standards outlined in their probationary letter. The student will receive a letter from the School of Manufacturing Systems and Networks explaining the reasons for recommendation for withdrawal. The student will have five (5) business days from the date of the letter to appeal the decision. The department’s Graduate Affairs Committee (GAC) will review the appeal and will make the necessary recommendation. The GAC Chair, on behalf of the GAC, will provide a written explanation of the outcome of the appeal.

  - If the outcome is favorable, the student will have to meet all the outlined requirements at the end of the specified period. The student will be required to sign an agreement acknowledging the recommendations of the GAC and the consequences if the agreements are not met.

  - If the GAC recommends that the appeal is not granted in favor of the student, the GAC Chair, on behalf of the GAC, will recommend to the Fulton Schools of Engineering (FSE) Dean’s Office to withdraw the student from the graduate program. The student’s appeal will then be reviewed by the FSE Academic Standards Committee, which reviews the student’s case and makes the final recommendation on behalf of the FSE Dean’s Office and the department. If the appeal is not granted in favor of the student, the Fulton Schools of Engineering Dean’s Office will recommend to the Graduate College to withdraw the student.
from the graduate program. Please refer to the Graduate College catalog for policies and procedures or contact the graduate advisor in the School of Manufacturing Systems and Networks with further questions.

- A student will be recommended for Withdrawal from the program if they fail to meet the provisional admission requires outlined within their admission letter. The student will receive a notice from the School of Manufacturing Systems and Networks explaining the reasons for recommendation for withdrawal. The withdrawal notice will be submitted to the ASU Graduate College for processing. Provisional admits are unable to appeal if they fail to meet requirements outlined within the standards of their admission.

- A student will be recommended for Withdrawal from the program if they fail to meet the deficiency admission requires outlined within their admission letter. The student will receive a letter from the School of Manufacturing Systems and Networks explaining the reasons for recommendation for withdrawal. The withdrawal notice will be submitted to the ASU Graduate College for processing. Students not meeting the admission requirements of their deficiency as outlined in their admission letter are granted the ability to appeal and follow the process noted above. If appeal is unsuccessful, the withdrawal notice will be submitted to the ASU Graduate College for processing.

  o Deficiency Course(s)
    o Lack of progress toward completion of required deficiencies as listed on the admission letter
    o Received a “D” or “E” in a required deficiency course or in a course at the 400 level or above
    o Deficiency GPA below 3.0

**Plan of Study (iPOS)**
The Plan of Study (iPOS) functions as a contract between the student, the academic unit, and the Graduate College. The iPOS contains certain degree requirements such as core and elective coursework as well as a culminating experience, which must be included in the iPOS before it can be approved. Students should submit an iPOS after registering for their second semester in the program. Students **must** submit an iPOS before the beginning of their second semester of their degree program. A student is not eligible to schedule the comprehensive examination without an approved iPOS. Students may not register for applied project (593), thesis (599), internship (584), or dissertation credit (799) until their iPOS is submitted and approved.

A student can access the iPOS by visiting [My ASU > My Programs > iPOS > Graduate Interactive Plan of Study (iPOS)](https://myasu.asu.edu/). Please reference our [iPOS Overview](https://myasu.asu.edu/) for in-depth information on what must be included on the iPOS.
Time Limit for Degree Completion
All work toward a master’s degree must be completed within six consecutive years. Doctoral students must complete all program requirements within a ten-year period. The time period begins with the semester and year of admission to the program. Graduate courses taken prior to admission that are included on the Plan of Study must have been completed within three years of the semester and year of admission to the program. See the ASU Graduate Policies and Procedures for more information.

Continuous Enrollment Policy
Once admitted to a graduate degree program, students must be registered for a minimum of one credit hour of graduate-level coursework (not audit) during each fall and spring semester of their graduate education. Summer registration is required for students taking examinations, completing culminating experiences, conducting a doctoral prospectus, defending theses or dissertations, or graduating from the degree program in that semester. This credit must appear on the Plan of Study or must be an appropriate graduate-level course (e.g. 595, Continuing Registration). Courses with grades of “W” and “X” are not considered valid registration for continuous enrollment purposes.

Students who have completed all necessary coursework but still need to complete research work towards their dissertation can request an override for 595 Continuing Registration for 1 credit hour to maintain active status in their program.

Leave of Absence Policy
Students planning to discontinue enrollment for a semester or more must request approval for a leave of absence through the Plan of Study (iPOS) petition titled Request to Maintain Continuous Enrollment. The Graduate College allows for a leave of absence for a maximum of two semesters during a student’s entire program. A petition for a leave of absence may be submitted through a student’s interactive plan of study and must be approved by the Graduate College. The request must be submitted and approved before the start of the semester of the anticipated absence.

An approved leave of absence will enable students to re-enter their program without reapplying to the university and the graduate program. Students who do not enroll for a fall or spring semester and do not have an approved Request to Maintain Continuous Enrollment are considered withdrawn from the university under the assumption that they have decided to discontinue their program. A student removed for this reason may reapply for admission to resume their degree program; the application will be considered along with all other new applications to the degree program.

A student with a Graduate College-approved Request to Maintain Continuous Enrollment is not required to pay tuition and/or fees, but in turn is not permitted to place any demands on university faculty or use any university resources. See the ASU Graduate Policies and Procedures for more information.
Graduate College Policies and Procedures
All graduate students are expected to read, understand and meet the terms of the ASU Graduate College Policies and Procedures handbook as outlined at: ASU Graduate Policies and Procedures.

Policy on Maximum Course Load
Registration in nine (9) credits is considered a full-time load for graduate students at ASU, and graduate students in the Ira A. Fulton Schools of Engineering are restricted to a maximum of 12 credits per semester. Overrides to register for more than 12 credits require the approval of the student’s committee chair and Graduate Program Chair and will be granted only in exceptional cases. Requests to register for more than 15 credits will not be supported.

Internships
The School of Manufacturing Systems and Networks graduate students can request to take internship as a 584 course option for academic credit if an approved and eligible internship is obtained. Internship is not a requirement for graduate programs within The School of Manufacturing Systems and Networks, but can be added as a planned option to the graduate plan of study. International students can apply for curricular practical training (CPT) if eligible to do so. No more than 3 credits of internship coursework can be used. The 3 credits can be divided between a maximum of two semesters for two different internship opportunities. For more information on internships, policies, and the application process, please visit: https://poly.engineering.asu.edu/advising/internships/.

Applying for Graduation
Graduate students should become familiar with the process of applying for graduation to ensure the graduation application is submitted by the deadline of the graduating semester. The University has specific deadlines each semester for submitting the Graduation application. To view the specific deadlines for future terms, log into MyASU and click on the Graduation tab. Please also be sure to review the Graduate College graduation deadlines and procedures as well. All students must have an approved and up-to-date iPOS on file in order to apply for graduation.

General ASU Information

Academic Calendar
Students are responsible for meeting all deadlines set within the ASU Academic Calendar. The calendar can be found at students.asu.edu/academic-calendar.

Student Code of Conduct
The aim of education is the intellectual, personal, social, and ethical development of the individual. The educational process is ideally conducted in an environment that encourages reasoned
discourse, intellectual honesty, openness to constructive change, and respect for the rights of all individuals. Self-discipline and a respect for the rights of others in the university community are necessary for the fulfillment of such goals. The Student Code of Conduct is designed to promote this environment at Arizona State University.

The Student Code of Conduct sets forth the standards of conduct expected of students who choose to join the university community. Students who violate these standards will be subject to disciplinary sanctions in order to promote their own personal development, to protect the university community, and to maintain order and stability on campus.

All students are expected to adhere to the ABOR Student Code of Conduct.

**Academic Integrity**
The highest standards of academic integrity and compliance with the university’s Student Code of Conduct are expected of all graduate students in academic coursework and research activities. The failure of any graduate student to uphold these standards may result in serious consequences, including suspension or expulsion from the university and/or other sanctions as specified in the academic integrity policies of the School of Manufacturing Systems and Networks as well as the University.

Violations of academic integrity include, but are not limited to: cheating, fabrication of data, tampering, plagiarism, or aiding and/or facilitating such activities. At the graduate level, it is expected that students are familiar with these issues and take personal responsibility in their work. It is the student’s responsibility to become familiar with the academic integrity policies of the university and Graduate College.

**Department and University Resources**

- **Academics and Professional Development**
  - Academic Integrity Policy
  - ASU libraries
  - Career Centers (both ASU and Fulton Schools of Engineering)
  - Graduate and Professional Student Association
  - FSE student resources
  - Professional development
  - Writing Center

- **Student Support Services**
  - Counseling
  - Student Accessibility and Inclusive Learning
  - Graduate Wellness Resources
    - 10 Best Practices in Graduate Student Wellbeing
  - Health
- Housing
- International Student Services
  - FSE International Student Resources
- Veterans

- Business and Finance Services
  - ASU ID cards
  - ASU bookstore
  - Parking and Transit
  - Student accounts

Contact Information
For more information about the School of Manufacturing Systems and Networks graduate programs or the policies in this handbook, contact the graduate advising office at msngrad@asu.edu or 480-727-4723.
Appendix A

Plan of Study Outline – Bachelor’s to PhD
Plan of Study (iPOS) Outline  
Systems Engineering PhD  
Bachelor’s directly to PhD

A minimum of 84 semester credit hours are required for the Systems Engineering PhD degree, distributed as follows:

- Three core courses, totaling 9 credit hours:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 602</td>
<td></td>
<td></td>
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<tr>
<td>EGR 608</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGR 611</td>
<td></td>
<td></td>
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</tbody>
</table>

- One foundational area course, totaling 3 credit hours:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

- 30 credit hours of coursework chosen in conference with your faculty advisor/committee chair. Must include 6 credits of approved mathematics coursework from this area. 3 credits of math coursework can also apply from EGR 608 to fulfill the 9 credit requirement.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 520</td>
<td>*Engineering Analysis</td>
<td></td>
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<tr>
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<td>*</td>
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</tr>
</tbody>
</table>

*See program handbook for list of approved mathematics coursework.*
☐ Qualifying exam. EGR 602 serves as the qualifying exam. Must have a faculty advisor and confirmed research track before taking 602.

☐ 30 credit hours of Elective/Research Credits
  Electives coursework is directly in support of the research area, 0-18 credit hours.
  EGR792 Research: 12-30 credit hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 792</td>
<td>Research (3)</td>
<td></td>
</tr>
<tr>
<td>EGR 792</td>
<td>Research (3)</td>
<td></td>
</tr>
<tr>
<td>EGR 792</td>
<td>Research (3)</td>
<td></td>
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<td>EGR 792</td>
<td>Research (3)</td>
<td></td>
</tr>
<tr>
<td>EGR 792</td>
<td>Research (3)</td>
<td></td>
</tr>
</tbody>
</table>

☐ Comprehensive Exam It is expected that the comprehensive exam will be completed by the end of the second year and no later than the third year.

☐ 12 credit hours of EGR 799 Dissertation:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 799</td>
<td>Dissertation</td>
<td></td>
</tr>
<tr>
<td>EGR 799</td>
<td>Dissertation</td>
<td></td>
</tr>
<tr>
<td>EGR 799</td>
<td>Dissertation</td>
<td></td>
</tr>
<tr>
<td>EGR 799</td>
<td>Dissertation</td>
<td></td>
</tr>
</tbody>
</table>

Students are required to complete a minimum of nine (9) credits of mathematics coursework.
These courses may be duplicated from the above section as this is simply identifying the nine credits of mathematics coursework to be completed before degree completion (ex: EGR520 Engineering Analysis may be listed as an elective above, but must be identified in the section below). See page 9 of the PhD Systems Engineering handbook for approved mathematics coursework. EGR608 may be one of the three classes if a math-intensive project was completed in the course. A project overview statement will be required for EGR608 evaluation.

**9 credit hours of mathematics coursework:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
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</tbody>
</table>

Systems Engineering PhD students must also select three (3) members for the committee (ex: 1 chair, 2 members) prior to scheduling comprehensive exam. Please use this section to list faculty members you are considering:

- Committee Chair: ______________________________________________________
- Committee Member #1: ________________________________________________
- Committee Member #2: _______________________________________________
Appendix B

Plan of Study Outline – MS to PhD
A minimum of 84 semester credit hours are required for the Systems Engineering PhD degree, distributed as follows:

- A maximum of **30 credit hours** of coursework from a previous Master’s degree in Engineering or related field may be applied to the PhD.
- Three core courses, totaling **9 credit hours**:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 602</td>
<td>Principles of Independent Research</td>
<td></td>
</tr>
<tr>
<td>EGR 608</td>
<td>Advanced Simulation</td>
<td></td>
</tr>
<tr>
<td>EGR 611</td>
<td>Complex Engineering Systems</td>
<td></td>
</tr>
</tbody>
</table>

- **Qualifying exam.** EGR 602 serves as the qualifying exam. Must have a faculty advisor and confirmed research track before taking 602.

- One foundational area course, totaling **3 credit hours**: Approved foundational area courses are listed in the program handbook.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
</table>

- **30 credit hours** of Elective/Research Credits
  Elective coursework is directly in support of the research area, 0-18 credit hours.
  EGR 792 Research: 12-30 credit hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>EGR 792</td>
<td>Research (3)</td>
<td></td>
</tr>
<tr>
<td>EGR 792</td>
<td>Research (3)</td>
<td></td>
</tr>
</tbody>
</table>
**Comprehensive Exam** It is expected that the comprehensive exam will be completed by the end of the second year and no later than the third year.

**12 credit hours** of EGR 799 Dissertation:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR 799</td>
<td>Dissertation (3)</td>
<td></td>
</tr>
<tr>
<td>EGR 799</td>
<td>Dissertation (3)</td>
<td></td>
</tr>
<tr>
<td>EGR 799</td>
<td>Dissertation (3)</td>
<td></td>
</tr>
<tr>
<td>EGR 799</td>
<td>Dissertation (3)</td>
<td></td>
</tr>
</tbody>
</table>

Students are required to complete a minimum of nine (9) credits of mathematics coursework. A maximum of six (6) credits can be applied from the master’s degree.

These courses may be duplicated from the above section as this is simply identifying the nine credits of mathematics coursework to be completed before degree completion (ex: EGR520 Engineering Analysis may be listed as an elective above, but must be identified in the section below).

See page 9 of the PhD Systems Engineering handbook for approved mathematics coursework. EGR608 may be one of the three classes if a math-intensive project was completed in the course. A project overview statement will be required for EGR608 evaluation.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
</tbody>
</table>

Systems Engineering PhD students must also select three (3) members for the committee (ex: 1 chair, 2 members) prior to scheduling comprehensive exam. Please use this section to list faculty members you are considering:

Committee Chair: ____________________________________________
Committee Member #1: ________________________________________________

Committee Member #2: ________________________________________________
Appendix C

Comprehensive Exam Results Form
# Comprehensive Exam Results

## Systems Engineering PhD

<table>
<thead>
<tr>
<th>Name:</th>
<th>ID:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of comprehensive examination:</td>
<td>Phone:</td>
</tr>
<tr>
<td>Advisor:</td>
<td>Date Submitted:</td>
</tr>
<tr>
<td>Title of dissertation proposal:</td>
<td></td>
</tr>
</tbody>
</table>

Please check the box for the draft version:
- [ ] Original Draft  - [ ] Draft after major revisions

**Examination Results:** To be completed by the examining committee.
- [ ] Pass  - [ ] Pass with minor revisions  - [ ] Pass with major revisions  - [ ] Fail

<table>
<thead>
<tr>
<th>NAMES OF FACULTY</th>
<th>SIGNATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAIR</td>
<td></td>
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</tbody>
</table>

Comments (optional):

Comments (optional):

**Final Result:** To be completed by Systems Engineering PhD Executive Committee Chair.

<table>
<thead>
<tr>
<th>PASSED</th>
<th>FAILED</th>
<th>SIGNATURE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
</tbody>
</table>

GRADUATE ADVISOR

DATE RECEIVED

DATE ENTERED IN PS

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Polygrad@asu.edu | 480.727.4723 | poly.engineering.asu.edu