Program Requirements

IOWA STATE UNIVERSITY

Systems ENGINEERING

College of Engineering

Master of Engineering in Systems Engineering

Student Handbook
Prior to 2013-2014

Welcome to the Systems Engineering Graduate Program at Iowa State University! We are excited to have you join this program and are prepared to assist you through the course of your graduate program.

This student handbook will provide you with general guidelines regarding policies and procedures related to the Systems Engineering Graduate Program. Please note, the Graduate College Handbook provides more detailed information on the Graduate Program policies. We advise that you review the Graduate College Handbook at http://www.grad-college.iastate.edu/common/handbook/.

Please review this handbook periodically for any updates. We look forward to working with you!

Systems Engineering Graduate Program Office
3032 Black Engineering

Website: http://www.elo.iastate.edu/graduate-degrees/systems-engineering-master%e2%80%99s-degree-online/

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Student Handbook
for
Master of Engineering in Systems Engineering

1. Introduction

1.1 What is Systems Engineering?

Welcome to Systems Engineering at Iowa State University. The International Council of Systems Engineering (INCOSE) defines systems engineering as follows:

Systems Engineering (SE) is a design and management discipline that is very useful in the designing and building of large or complex systems. It is a discipline that was conceived of and introduced by the U.S. Government and was developed to counteract the difficulties encountered in the engineering of increasingly large, complex, and inter-disciplinary technological systems. However, this discipline has also evolved to aid in the design of many other types of systems (Social Systems Design), not the subject of this program.

1.2 Some of the Principles of SE Based Design

Systems Engineering has as its basis a few simple but powerful principles. The first principle is iterative top-down (or hierarchical) design. This simply means that a complex system is designed by breaking a system down into its component subsystems and then repeating the process on each subsystem until off-the-shelf or easily designable components are all that remains.

A second principle is bottom-up integration. This principle simply means that large systems are built by taking the lowest level components and putting them together one level at a time. Between each level's integration, the result of the previous level is tested to make sure it works. This way even very large systems can be easily built and bugs can be discovered and fixed before they are buried too deeply. In reality, bottom-up integration is the same as top-down design in reverse.

A third principle is that of the system life cycle. A life cycle is simply an understanding of the progression of a system from inception, to design, to construction, implementation, operation, maintenance, and eventually to its shutdown, disassembly and disposal. The system being designed has a life cycle; the systems engineering design and manufacturing process has a life cycle; each stage in each of these life cycles has a life cycle, and on and on iteratively. This principle aids in the understanding of what needs to be done when and where, how each small piece fits in the big picture, and aids in breaking large conceptual procedures or processes into smaller, more easily manageable chunks. This, alone, was found to be responsible for the elimination of a large amount of the errors that occur in the design of very large, complex systems.

The last principle is that of "user perspective." Systems Engineering attempts to build systems that take into account the user's wants, needs, preferences, and capabilities. Every type of user of a potential system (operator, maintenance, management, etc.) MUST be involved in the design of that system. This is a simple factor of optimization -- who knows better than the user what they want, what they need, and what their capabilities are?

2. Systems Engineering Program at ISU

This program in systems engineering will lead you to a master's degree in engineering. It is designed to enable engineers, regardless of undergraduate discipline, to develop the analytical abilities needed to design, evaluate, and build complex systems involving many components and demanding specifications. The intent of the program is to extend the ability of engineers to work across disciplinary boundaries as needed. It also develops the management capabilities needed in today's work environment.

Iowa State offers several options in bringing this degree program closer to you, so you can fulfill your professional obligations and enhance your qualifications without extensive travel to the Iowa State campus in Ames. Delivery options include: Live and archived media over the web or On-campus.

3. Administration of Systems Engineering Program

The following individuals at ISU are available to assist you with any problems or questions you may have.

Director of Graduate Education for Systems Engineering
Dr. Douglas D. Gemmill
Department of Industrial and Manufacturing Systems Engineering
3019 Black Engineering
Iowa State University
Ames, Iowa   50011
Tel: 515-294-8731
Fax: 515-294-3524
Email: n2ddg@iastate.edu

Program Assistant
Holly Twedt
3032 Black Engineering
Iowa State University
Ames, Iowa 50011
Tel: 515-294-4702
Fax: 515-294-3524
Email: hstwedt@iastate.edu

4. Admission Requirements

Individuals with undergraduate degrees in any area of Engineering, and graduated with at least a 3.00 GPA or above may apply. Applicants with non-Engineering degrees and/or below a 3.00 GPA will be considered on an individual basis.

Each applicant must submit a completed application form, three letters of recommendation, an official transcript of undergraduate and graduate records to date, and a $40 nonrefundable fee for US applicants and a $90 fee for international applicants. Application should be submitted as early as possible before the beginning of the term for which admission is sought.

Applicants may apply for admission to the Systems Engineering Program on-line through the Graduate College website at https://www.applyweb.com/apply/isu/.

5. Degree Requirements

Coursework Only Option

The complete requirements for the coursework only option are:
1. **Systems Engineering Core Courses**
   Six graduate credits in the general area of systems engineering. All students must take:
   AerE/EE/IE 565: System Engineering and Analysis (3 credits)
   IE 566: Applied Systems Engineering (3 credits)
2. **Elective Engineering Courses**
   Fifteen graduate credits in advanced engineering. These courses are determined by the student and academic advisor to fit the needs of the individual student's program.
3. **Elective Non-Engineering courses**
   Six credits outside of the engineering fields that meet individual educational objectives. These might come from business, economics, computer science, mathematics or statistics, among other areas.
4. **Elective course**
   One additional 3-credit course. This course could be chosen from either category 2 or 3 above based on the needs of the individual student's program with guidance from the academic advisor.
5. **There is no final oral exam.**
   Students will be mentored by the Director of Graduate Education for Systems Engineering who will also have responsibility to monitor their progress and provide guidance on course work. The Major Professor approves each student's Program of Study (POS).

**Creative Component Option**

A second option to obtain a Masters of Engineering in Systems Engineering includes a creative component and the requirement to pass a final oral exam. For more information on this option please contact Dr. Doug Gemmill.

6. Chronological list of items that must be completed to obtain the degree:
All forms noted below can be found on the Graduate College website at
http://www.grad-college.iastate.edu/common/forms/student_forms.php

Items	Completion Date	Form
Application for Graduate College	Before the completion of nine credit hours of coursework at ISU	https://www.applyweb.com/apply/isu/
Request to Establish a Home Department	First semester after admission to SE Program	"Home Department for Students Admitted to Interdepartmental Majors" form
Satisfy Graduate English Requirement *(for non-native speakers only, see details below)*	Beginning of first semester of enrollment	
Approval of Program Of Study	Before completing 12 credits of graduate work	"Program of Study" form
Application for Graduation (Diploma Slip) Filed	Before the semester of graduation begins	"Application for Graduation (Diploma Slip)" form
Request for Graduation Check/Approval	Before the semester of graduation begins	"Request for Graduation Check/Approval" form

Fill out a draft copy of each form and email to the Program Assistant. We will review and return to student for signature.

Description of the chronological list of items that must be completed to obtain the degree:

Complete application for Graduate School
You must be admitted to the Graduate College before you complete more than nine hours of coursework at ISU. That is, if you are taking courses as a non-degree (undeclared) student, do not take more than nine credits at ISU before you formally apply

to the Systems Engineering program. **Only nine credits taken before admission may be applied to the total number of credits required for graduation**.

You may apply online at https://www.applyweb.com/apply/isu/ When completing the application, be sure to enter "**Systems Engineering**" as the major desired.

Satisfy graduate English requirement, if applicable
Non-Native speakers or international students who do not have undergraduate degrees from U.S. universities must take the English Placement Test at the beginning of their first semester of enrollment. Students who do not pass the exam will be assigned to take one or more English courses. Please refer to the following link for additional details:
http://www.grad-college.iastate.edu/common/handbook/

For more information on dates and locations of the exams, please contact:

Yoo-Ree Chung
TESL/Applied Linguistics
226 Ross Hall
Ames, IA 50011
Phone: 515-294-6398
Email: ept@iastate.edu

Request to Establish a Home Department
The student is required to complete a "Home Department for Students Admitted to Interdepartmental Majors" form. The student will then reside in the department of his/her major professor. When completing the form, be sure to enter "IMSE Department".

Approval of Program of Study (POS)

- Accomplish before completing 12 credits of graduate work. (If necessary, changes may be made in the POS at a later date by completing the Modifications to the POS Form)
- List all courses applicable to the program.
- The Director of Graduate Education for Systems Engineering will assist you with development of your POS.

Diploma Slip

Completed and submitted before the semester of graduation begins.

<u>Request for Graduation Check/Approval List</u>

Completed before the semester of graduation begins

Graduate College Handbook
For detailed information regarding the items described above, please consult the "**Graduate Handbook**". The handbook describes Graduate College guidelines and procedures. It is a valuable reference for ISU students. You can also access the latest version of the handbook on the WEB at: **http://www.grad-college.iastate.edu/common/handbook/**

7. <u>Courses</u>

7.1 Schedule of Courses

A schedule of courses provided for each semester can be found on the Engineering & LAS Online Learning webpage at http://www.elo.iastate.edu/

Tentative Course Rotations can be found online at http://www.elo.iastate.edu/tentative-course-rotations/

7.2 Registering for courses

There are several options to register for courses. The student can register online through the following website https://accessplus.iastate.edu/NonAuth/R404/R4048.jsp

7.3 Transfer Courses

You may not transfer more than nine hours of coursework to be applied to your program of study. In other words, at least twenty-two credits must be taken at ISU. You must receive a "B" or better on any transfer course. It is advisable to get the course approved with your major professor before you take the course. Provide a description of course numbering system (in order for ISU to confirm the course is a graduate level course) or some other type of evidence that the institution at which you took the course considers it to be a graduate course. Also provide a copy of the course syllabus, a catalog description of the course, the name of textbook(s) used for the course, and the name and telephone number of the course instructor

7.4 Textbooks

Textbook information is available from:
    University Book Store
    Phone: 1-800-478-0048
    On-line: http://www.isubookstore.com/

7.5 Tuition and fees

Tuition and fees are subject to change. The latest updated information can be found on the Engineering-LAS Online Learning Web page at
http://www.elo.iastate.edu/how-elo-works/tuition-and-fees/

8. <u>Important telephone numbers and Links</u>

What	Telephone	Website
Bookstore University Bookstore	1-800-433-3451, or 515-294-5684	http://www.isubookstore.com/
College of Engineering		http://www.eng.iastate.edu/
Engineering-LAS Online Learning	1-800-854-1675 or 515-294-7470	http://www.elo.iastate.edu/
Graduate Admissions	515-294-0818	
Graduate College	515-294-4531	http://www.grad-college.iastate.edu/
Systems Engineering		http://www.elo.iastate.edu/graduate-degrees/systems-engineering-master%e2%80%99s-degree-online/
Director of Graduate Education for Systems Engineering Dr. Doug Gemmill	515-294-8731	Email: n2ddg@iastate.edu
Program Assistant Holly Twedt	515-294-4702	Email: hstwedt@iastate.edu