

Industrial Engineering
MS Graduate Handbook
2021 - 2022



**MANUAL OF THE MS DEGREE IN
INDUSTRIAL ENGINEERING**

ARIZONA STATE UNIVERSITY

2021 – 2022

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Table of Contents

I.	Introduction to the Industrial Engineering Program	1
II.	Objective of the handbook	2
III.	Student responsibility and resources	2
IV.	Faculty responsibility	2
V.	Admission and eligibility to the MS degree programs	3
	Eligibility	3
	Application	3
	Application deadlines.....	3
	GRE scores	3
	Personal Statement	3
	Letters of recommendation	3
	GPA requirement	4
	Application evaluation	4
	Deficiencies.....	4
	Deficiency test-out exam	4
	Notice of Admission	5
	Pre-admission credits and Transfer credit.....	5
VI.	MS degree requirements	5
	a. Degree requirements	5
	b. MS Thesis Option.	7
	c. MS Portfolio Option	7
	d. Steps to Preparing for Your MS Defense	8
VII.	General Information.....	9
	a. Research Standards for Publication of Thesis.....	9
	b. Financial assistance and/or fellowships	9
	c. Continuous Enrollment and Leave of Absence Policies	9
	d. Maximum Time Limit.....	10
	e. Registration requirements for Research and Teaching Assistants	10

f. Satisfactory Academic Progress Probation, and Withdrawal	11
g. Academic Integrity.....	12
h. IEE 584 Internship	12
i. IEE 590 Reading and Conference.....	14
j. Student chapters of professional societies	14
k. Instructional Concerns and Course-Related Complaints	14
Concentration Areas of IE Graduate Courses	17
Special Program	18
Course Descriptions	19
Industrial Engineering Faculty	25

I. Introduction to the Industrial Engineering Program

The Industrial Engineering (IE) Program of Arizona State University (ASU) offers two graduate degrees: Master of Science (MS) with a thesis or a non-thesis option and a Doctor of Philosophy (Ph.D.). The MS degree requires a written and an oral defense of the thesis or a final written Comprehensive Exam covering three out of the four core courses. The Ph.D. degree is offered to students who have completed a Bachelor's or Master's degree in engineering, or a closely related field, with distinction. It requires a qualifying exam, Comprehensive Exam, written dissertation, and an oral defense of the dissertation.

Here at ASU's School of Computing and Augmented Intelligence (SCAI), formerly the School of Computing, Informatics, and Decision Systems Engineering (CIDSE), we envision a society where secure, accurate, and current information is ubiquitously available and data is seamlessly collected, managed, and converted into information that entertains individuals, empowers businesses, and guides the decisions of both in their daily affairs.

We envision our school as a community recognized by its colleagues internationally as a leader in envisioning and enabling the information-driven society and by students as a preferred location for acquiring the knowledge and skills necessary to contribute to this vision.

We envision a community of scholars cooperatively engaged in transdisciplinary research addressing the grand challenges of modern society and supporting the intellectual growth of students and colleagues.

Our mission is to benefit society through excellence in education, use-inspired research from basic to translational, and leadership in service to the profession and community. We seek to provide a supportive environment that promotes creativity, diversity, multidisciplinary teaming, scholarship, and ethical behavior in order to advance knowledge and practice in computing, information and decision technologies to enhance society.

ASU prohibits all forms of discrimination, harassment and retaliation. To view ASU's policy please see <https://www.asu.edu/aad/manuals/acd/acd401.html>.

Title IX protects individuals from discrimination based on sex in any educational program or activity operated by recipients of federal financial assistance. As required by Title IX, ASU does not discriminate on the basis of sex in the education programs or activities that we operate, including in admission and employment. Inquiries concerning the application of Title IX may be referred to the Title IX Coordinator or to the U.S. Department of Education, Assistant Secretary, or both. Contact titleixcoordinator@asu.edu or 480-965-0696 for more information. Office located at 1120 S. Cady Mall, INTDSB 284. For information on making a report please go to www.asu.edu/reportit/.

II. Objective of the handbook

The purpose of this handbook is to provide guidance and information related to admission, degree requirements, and general policies and procedures. Please note that in some cases,

you will find differences between the Graduate Policies and Procedures and the Industrial Engineering Program requirements. In these cases, IE has established higher standards. Students must satisfy both sets of requirements. Please note that policies and procedures are occasionally amended to improve the program. Changes will be communicated to students through email and posting on the SCAI website.

III. Student responsibility and resources

All students are expected to become familiar with university and program policies and procedures and abide by the terms set forth. Information is available both online. Most importantly, you should visit the following websites:

- The Graduate College– <https://graduate.asu.edu/>
- Graduate College Policies and Procedures – <https://graduate.asu.edu/policies-procedures>
- The Industrial Engineering Program – <http://SCAI.engineering.asu.edu/forstudent/graduate/industrial-engineering/>
- The International Students and Scholars Center – <https://issc.asu.edu/>, if applicable.
- The Ira A. Fulton Schools of Engineering – <https://engineering.asu.edu/>

Wellness Resources

We believe graduate education provides an opportunity to grow in our knowledge and expertise, and during our studies, we may face challenges and hardships that can affect our wellbeing. The Graduate College and the ASU Graduate Student Association have put together resources and best practices guides to help your educational journey. Should you need additional guidance and support, we encourage you to contact a graduate advisor at the CIDSESCAISCAI Graduate Advising Office.

- [Graduate Wellness Resources](#) – a one-page guide to Financial, Social, Emotional, and Physical Health and Wellness Resources for ASU Graduate Students was developed by the GPSA .
- [10 Best Practices in Graduate Student Wellbeing](#) – proven ways to help graduate students better care for themselves under the increasing demands of graduate school

IV. Faculty responsibility

The members of the faculty of Industrial Engineering have diverse backgrounds and knowledge. They are available to assist you in your plan of study and your educational and career goals. We encourage you to take the opportunity to make individual appointments with faculty members with whom you have common interests. Please refer to the list of the faculty names, areas of expertise, and research interest at the end of this handbook.

V. Admission and eligibility to the MS degree programs

The Industrial Engineering MS degree requires a background in engineering, math, statistics, sciences or closely related fields. However, in some cases, students with non-traditional educational backgrounds will be considered for admission. These students may be required to take foundational courses to better prepare for the graduate coursework. A student is encouraged to contact a graduate advisor in the School of Computing, Informatics, and Decision Systems Engineering (SCAI), Advising Center to obtain advice on their educational pursuits.

Eligibility - Before applying to the IE MS program, students are required to have completed 3 semesters or 12 credit hours of Calculus including Multivariate Calculus.

Application - All students are required to submit an application with the Office of Graduate Admissions <https://students.asu.edu/graduate> and pay the required fee to have their application properly processed.

Application deadlines - January 15 for fall semester and September 15 for spring semester - To receive full consideration, we ask that you have all the required documents submitted by the deadline.

GRE scores are not required.

English Proficiency - The University requires all international applicants from a country whose native language is not English to provide the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) scores, or Pearson (PTE). Industrial Engineering Program uses average scores of 575 (paper-based) or 90 (internet-based) for TOEFL, 7.0 for IELTS, or 115 for Duolingo, and 65 for PTE for admission. **Please note that your application will not be processed until the university receives official scores, which are valid two years from the start date of the degree program.** Exemption from the English Proficiency requirement can be met by visiting Graduate Admission site under English Proficiency. Please address all English Proficiency questions to the Office of Graduate Admission <https://students.asu.edu/graduate/proficiency>. The ASU institution code is 4007 if a department code is required, use: 99 for TOEFL.

Personal statement - Applicant must submit a personal statement that indicates professional goals and reasons for desiring to enroll in the MS programs.

Letters of recommendation - IE requires three (3) letters of recommendation, at least one of which must come from former faculty. There is no standard form for letters of recommendation. Our current application process allows students to submit the letter of recommendations electronically by indicating the names and the e-mails of the recommender. In turn, the Office of Graduate Admission sends an e-mail to the recommender alerting him or her to go online and submit a recommendation. We encourage letters from people who know you well, such as teachers, professional associates, and supervisors. Ask people who can comment on your academic, emotional, intellectual, and professional development.

GPA requirement - To be considered for the MS program, we require a minimum cumulative GPA of 3.2 in the last 60 credit hours of the undergraduate degree.

Application evaluation - Several factors are taken into consideration when evaluating a student's application: the student's cumulative GPA, major, institution, personal statement, letters of recommendation, standardized test scores, and performance in individual courses.

Deficiencies - Depending on prior academic preparation and accomplishments of an applicant, deficiency courses may be specified to ensure adequate background preparation. Students wishing to have their course syllabi examined as evidence that deficiencies have been satisfied must submit a petition form together with the support documents to SCAI.Advising@asu.edu. If after evaluation the petition is not approved, the student may choose to take the deficiency test-out examination. Please note that deficiencies are not intended solely as prerequisites for graduate coursework; they also satisfy the breadth requirement for all graduates of IE.

Option 1: Waiver Process: Students wishing to have their course syllabi examined as evidence that deficiencies have been satisfied must submit a petition. The request will need to be submitted using the Petition for Reevaluation of Deficiency Course form along with supporting documents such as a syllabus, catalog description, and university transcripts (including the grade scale), to prove that you have met the requirements. Be advised that the documents you uploaded during the admission application have been evaluated, so a reevaluation petition should only be submitted if you have new information to provide. Once the petition has been reviewed, it is final. There will be no future petition or consideration request. If, after evaluation, the petition is not approved, the student may choose to take the deficiency test-out examination.

Option 2: Deficiency test-out exam Prior to fall and spring semesters, an online course proficiency examination (CPE) is provided to allow students entering with deficiencies (listed in the admission letter) to take a test to establish whether they possess basic knowledge of the course material sufficient to have an assigned deficiency waived. The cost for each subject examination is \$59, payable at the time of registration. This scheduled testing period is the only opportunity for deficiency test-outs. No other arrangements will be made for students to test out of assigned deficiencies. There are no CPE exams for CSE 110, 205, and MAT 242.

Below is a list of prerequisites along with the associated ASU course numbers:

- CSE 110 – Principles of Programming in Java
- CSE 205 – Object-Oriented Programming and Data Structures
- MAT 242 – Linear Algebra
- IEE 376 – Deterministic Operations Research
- IEE 380 – Probability and Statistics for Engineering Problem Solving
- IEE 470 – Stochastic Operations Research

Deficiency coursework completed with a grade of “C” or better at the undergraduate level will satisfy the requirements. A grade of “B” or better is required for all assigned deficiency coursework at the post-baccalaureate level. International coursework are evaluated differently.

Option 3: Enrolling in the course. Students who could not clear their assigned deficiency through the waiver process or deficiency test-out exam are required to enroll and pass the course(s) in their first year.

Notice of Admission - IE submits its recommendation of admission to the Office of Graduate Admission and the Office of Graduate Admission notifies the final notice of admission decision in writing. You may check your application status on My ASU (my.asu.edu).

Pre-admission credits and Transfer credit – **Please refer to the Graduate College policies and procedures.** Approved transfer credit cannot count towards meeting the core requirement unless the credit was earned at ASU.

VI. MS degree requirements

A minimum of 30 credit hours of coursework beyond the bachelor’s degree and deficiency courses are required to complete the MS degrees. All Master's students are required to develop and submit a Plan of Study (iPOS) through online ASU Interactive before registering for courses for the upcoming semester. The iPOS should be developed with the aid of the student’s academic advisor. The IE Graduate Academic Advisor, acting on behalf of the Graduate Program Chair, will initially advise the student.

Deficiency course expectation: Assigned deficiency courses must be completed by the end of the 12th semester hour. A “B” or better average is required for deficiency courses, and a “B” must be achieved in each course. A grade of “B” or better in a course that follows a prerequisite class does not waive this requirement.

Degree requirements, area of study courses, and comprehensive exams are defined below.

The four **core courses** from the courses listed below **must be completed by the end of the 18th semester** hour applied to the Plan of Study (four of the first six POS classes). The four core courses include a course in Information Systems, a course in Simulation, a course in Industrial Statistics, and a course in Operations Research. These courses are intended to expose the student to the fundamental topics across the IE spectrum. A grade of “C” or better must be achieved in each core course. Please note the core is not intended solely as prerequisites for the following coursework; it also satisfies the breadth requirement for all graduates of our program.

1. IEE 505 – Information Systems Engineering or
IEE 506 - Web-Enabled Decision Support Systems
2. IEE 545 – Simulating Stochastic Systems or
IEE 561 - Production Systems

3. IEE 572 - Design of Engineering Experiments or
IEE 573 – Reliability Engineering or
IEE 578 – Regression Analysis
4. IEE 574 – Applied Deterministic Operations Research Models, or
IEE 575 – Stochastic Operation Research

BS/MS Accelerated Program Students (4+1) core requirements

Note: Students in the accelerated program are may complete their master degree in one year after completing their bachelors, if they choose to do so. Students can share a maximum of 9 credit hours and can reserve 3 credit hours while completing their undergraduate degree. Refer to the maximum time limit to degree completion.

1. IEE 505 – Information Systems Engineering or
IEE 506 - Web-Enabled Decision Support Systems
2. IEE 561 – Production Systems or
IEE 544 - Simulating Stochastic Systems
3. IEE 572 - Design of Engineering Experiments or
IEE 573 – Reliability Engineering or
IEE 578 – Regression Analysis
4. IEE 574 – Applied Deterministic Operations Research Models or
IEE 575 – Applied Stochastic Operations Research Models

Four area courses form one of the defined areas of study – Operations Research (OR), Production Systems and Logistics (PSL), Information Management & Systems (IMS), Industrial Statistics (IS). Refer to page 15 for a list of approved area courses.

Two elective courses, 500-level or above: Elective courses taken from other departments are encouraged but must be approved before enrolling in the course. Either IEE 541, 543 or 547 is permitted as an elective with approval.

A maximum of six credit hours of 400 level coursework may be used on an approved iPOS (400 level courses taken for a grade of Pass/Fail cannot be included on an iPOS). Students must get approval from the Program Chair before enrolling and completing a 400 level coursework, except for the course that is a deficiency requirement. Courses with grades of “D” (1.00) and “E” (0.00) cannot be included on an IPOS.

Satisfactory Progress as a Graduate Student: All students must maintain a GPA of 3.0 or higher (Cumulative, Graduate and IPOS). If a student falls below a 3.0 GPA, they are placed on probation and provided the timeframe in which the GPA must be raised to the satisfactory level. Students who do not raise their GPA to a 3.0 within the provided timeline risk dismissal from the program. Please Note: any 500 level courses taken as an undergraduate student will immediately count towards your satisfactory progress GPA

calculation once you become a graduate student.

Portfolio requirement for culminating event: a project portfolio (see below the details for the project portfolio).

Eligibility requirement for the Project:

- A student must have a cumulative grade-point-average (GPA) of 3.0 over all coursework,
- 3.0 over all graduate coursework,
- 3.0 over all iPOS courses, and
- have completed all the deficiency courses with a grade of “B” or higher to take the Comprehensive Exam.

Portfolio (Non-Thesis) for Fall 2020 incoming students and onwards: The portfolio includes requirement for a student to attend a total of three IE Decision Systems Engineering seminars in the last year he/she graduates. Students will fill out the attendance form with a signature from an IE faculty or the speaker and turn in the forms from the three seminars at the end of the semester to the Canvas. Submissions will be evaluated by the IE GPC Chair.

MS Thesis Option: Students writing a 6-hour thesis (MS Degree) can reduce area course requirements by one course and eliminate one elective course, or they may alternatively eliminate two elective courses, but in either case must complete 24 hours of 500 level or higher courses. **A minimum GPA of 3.2 is required in the first 18 POS hours to pursue the MS thesis option.**

MS students writing a thesis require a research advisory committee comprised of at least three faculty members, including the committee chair. The chair must have PhD dissertation committee chairing in IE graduate program to chair an MS thesis committee. The two additional members are chosen jointly by the committee chair and the student to facilitate the student's research. A least one additional member should be from the IE faculty. Please refer at the back of the handbook for a list of area faculty and their research.

For MS students, the thesis and a successful oral defense constitute their final examination. A majority pass vote by the student's committee is required. For visa reasons, international students have a maximum of two semesters to finish the thesis after completion of coursework listed in the iPOS.

Steps to Preparing for Your MS Defense:

Before defense:

1. Obtain a consensus of approval from the committee chair and the committee members to proceed with the oral defense.
2. Schedule a date and time with your committee for the oral defense on MyASU.
3. Important: Ensure that a minimum of 50% of the official committee is physically present at the defense. If at least 50% of the committee cannot be physically present, the defense must be rescheduled.

4. Visit the Graduate College website https://graduate.asu.edu/completing-your-degree#tabs-0-content_main-5 to familiarize yourself with the dates and deadlines on format approval.

10 days prior to the defense: These steps are required to be completed prior to 10 working days from the date of oral defense.

1. Reserve a room with the SCAI administrative office (Brickyard 5th Floor).
2. Submit an electronic version of your abstract with title, full names of your committee members, defense date/time/place, and your name as you want it to appear on the defense announcement to the SCAI administrative office (Brickyard 5th Floor).
3. Schedule on MyASU your defense with the Graduate College.

On the day of the defense:

1. Set-up all your equipment at least one half-hour prior to your presentation to make sure they work properly.

After the defense:

1. Your committee will have comments and a discussion with you. At the end, the committee makes their recommendation: Pass, Pass with minor revisions, Pass with major revisions, or Fail.
2. Failing a thesis defense is final.
3. Revisions are normal and are expected to be completed within one year period. This includes remaining registered until the finished document has been uploaded through MyASU on ProQuest.
4. Follow the steps on MyASU on uploading your final dissertation through Graduate College and ProQuest.

VII. General Information

A. Research Standards for Publication of Thesis

Graduate research is the study of an issue that is of sufficient breadth and depth to be publishable in an IE-related journal. The effort should reflect a minimum of 750 hours of thoughtful work for a thesis (M.S.). The research should follow the ‘scientific method’ and thus be both objective and reproducible. The thesis should demonstrate independent, original, and creative inquiry. There should be predefined hypotheses or developmental goals and objectives that are measurable and can be tested. The document should demonstrate proficiency with written English and should conform to the Graduate College format guidelines. For more information on format guidelines, please visit the Graduate College web site https://graduate.asu.edu/completing-your-degree#tabs-0-content_main-5

B. Financial assistance and/or fellowships

There are limited funds for MS students. We encourage students to pursue assistantships outside the IE and not limit their search to IE.

C. Continuous Enrollment and Leave of Absence Policies

Once admitted to a graduate degree program or graduate certificate program, students must be registered for a minimum of one credit hour during all phases of their graduate education, including the terms in which they are admitted and graduate. This includes periods when students are engaged in research, conducting a doctoral prospectus, working on or defending theses or dissertations, taking comprehensive examinations, taking Graduate Foreign Language Examinations or in any other way utilizing university resources, facilities or faculty time.

Registration for every fall semester and spring semester is required. Summer registration is required for students taking examinations, completing culminating experiences, defending theses or graduating from the degree program.

To maintain continuous enrollment, the credit hour(s) must:

- Appear on the student's Interactive Plan of Study, OR
- Be thesis (599), or continuing registration (595), OR
- Be a graduate-level course.

Grades of "W" and/or "X" are not considered valid registration for continuous enrollment purposes. "W" grades are received when students officially withdraw from a course after the drop/add period. "X" grades are received for audit courses. Additionally, students completing work for a course in which they received a grade of "I" must maintain continuous enrollment as defined previously. Graduate students have one year to complete work for an incomplete grade; if the work is not complete and the grade changed within one year, the "I" grade becomes permanent and will remain on the students' transcripts. Additional information regarding incomplete grades can be found at asu.edu/aad/manuals/ssm/ssm203-09.html.

Leave of Absence

Students planning to discontinue enrollment for a semester or more must request approval for a leave of absence. Students may petition the Graduate College for a leave of absence for a maximum of two semesters during their entire program. The Graduate College Dean must approve a petition for a leave of absence, endorsed by the members of the student's supervisory committee (thesis students) and the head of the academic unit. **This request must be filed and approved before the anticipated absence.**

An approved leave of absence will enable students to re-enter their program without re-applying to the university. Students who do not enroll for a fall or spring semester without an approved leave of absence by the Graduate College 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 on leave is not required to pay fees, but in turn, is not permitted to place any demands on university faculty or use any university resources.

D. Maximum Time Limit

All work toward an MS degree must be completed within **six consecutive years**. The six years begins with the semester and year of admission to the program. Graduate courses taken before admission that are included in the *Plan of Study* must have been completed within three years of the semester and year of admission to the program.

E. Registration requirements for research assistants (RA) and teaching assistants (TA)

Students awarded an assistantship within the Ira A. Fulton Schools of Engineering are required to be registered for 12 credit hours (no more, no less). Audit credit hours do not count towards the 12 credit hours.

Students who obtain an assistantship outside the Ira A. Fulton Schools of Engineering are required to follow the policy of the unit that hires them.

Students with TA/RA .50 FTE appointments (i.e., 20 hours per week), who are appointed within the first 8 weeks of a semester during the academic year, receive an award covering tuition for the semester. Students with TA/RA .50 FTE appointments during the summer session(s) receive an award covering tuition.

Students with TA/RA .25–.49 FTE appointments (i.e., 10–19 hours per week), who are appointed within the first 8 weeks of a semester during the academic year, receive an award covering 100% of the nonresident portion of tuition and an award covering 50% of the remaining tuition for the semester. Students with TA/RA .25–.49 FTE appointments during the summer session(s) receive an award covering 100% of the nonresident portion of tuition and an award covering 50% of the remaining tuition.

The university provides an award covering the premium for individual health insurance for teaching and research assistants/associates who meet the minimum eligibility requirements during the duration of their appointment (coverage periods are August 16–January 15 and January 16–August 15). These are:

- appointment at 50% time (20 hours per week)
- hired as a TA or RA no later than the end of the eighth week of classes of the semester

There are four ways a student can fulfill the English language requirement. Any of the following will fulfill the language requirement:

1. Take and pass the SPEAK test with a score of 55 or higher. Only SPEAK scores from Global Launch are allowed.
2. Take the iBT (Internet-based TOEFL) test and receive a score of 26 or higher on the oral portion of the test.
3. Take the IELTS test and receive a score of 8 or higher on the speaking portion of the test.
4. Successfully complete the ITA Teacher Training Course with a score of ‘certified.’

F. Satisfactory Progress, Academic Probation, Progress probation, and Withdrawal from the IE Program:

At the end of the student's first completed semester and every semester thereafter, the school will conduct an audit to determine if the student is maintaining the required minimum satisfactory progress, including progress on academic (GPAs and deficiencies) and probationary issues. Any student that is not in compliance with the satisfactory academic/ progress requirements is notified that she/he is either

- on academic probation and is given the next 9 credit hours or two semesters (fall and spring) to bring the GPA up to the proper level or
- on continued progress probation and is required to meet the conditions outlined in the continued probation letter.

Failure to properly remediate the GPA or the conditions outlined in the letter within the time frame will result in the school recommending that the student be dismissed from the program.

Note: Fully admitted students who take optional summer courses are placed on probation after the summer term if the earned grade(s) causes their GPA to fall below the satisfactory progress GPA minimum.

If applicable, the above-noted audit will also review each student's progress towards removing enrollment deficiency courses and/or any other degree requirement milestone(s). Failure to satisfactorily complete all deficiency course(s) and/or required milestones by the stipulated deadline may result in a recommendation for dismissal to the Graduate College.

Each semester, the Industrial Engineering Program reviews students' files for satisfactory progress towards completion of the degree. All students are placed on one of the four categories:

1. Satisfactory progress
2. Academic Probation
3. Progress probation
4. Withdrawal from the IE Program.

1. Satisfactory progress means that the student does not have any academic and progress probationary issues. In addition to the probationary rules, satisfactory progress includes communication each semester with the student's Committee Chair regarding his or her progress.

2. Academic Probation pertains to grades that might affect Program and University policies, including graduation. The following are notices/letters you will receive if one of these pertains to your academics:

- GPA below 3.0 in approved POS courses.
- Overall -post-baccalaureate GPA below 3.0.

- Overall graduate (500 level or above) GPA below 3.0.
- Deficiency course grade is below 3.0.

3. Progress probation pertains to issues dealing with making progress towards a degree. The following are notices/letters you will receive if one of these pertains to your academics:

- Lack of Progress toward removing deficiencies as listed on your admission letter.
- Lack of Progress toward completing the four Core courses within the first 18 hours of POS courses.
- Failure to pass the culminating event - Portfolio.
- Failure to staying in touch with your Thesis Chair in every semester.

4. A student is recommended for **withdrawal from the IE Program** if she or he fails to meet the probationary standards placed upon in the semester mentioned in the probationary letter. The student will receive a letter from the Industrial Engineering Program explaining the reasons for the withdrawal. The student will have 5 working days from the date of the letter to appeal the decision. The IE Graduate Program Committee (GPC) will review the case and will make the necessary recommendation. The Graduate Program Chair, on behalf of the GPC, will provide a written explanation of the outcome. 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 and the consequences if the agreements are not met. If the GPC recommends that the appeal is not granted in favor of the student, the Graduate Program Chair, on behalf of the GPC, will recommend to the Dean's Academic Affairs to withdraw the student from the IE Program. The student will then have the opportunity to appeal to the Ira A. Fulton Schools Standards Committee, which reviews the student's case and makes the final ruling to Associate Dean and the IE Program. If the appeal is not granted in favor of the student, the Dean's Academic and Student Affairs will recommend to the Graduate College to withdraw the student from the IE MS Program. Please refer to the Graduate College catalog on policies and procedures or contact the graduate advisor in the SCAI Advising Center.

G. Academic Integrity

The highest standards of academic integrity are expected of all graduate students, both in the academic coursework and in their related research activities. The failure of any graduate student to meet 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 individual schools as well as the university.

Violations of academic integrity include, but are not limited to cheating, fabrication, tampering, plagiarism, or aiding and/or facilitating such activities. At the graduate level, it is expected that students are familiar with these issues, and each student must take personal responsibility in their work. Also, graduate students are expected to follow university guidelines related to the Student Code of Conduct. University policies related to academic integrity and code of conduct are available in the Graduate College, or at <http://graduate.asu.edu/beintheknow>.

H. IEE 584 - Internship

Curricular Practical Training (CPT) is an academic experience usually obtained at off-campus work settings, allowing the student to apply knowledge and skills gained in various classes. It is intended as a unique, hands-on learning experience to provide students with several valuable skills that they can use upon graduation from their graduate degree programs. Accordingly, it is not available to full-time or part-time workers regularly employed by the company where the internship is proposed.

The CPT is available to both domestic and international students. However, international students must work with the International Students and Scholars Center (ISSC) and submit additional documentation to obtain work authorization. Furthermore, students are strongly encouraged to include a maximum of three one-credit hours of CPT course IEE 584 (1 credit hour) as an integral part of their Program of Study, reflected by their approved iPOS. These credits are not part of the 30 mandatory credits. Addition of the CPT course(s) should be done at the initial submission of the student's iPOS. The Internship course cannot be added to an approved iPOS once all coursework has been completed. Exceptions may be made if the internship is relevant to thesis research. The Graduate Program Chair will determine the need for a CPT internship in such cases in consultation with the Graduate Academic Advisor. Note that approval of an iPOS with the IEE 584 course confirms that the internship is an integral part of the degree requirements as planned by the student. Internship credit hours can be removed from the iPOS if not used at the time of graduation. Note: Only internship courses can be removed from the iPOS. Courses that are approved as part of the overall degree program in the iPOS can only be substituted with another approved course.

To be eligible for an internship, a student must be in good academic standing (cumulative, graduate and iPOS GPA of 3.00 or above) for two full semesters (summer semesters not included). International students need to be aware of immigration policies and regulations, which may jeopardize their academic status. Hence, it is strongly recommended for international students to consult with the International Students and Scholars Center (ISSC).

Who can participate:

All students (domestic and international) can participate in an **out of state or an in-state internship, full time or part-time** in the **summer semester** if ALL of their GPA's (graduate, IPOS and CUM GPA are at least a 3.0 .

Students with all GPAs between **3.0-3.24** may participate in an **in-state internship part time only** in the **fall and spring semesters**.

Students with all GPA's **3.25 or higher** may participate in an **out of state or in-state internship, part time or full time in the fall and spring semesters**. During the regular Fall and Spring semesters, international graduate students in F-1 status must register for a minimum of nine (9) credit hours to maintain full-time status.

Required documents and forms for the internship proposal must be submitted to the SCAI Advising Office at least two weeks before the beginning of the semester in which the internship is planned. Students will not be able to request late-add registration of the IEE

584 Internship credit to their class schedule after the drop/add deadline of each semester. An approved proposal is required before commencing the internship. The request will include a statement from the employer that indicates they understand that the work is to satisfy a degree requirement. A sample letter and other required forms are available from the Graduate Advisor. Students must receive approval from their faculty advisor and the Graduate Program Director before registering for IEE 584. In order register for the IEE 584 - Internship, a student must have a cumulative, graduate and iPOS GPA of 3.00 or above and not have an academic integrity violation in a course for two full semesters (summer semesters not included) from the initial reporting of the incident. A final Plan of Study must be filed with the Graduate College showing the Internship course before registering for IEE 584. All application materials for an Internship must be completed by the last day of regular registration for any semester. The student must take classes appearing on the Plan of Study the semester following the internship.

Renegé: (verb) to fail to carry out a promise or commitment

It is unethical for students to continue to seek or consider other employment opportunities once an offer has been accepted. SCAI expects students to honor an acceptance and withdraw from all employment seeking activities. Students who accept an offer from an organization and later renege/decline the offer will be prohibited from further requesting future CPT pending a meeting with the Assistant Director.

A five-page final report is required at the end of the internship before a grade, and credit is given. The final report must be submitted to the reporting supervisor for comments and then to the faculty advisor for grade assignment. Refer to the [SCAI website](#) for guidelines to prepare the final report.

I. IEE 590 Reading and Conference

IEE 590 Reading and Conference (Independent Study) is available for MS students. The student cannot combine IEE 590, 584, and 581 as part of the Plan of Study. The student must get written approval from the supervising faculty outlining the coverage of the content. The Independent Study form must be approved by the Graduate Program Chair, which will be placed in the student's file.

J. Student chapters of professional societies

Our graduate students are involved in many professional societies. Most branches of Industrial Engineering have professional societies associated with them. Participation in professional societies is an excellent road to career and interest group connections. Student membership typically costs less than \$30 and includes many benefits including a monthly magazine. Professors will be happy to sign a membership form that will entitle a student to reduced rates. The professional society for all areas of Industrial Engineering is the Institute of Industrial Engineers (IIE). The ASU student chapter of IIE was the first student chapter formed in the Industrial Engineering Program and has a long history including many chapter awards. In 1999, a new student chapter of INFORMS, an operations research and management science professional society, was formed at ASU.

K. Instructional Concerns and Course-Related Complaints

Being part of a large university creates opportunities to learn from a diverse instructor population with different teaching styles and modalities for delivering course content. Courses are offered by a diverse set of faculty, including those who are research-intensive, those whose primary responsibility is teaching, and part-time faculty who are working in the field. Based on enrollment or modality of offering, faculty may also be supported by graduate student teaching assistants and graders. This diverse higher education delivery platform may differ significantly from the high school experience, and while it provides an opportunity to expand the student's ability to learn and develop problem-solving skills, concerns and conflicts with requirements and instructors may occasionally arise. SCAI students with instructional concerns should review and adhere to the following guidelines for attempting to resolve their issues. First and foremost keep in mind that the faculty and advising staff are experienced, dedicated educators that are here to help you achieve your educational goals but at the same time, as an engineering and computer science program, they have a responsibility to ensure standards are maintained and student outcomes are achieved before graduation. The university culture recognizes the value of diversity in multiple dimensions as well as the presumption of expertise and academic freedom of the faculty.

Communicate with your Instructor

If you have a difference of opinion with your instructor or teaching assistant (TA), or have concerns about technical or administrative aspects of the course, visit the instructor or TA during office hours or contact them via email (if you cannot visit them during the office hours). Express your concerns clearly and respectfully and ask for help. Be sure to provide succinct information about what you have trouble understanding in the course or your concern. Instructors and TAs are here to help. Please remember that you are responsible for pre-requisite knowledge/skills required for a course and regularly studying the material taught in the course. The teaching staff may not be able to help you with your problem if you lack the pre-requisite knowledge/skills or have not been keeping up with the course material. As a guideline, you should be spending three hours studying every week for each hour of course credit. Thus, you should schedule 8-10 hours each week to devote to each 3-credit course. al, make sure to resolve the issues as soon as they occur and maintain all documentation. For example, if the assignment instructions are not clear, get the clarification on the day the assignment is assigned and do not wait until the deadline of the assignment.

If, after communicating with your instructor or TA, you are still having problems in the course, connect with your academic advisor to understand your options moving forward.

Connect with your Graduate Program Chair

If you are unable to resolve the concern after initial contact with the instructor or the TA, and you have met with your academic advisor, you should then connect with the Graduate Program Chair for your major (or the department offering the course). The Graduate Program Chair will confer with the instructor and/or TA to better understand the concern and try to resolve the problem. Please note that before meeting with the Graduate Program Chair, you should have made a reasonable effort to meet with the course instructor (not just the TA) and get the issue resolved. When contacting the Graduate Program Chair provides all the relevant details such as the course syllabus, assignment handout, email

exchange with the instructor, etc. so that the Graduate Program Chair can promptly act on your concerns. Please be brief and precise in the description of your concerns. In some cases, the Graduate Program Chair would like to meet you. When coming for the meeting, please bring along all the relevant documents.

If the instructional concern is not resolved with the Graduate Program Chair or the department offering the course, contact the Associate Dean of Academic Affairs office for the college offering the course for assistance.

Remain Focused

When faced with instructional concerns, it is important to remain focused on the rest of the course while addressing specific areas that are under review. Be sure to stay connected with your academic advisor if there are any changes in your situation.

NOTE:

- Misrepresentation of facts or disrespectful behavior when confronting your instructor or teaching assistant is considered an academic integrity violation.
- Maintain all documentation.
- Act proactively and promptly.

In Summary, Guidelines for Avoiding Problems

- Be sure you have the necessary prerequisite knowledge before starting a course;
- Attend class and on-line exercises regularly;
- Devote time each week to studying to avoid getting behind;
- Contact the TA (if assigned) or instructor during office hours at first sign of trouble and come prepared to ask precise questions and to explain your difficulty
- Accept the fact that you grow intellectually and professionally by being challenged and learning to deal with diverse expectations and environments.

Process for Resolving Conflicts in Grading, Course Expectations, etc.

- Contact the TA (if available) or instructor to explain your concern and seek resolution;
- If the TA/instructor has attempted to assist you, but you are still having an academic difficulty that is causing personal stress or hindering your academic success, see your Academic Advisor;
- If the TA/instructor is not responsive or does not provide a legitimate response/accommodation, then contact your Graduate Program Chair.
- If you still feel there is a legal, ethical or procedural violation that is victimizing you, contact the Office of the Associate Dean of Engineering for Academic Affairs.
- Circumventing this process will be considered a violation of professional ethics and protocol.

Concentration Areas of IE Graduate Courses

COURSE	TITLE	OR	PSL	IMS	IS
IEE 505	Information Systems Engineering (3)			X	
IEE 506	Web-Enabled Decision Support Systems			X	
IEE 511	Analysis of Decision Processes (3)	X	X	X	X
IEE 512	Introduction to Financial Engineering (3)	X	X	X	
IEE 520	Statistical Learning for Data Mining (3)			X	X
IEE 521	Urban Operations Research	X	X		
IEE 526	Operations Research in Healthcare	X	X		
IEE 530	Enterprise Modeling (3)			X	
IEE 533	Scheduling (3)	X	X		
IEE 534	Supply Chain Modeling and Analysis (3)	X	X		
IEE 535	Introduction to International Logistics Systems (3)		X		
IEE 541	Engineering Administration (3)			X	
IEE 545	Advanced Simulating Stochastic Systems (3)	X	X		
IEE 552	Strategic Technological Planning (3)			X	
IEE 556	Introduction to Systems Engineering			X	
IEE 561	Production Systems (3)		X		
IEE 570	Advanced Quality Control (3)			X	X
IEE 571	Quality Management (3)				X
IEE 572	Design Engineering Experiments (3)				X
IEE 573	Reliability Engineering (3)				X
IEE 574	Applied Deterministic Operations research Models (3)	X	X		
IEE 575	Applied Stochastic Operations Research Models (3)	X	X		
IEE 576	Network Optimization and Algorithms	X	X		
IEE 577	Data Science for Systems Decision Analytics			X	X
IEE 578	Regression Analysis (3)				X
IEE 579	Time Series Analysis and Forecasting (3)				X
IEE 581	Six Sigma Methodology (3)				X
IEE 582	Response Surfaces and Process Optimization (3)	X		X	X
IEE 605	Foundations of Information Systems Engineering (3)			X	
IEE 620	Optimization I (3)	X			
IEE 622	Optimization II (3)	X			
IEE 640	Probability & Stochastic Model (3)	X			
IEE 670	Mathematical Statistics (3)				X
IEE 672	Advanced Topics in Experimental Design (3)				X
BMI 501	Intro to Biomedical Informatics				X
BMI 502	Foundations of BMI Methods I				X
CSE 520	Computer Architecture II (3)			X	
CSE 534	Advanced Computer Networks (3)			X	
CSE 536	Advanced Operating Systems (3)			X	
CSE 550	Combinatorial Algorithms and Intractability (3)	X		X	
FSE 501	Technology Entrepreneurship			X	
FSE 502	Strategic Enterprise Innovation			X	
STP 526	Theory of Statistical Linear Models (3)				X
STP 532	Applied Nonparametric Statistics (3)				X
STP 533	Applied Multivariate Analysis (3)				X
STP 534	Applied Discrete Data Analysis (3)				X
STP 540	Computational Statistics				X
APM 523	Numerical Optimization (3)	X			

OR = Operations Research
PSL = Production Systems and Logistics

IMS = Information Management and Systems
IS = Industrial Statistics

SPECIAL PROGRAM

ENGINEERING LOGISTICS – Supervising faculty: Drs. Esma Gel and Rene Villalobos.

Four core courses

Refer to page 4

Other required classes:

IEE 534 Supply Chain Modeling and Analysis. (3)

IEE 535 Introduction to International Logistics Systems. (3)

Two courses from the following list:

IEE 530 Enterprise Modeling. (3)

IEE 533 Scheduling (3)

IEE 561* Production Systems. (3)

IEE 574* Applied Deterministic Operations Research Models. (3)

IEE 575* Applied Stochastic Operations Research Models. (3)

IEE 576 Network Optimization and Algorithms

Two more elective courses or Research and Thesis

* These courses may be used as area or core courses but not both.

Industrial Engineering Course Descriptions

IEE 505 Information Systems Engr

Studies information systems application engineering.

Topics include information technology, data modeling, data organization, process mapping, application and database engineering, and user interface development. Prerequisite: CSE 205

IEE 506 Web-Enabled Decision Support Systems

Development and analysis of Web-enabled applications for decision support. Topics include: (1) Web application development using ASP.NET; (2) design for computing scalability, interface usability and cyber security; and (3) use of application development skills and design concepts to develop a decision support system consisting of database, analytical data processing, expert knowledge and reasoning, and user-friendly interface for enabling transitions from data to information, knowledge and decisions. Knowledge of database development is necessary to be successful in this course. Prerequisite: CSE 205

IEE 511 Analysis of Decision Processes

Methods of making decisions in complex environments and statistical decision theory; effects of risk, uncertainty, and strategy on engineering and managerial decisions. Prerequisite: IEE 380

IEE 512 Introduction to Financial Engineering

Introductory course on financial engineering covering traditional portfolio theory, forwards, futures, financial stochastic models, option pricing, and risk management. Prerequisite: Graduate Standing

IEE 520 Statistical Learning for Data Mining

Surveys data analysis methods for massive data sets and provides experience in analysis with computer software. Prerequisite: IEE 380

IEE 521 Urban Operations Research

Probabilistic modeling and analysis of transportation systems (car, bus, train) and emergency service systems (fire, police, and ambulance) using functions of random variables, geometric probability, queuing theory, location theory, network analysis and graph applications. Prerequisites: Graduate Engineering student; Credit is allowed for only IEE 426, 498 (OR in Hospitals), 526 or 598 (OR in Hospitals)

IEE 526 Operations Research in Healthcare

Quantitative methods for modeling and analysis of healthcare systems to address operational and tactical decision-making problems. Topics include forecasting, scheduling, decision making, facility location and layout, staffing, quality control and supply chain management in hospitals and healthcare delivery facilities. Pre-requisites: Graduate Engineering student; Credit is allowed for only IEE 426, 498 (OR in Hospitals), 526 or 598 (OR in Hospitals)

IEE 530 Enterprise Modeling

Focuses on social, economic, and technical models of the enterprise with emphasis on the management of technological resources. Includes organization, econometric, financial, and large-scale mathematical models. Prerequisite: Graduate Standing.

IEE 533 Scheduling

Provides the basic theory of scheduling and introduction to the applications domain. Prerequisites: IEE 376 and 470

IEE 534 Supply Chain Modeling/Analysis

Techniques for modeling and analysis of supply chains. Inventory management, transportation/location models, the value of information, channel alignment, risk pooling, contracts. Prerequisites: IEE 574 or 620

IEE 535 Intro Intl Logistics Systems

Exploratory project-oriented course that addresses domestic and international logistics practices from a high-level descriptive perspective and an analytical model-based perspective. Prerequisite: IEE 376

IEE 541 Engineering Administration

Introduces quantitative and qualitative approaches to management functions, engineering administration, organizational analysis, decision making, and communication. Credit is allowed for only IEE 541 or 431. Prerequisite: Graduate Standing

IEE 545 Simulating Stochastic Systems

Analyzes stochastic systems using basic queuing networks and discrete event simulation. Basic network modeling, shared resources, routing, assembly logic. Credit is allowed for only IEE 545 or 475. Prerequisites: CSE 205 and IEE 376; Co-requisites: IEE 470

IEE 547 Human Factors Engineering

Study of people at work; designing for human performance effectiveness and productivity. Considerations of human physiological and psychological factors. Credit is allowed for only IEE 547 or 437. Prerequisite: Graduate Standing

IEE 552 Strategic Technological Plng

Studies concepts of strategy, strategy formulation process, and strategic planning methodologies with emphasis on engineering design and manufacturing strategy, complemented with case studies. Presents and uses an analytical executive planning decision support system throughout the course. Must be an Engineering graduate student AND a grade of C or better or co-enrolled in IEE 545, IEE 561, IEE 572 or IEE 574.

IEE 556 Introduction to Systems Engineering

Foundation course addressing the concepts needed for successful system planning, design, and build process. Topics include successfully bringing large-scale systems to completion on schedule and budget, modeling, and cost estimating techniques, risk, and variability. Graduate students are expected to have a background in and understanding of large-scale systems. Pre-requisite:

Engineering graduate student; Credit is allowed for only IEE 456, 556 or 598 (Intro to Systems Engineering)

IEE 561 Production Systems

Understanding how factories operate, how performance is measured, and how operational changes impact performance metrics. Operational philosophies, increasing production efficiency through quantitative methods. Prerequisites: IEE 376 and IEE 470.

IEE 570 Advanced Quality Control

Process monitoring with control charts (Shewhart, cusum, EWMA), feedback adjustment and engineering process control, process capability, autocorrelation, selected topics from current literature. Prerequisite: IEE 380.

IEE 571 Quality Management

Total quality concepts, quality strategies, quality and competitive position, quality costs, vendor relations, the quality manual, and quality in the services. Prerequisite: Graduate Standing

IEE 572 Design Engineering Experiments

Analysis of variance and experimental design. Topics include the strategy of experimentation, factorials, blocking and confounding, fractional factorials, response surfaces, nested and split-plot designs. Prerequisite: IEE 380.

IEE 573 Reliability Engineering

Nature of reliability, time to failure densities, series/parallel/standby systems, complex system reliability, Bayesian reliability, and sequential reliability tests. Prerequisite: IEE 380.

IEE 574 Appl Deterministic Oper Rsch

Develops advanced techniques in operations research for the solution of complex industrial systems problems. Goal programming, integer programming, heuristic methods, dynamic and nonlinear programming. Must be an Industrial Engineering MS//PhD student. Prerequisite: IEE 376 or 470.

IEE 575 Appl Stochastic Oper Rsch Mdl

Formulate and solve industrial systems problems with stochastic components using analytical techniques. Convolution, continuous-time Markov chains, queues with batching, priorities, balking, open/closed queuing networks. Enroll requirements: Prerequisites: IEE 376 and 470.

IEE 576 Network Optimization and Algorithms

Algorithms to solve network flow problems with an objective to improve computational complexity by using appropriate data structures and computing procedures.

Credit is allowed for only IEE 576 or IEE 598 (Network Flows and Algorithms) or IEE 598 (Network Optimization and Algorithms). Prerequisite: IEE 376.

IEE 577 Data Science for System Decision Analytics

Focuses on applied data science techniques for the system decision support in PYTHON. Also targets anyone who is interested in data analytics in general or plans to work with data in a future

career (such as data scientist and data analytics). Highly encourages some prior knowledge about PYTHON. Focuses on the conceptual understanding of system modeling, statistical and machine learning, and optimization with some mathematical formulation. Also covers the main concept and some implementation of the latest development in data science, such as distributed computing, large-scale optimization, and deep learning. Furthermore, covers how to implement these models for different types of data, such as tabular data, images, text data. Finally, discusses how to interpret these models for decision support of complex systems. Prerequisite: CSE 110, IEE 380, and IEE 376

IEE 578 Regression Analysis

Regression model building oriented toward engineers and physical scientists. Topics include linear regression, diagnostics, biased and robust fitting, nonlinear regression. Prerequisites: IEE 380.

IEE 579 Time Series Analy/forecasting

Forecasting time series by regression-based, exponential smoothing, and ARIMA model techniques; uses digital computer programs to augment the theory. Prerequisites: IEE 380.

IEE 580 Practicum

Structured practical experience in a professional program, supervised by a practitioner and/or faculty member with whom the student works closely. Must be an MS//PHD Industrial Engineering student.

IEE 581 Six Sigma Methodology

The six sigma process improvement strategy of define, measure, analyze, improve, and control (DMAIC). Integrates and deploys statistical methods and other six sigma problem solving via the DMAIC framework. Prerequisites: IEE 570, 572, 578. At least two of the courses must be completed before registering for this course, and the third must be taken concurrently.

IEE 582 Response Surfaces/Process Opt

Classical response surface analysis and designs, including steepest ascent, canonical analysis, and multiple responses. Other topics include process robustness studies, robust design, and mixture experiments. Must be an Engineering MS//PHD student and have completed IEE 572 with a grade of C or better or be currently enrolled.

IEE 584 Internship

Structured practical experience following a contract or plan, supervised by faculty and practitioners. Must be an Engineering MS//PHD student.

IEE 585 Six Sigma Capstone.

The DMAIC (define, measure, analyze, improve, control) improvement strategy is applied in the formulation and execution of a six sigma project. Prerequisites: IEE 581.

IEE 590 Reading and Conference

Independent study in which a student meets regularly with a faculty member to discuss assignments. Course may include such assignments as intensive reading in a specialized area, writing a synthesis of the literature on a specified topic, or writing a literature review of a topic.

IEE 591 Seminar

A small class emphasizing discussion, presentations by students, and written research papers.

IEE 592 Research

Independent study in which a student, under the supervision of a faculty member, conducts research that is expected to lead to a specific project such as a thesis or dissertation, report, or publication. Assignments might include data collection, experimental work, data analysis, or preparation of a manuscript.

IEE 594 Conference and Workshop

Topical instruction, usually in compressed format, leading to academic credit. Often offered off-campus to groups of professionals. Must be an Industrial Engineering MS//PHD student.

IEE 595 Continuing Registration

Used in situations where registration is necessary but where credit is not needed. Replaces arbitrary enrollment in reading and conference, research, thesis, dissertation, etc. Used by students when taking comprehensive examinations, defending theses or dissertations, or fulfilling the continuous enrollment requirement in doctoral programs. Credit is not awarded, and no grade is assigned.

IEE 598 Special Topics

Topical courses not offered in regular course rotation--e.g., new courses not in the catalog, courses by visiting faculty, courses on timely topics, highly specialized courses responding to unique student demand. Check with the instructor for prerequisites and/or co-requisites.

IEE 599 Thesis

Supervised research focused on the preparation of the thesis, including literature review, research, data collection and analysis, and writing.

IEE 605 Foundations of Information Systems Engineering

Introduces science and engineering technologies of information systems design and analysis with a focus on industrial engineering applications. Topics include design and analysis of computational algorithms; and data mining techniques for classification, clustering, feature extraction, and data reduction problems. Pre-requisite: Industrial Engineering Graduate student; Credit is allowed for only IEE 598 (Found Info Syst Engr) or 605

IEE 620 Optimization I

First course of the Ph.D. level deterministic course series. This course covers foundations of optimization and linear programming. Prerequisites: MAT 272, 242, and IEE 376.

IEE 622 Optimization II

The course is a second graduate course of optimization. In this course, we introduce computational methods to solve optimization problem with integer variables efficiently as well as the mathematical theory. Pre-requisite: MAT 242 and IEE 376

IEE 640 Probability and Stochastic Processes

Presents fundamentals of probability and stochastic processes from a non-measure theoretic point-of-view to develop (a) basic model building and probabilistic reasoning skills, and (b) an understanding of important qualitative characteristics of some basic stochastic processes used to model dynamical systems with noise. Topics include a review of probability theory with particular attention to conditional probability and expectation; Markov chains; Renewal theory and the Poisson process. Considers applications in reliability, inventory theory, queuing. Prerequisites: MAT 242, IEE 376 & 470

IEE 670 Mathematical Statistics

This course is an introduction to the field of mathematical statistics at a level intended for first-year Ph.D. students in Industrial Engineering. It builds a solid background in the principles, concepts, and techniques of mathematical statistics. The class prepares students for advanced study and research in statistics and is useful for understanding statistical data analysis techniques and developing statistical thinking. Prerequisites: IEE 380

IEE 672 Adv Topics-Experimental Design

Multilevel and mixed-level factorials and fractions, design optimality, incomplete blocks, unbalanced designs, random effects and variance components, analysis of covariance. Must be an Engineering MS//PHD student AND have completed with a C or better IEE 572 or be currently enrolled.

IEE 684 Internship

Structured practical experience following a contract or plan, supervised by faculty and practitioners.

IEE 691 Seminar

A small class emphasizing discussion, presentations by students, and written research papers.

IEE 700 Research Methods

Course on research methods in a specific discipline. Must be an Engineering MS/PHD student.

IEE 784 Internship

Structured practical experience following a contract or plan, supervised by faculty and practitioners.

IEE 790 Reading and Conference

Independent study in which a student meets regularly with a faculty member to discuss assignments. Course may include such assignments as intensive reading in a specialized area, writing a synthesis of the literature on a specified topic, or writing a literature review of a topic.

IEE 792 Research

Independent study in which a student, under the supervision of a faculty member, conducts research that is expected to lead to a specific project such as a dissertation, report, or publication. Assignments might include data collection, experimental work, data analysis, or preparation of a manuscript.

IEE 795 Continuing Registration

Used in situations where registration is necessary but where credit is not needed. Replaces arbitrary enrollment in reading and conference, research, thesis, dissertation, etc. Used by students when taking comprehensive examinations, defending theses or dissertations, or fulfilling the continuous enrollment requirement in doctoral programs. Credit is not awarded, and no grade is assigned.

IEE 799 Dissertation

Supervised research focused on the preparation of the dissertation, including literature review, research, data collection and analysis, and writing. Grading method: Pass/Fail with Z Option

Industrial Engineering Faculty

Ronald G. Askin, Ph.D.

Georgia Institute of Technology (OR, PSL, IS)

Design and operation of discrete manufacturing systems, decision analysis, applied operations research, facilities planning, industrial statistics and applied optimization.

Geunyeong Byeon, PhD

University of Michigan, Ann Arbor (OR, IS)

Operations research and data analytics for supporting decision-making in large, interdependent systems

Linda Chattin, Ph.D.

State University of New York, Buffalo (IS, OR)

Discrete optimization, stochastic processes and probabilistic modeling, and emergency service location.

Adolfo R. Escobedo, Ph.D.

Texas A&M University (OR)

Theory and application of optimization, mathematical programming error reduction and elimination.

Esma S. Gel, Ph.D.

Northwestern University (OR, PSL)

Applied probability, stochastic processes, queuing theory, stochastic modeling and control of manufacturing systems.

Ashif S. Iquebal, PhD (OR, PSL)

Texas A&M University

Smart manufacturing, data science, unsupervised and active learning, additive and hybrid manufacturing

Cheryl L. Jennings, Ph.D.

Arizona State University (IS)

Quality engineering, quality management, engineering statistics, business analytics

Feng Ju, Ph.D.

University of Wisconsin Madison (OR, PSL)

Stochastic processes, stochastic modeling and control of manufacturing and healthcare systems, battery management systems.

Joseph Juarez, Ph.D.

Arizona State University (IS, PSL)

Project management, Industrial statistics

Daniel McCarville, Ph.D.

Arizona State University (IMS, IS)
Quality engineering, industrial statistics, engineering management.

Pitu B. Mirchandani, Sc. D.

Massachusetts Institute of Technology (OR, PSL)
Optimization, decision-making under uncertainty, real-time control and logistics, application interests in urban service systems, transportation, and homeland security

Douglas C. Montgomery, Ph.D.

Virginia Polytechnic Institute and State University (IS, PSL)
Statistical design of experiments, optimization and response surface methodology, empirical stochastic modeling and industrial statistics.

Rong Pan, Ph.D.

Pennsylvania State University (IS, PSL)
Industrial statistics, reliability analysis and time series modeling.

Theodore P. Pavlic, Ph.D.

The Ohio State University (OR, PSL, IMS, IS)
Distributed algorithms, autonomous systems, decentralized decision making, complex adaptive systems, self-organization, hybrid dynamical systems, sustainability in the built environment, behavioral ecology, behavioral economics, operations research, bio-mimicry and bio-inspiration, parallel computation, robotics, energy systems, intelligent control; optimization; game theory; resource allocation; collective behavior

Giulia Pedrielli, Ph.D.

Poltecnico di Milano (OR, PSL)
Simulation methodology, stochastics and learning statistics related to simulation improvement both for performance and evaluation as well as simulation-based optimization of complex systems.

George C. Runger, Ph.D.

University of Minnesota (IS, IMS)
Statistical learning, process control, and data mining for massive, multivariate data sets with applications in numerous disciplines.

Jorge A. Sefair, Ph.D.

University of Florida (OR)
Network optimization, robust optimization, integer programming, and applications of optimization in the environment, public policy, urban planning, and finance.

J. René Villalobos, Ph.D.

Texas A & M University (OR, PSL, IS)
Logistics, automated quality systems, manufacturing systems, and applied operations research.

Teresa Wu, Ph.D.

University of Iowa (IMS, PSL)

Information systems, supply chain management, multi-agent systems, data mining, Petri nets, Kalman filtering.

Hao Yan, PhD

Georgia Institute of Technology (IS, ISM)

Real time modeling and analysis with large-scale high dimensional data, smart adaptive sampling strategy and data reconstruction, data fusion for modeling of complex systems,

Nong Ye, Ph.D.

Purdue University (IMS)

Information and systems assurance, data mining and modeling, quality optimization, and control systems operations.

Appendix I - Absent Committee Member Procedure

While it is desirable that all members of a student's supervisory committee be available during the oral exam, prospectus and final dissertation defense, there are situations (e.g., faculty travel, faculty emergencies and/or faculty leave) that may necessitate holding the oral exam, prospectus, or final dissertation defense with one or more committee member(s) absent. The Academic Unit has established the following policies and procedures for such cases.

1. A minimum of 4 committee members (including chair/co-chair) from the student's official committee must be available during the student's oral exam, prospectus, and final dissertation defense.
2. A minimum of 50% of the student's official committee must be physically present with the student at the oral exam, prospectus, and final dissertation defense. If at least 50% of the committee cannot be physically present, the exam/defense must be rescheduled.
3. The chair (or one co-chair) must be available for the oral exam, prospectus, and final dissertation defense. If this is not possible, the exam/defense must be rescheduled.
4. The chair or (one co-chair) must be physically present at the oral exam, prospectus, or final dissertation defense. If this is not possible, the exam/defense must be rescheduled. The student cannot submit a committee change after the defense is scheduled to create co-chairs in the case of an absent chair.
5. A committee co-chair or member who cannot be available during the oral exam, prospectus, or final dissertation defense, may participate in one of three ways. These options are listed in the order of preference:
 - a. The absent committee member videoconferences into the oral exam defense location.*
 - b. The absent committee member teleconferences into the oral exam defense location.*
 - c. The absent committee member provides a substitute to be physically present (approved by the committee chair & the head of the academic unit) for the oral exam, prospectus, or final dissertation defense. The substitute must be someone who is approved to serve on graduate supervisory committees for that program. The absent committee member should provide the substitute questions, in writing, to be asked at the exam/defense. The substitute, although respecting the opinions expressed by the regular committee, must be free to use his/her judgment in voting on whether the student passes or fails the defense. The substitute should sign the absent committee member's name, and add his/her initials directly after the signature.

*The defense location must have the necessary equipment to accommodate video/teleconference materials.

*Students must provide a copy of their document and any other supporting presentation materials to the committee member at least 5 working days in advance of the defense. The defense location must have the necessary equipment to accommodate video/teleconference materials.

If the videoconference or teleconference option is selected, the absent member needs to e-mail the committee chair or co-chair to state that member voted to pass or fail the student and authorize that the chair signs their name on the form. The committee chair or co-chair should

sign the name of the absent individual on the form and then add his/her initials directly after the signature.

If a committee member is absent from the oral defense, the student or committee chair/co-chair must notify the Program Chair before or at the time of scheduling the oral exam defense. If the student is notified of absence after scheduling the oral exam, the student must contact the Program Chair before the oral exam defense date, so he/she finds a substitute.

For the final dissertation defense, if a committee member will be absent from the defense, the student or committee chair/co-chair must notify Graduate College before or at the time of scheduling the defense. If the student is notified of absence after scheduling the defense, the student must contact Graduate College before the defense date.