

University of Virginia
Department of Systems and Information Engineering

MASTER OF SCIENCE HANDBOOK

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1. PROGRAM DESCRIPTION

MASTER OF SCIENCE (M.S.) is a graduate degree for those wishing not only to acquire fundamental knowledge, but also to contribute to the advancement of knowledge through independent, original research. The program prepares students for careers as practicing systems engineers or research engineers, and serves as a stepping stone towards the doctorate. The program consists of five components.

- **Core courses** supplying the fundamentals of systems and decision sciences.
- **Elective courses** through which the student can expand and deepen the knowledge relevant to his/her research.
- **Colloquium**, a regular meeting of graduate students and faculty for presenting and discussing contemporary systems problems and research.
- **Research** conducted individually, under the guidance of a faculty advisor, and leading to a master's thesis and a technical paper.
- **Participation** in the intellectual life of the University.

2. DEGREE REQUIREMENTS

A candidate for the Master of Science degree must fulfill the general requirements of the School of Engineering and Applied Science and the following specific requirements.

- **Complete an approved plan of study** consisting of at least 32 credit hours.
- **Present satisfactorily a thesis proposal.**
- **Author or coauthor** at least one manuscript of a technical paper.
- **Defend satisfactorily a thesis.**

3. FACULTY ADVISOR

Upon admission to the program, the student is assigned a faculty advisor by the Graduate Programs Director. The student should meet with the advisor to initiate a planning effort. [Once the student identifies a research topic, the faculty advisor may be changed].

4. PLAN OF STUDY

4.1 The Planning Process

Immediately upon entering the program, the student should engage in a thorough and intensive planning effort in order to

- (i) crystallize academic and career objectives,
- (ii) formulate a research topic, and
- (iii) establish a working relationship with the faculty advisor who agrees to direct the research, and with faculty members in the area of the student's interests.

This planning effort culminates in a plan of study.

The plan of study must be prepared under the guidance of the faculty advisor by the end of the first semester of study. Then it must be approved by the Graduate Programs Director.

The approved plan of study may be revised if necessary; the new plan must be submitted for approval.

4.2 The Nominal Plan

The nominal plan of study is shown in the exhibit. A full-time student, who meets all the prerequisites (calculus, linear algebra, probability and statistics, computer programming) and enters the program in the Fall semester, should be able to fulfill the degree requirements in 18 – 24 months.

The student serving as a Graduate Teaching Assistant (GTA) or a Graduate Research Assistant (GRA) must carry at least 12 credit hours in a semester and 6 credit hours in summer. To meet this requirement, the GTA should register for

SYS 8997 Graduate Teaching Instruction,

whereas the GRA should register for

SYS 8999 Thesis, or
SYS 8995 Supervised Project Research,

depending on the presence or absence of a relationship between the research performed and the thesis topic.

**NOMINAL PLAN OF STUDY FOR
MASTER OF SCIENCE**

[When the Student Serves as a Teaching or Research Assistant]

Fall Semester	<u>Registration Credit</u>	<u>Degree Credit</u>
SYS 6001 Introduction to Systems Engineering	3	3
SYS 6003 Mathematical Programming	3	3
SYS 6005 Stochastic Systems	3	3
SYS xxxx Teaching or Research	3	
SYS 7096 Systems Engineering Colloquium	<u>1</u>	<u>1</u>
	13	10
 Spring Semester		
SYS xxxx Systems Engineering Elective	3	3
... Elective	3	3
... Elective	3	3
SYS xxxx Teaching or Research	3	
SYS 7096 Systems Engineering Colloquium	<u>1</u>	<u>1</u>
	13	10
 Summer Session		
SYS xxxx Teaching or Research	3	
SYS 8999 Thesis	<u>3</u>	<u>3</u>
	6	3
 Fall Semester		
... Elective	3	3
... Elective	3	3
SYS xxxx Teaching or Research	3	
SYS 8999 Thesis	<u>3</u>	<u>3</u>
	12	9
Minimum total number of credit hours		32

4.3 The Required Credits

The plan of study must include at least 32 credit hours of graduate-level work and must satisfy the following requirements.

9 or more credit hours of *core courses* distributed thusly:

- At least one course in the "methodological" aspects of systems engineering: SYS 6001, SYS 6021, SYS 6023, SYS 6050, SYS 7001.
- At least one course in the "optimization" aspects of systems engineering: SYS 6003, SYS 7042.
- At least one course in the "stochastic" aspects of systems engineering: SYS 6005, SYS 6018, SYS 6034.

15 or more credit hours of *elective courses* distributed thusly:

- At least 6 credit hours of systems engineering courses at the 6000 or 7000 level. [These credit hours cannot be earned through Independent Study SYS 6993 and SYS 7993, Supervised Project Research SYS 6995 and SYS 8995, Graduate Teaching Instruction SYS 8997 and SYS 9997, Thesis SYS 8999, and Dissertation SYS 9999.]
- No more than 3 credit hours of Independent Study SYS 6993 or SYS 7993.
- No more than 3 credit hours at the 5000 level from the School of Engineering and Applied Science. [The 5000-level courses in the Graduate School of Arts and Sciences are nominally equivalent to 6000-level courses in the School of Engineering and Applied Science.]

2 or more credit hours of Systems Engineering Colloquium, SYS 7096.
The student should register for one credit hour in each semester of the first year of study.

6 or more credit hours of Thesis, SYS 8999.

4.4 Special Circumstances

Prerequisites. The student who does not have the prerequisites (calculus, linear algebra, probability and statistics, computer programming) should take articulation courses. These courses cannot be used to satisfy the degree requirements.

Equivalent Courses. The student who, prior to enrolling in our graduate program, has already taken a course equivalent to a core course, may petition the Graduate Programs Director for the substitution of the core course by an elective course.

Transfer Credit. Up to 6 credit hours of graduate courses may be transferred. Only courses with a grade of B or better which have not been applied towards another degree may be transferred. The request for credit transfer must include the following documents: a description of course content and level, an official transcript, and a statement by the student certifying that the course has not been used to satisfy requirements for another degree. If the student is already admitted into a program at the University of Virginia, then the request for credit transfer must be pre-approved before the course is taken.

5. THESIS PROPOSAL

5.1 Under the guidance of a faculty advisor, the student prepares a written proposal for research that will lead to a master's thesis. The proposal should include a statement of the problem, literature review, research objectives, outline of the proposed approach, discussion of the anticipated contribution, and references. The document should not exceed 10 pages, double-spaced.

5.2 A written thesis proposal must be submitted to an advisory committee, and then presented orally in a public forum. This presentation should take place at least 4 months prior to the defense of the thesis.

5.3 The presentation of the thesis proposal should be planned and conducted in accordance with the following guidelines.

- The advisory committee must consist of at least 3 members of the University faculty. At least 2 members (the thesis advisor and the committee chair) must have their primary appointments (not joint appointments) in the Systems and Information Engineering Department. One member may be from outside the department. The request to appoint the advisory committee must be submitted at least 14 days before the proposed presentation date. The request must be approved by the Graduate Programs Director.
- The presentation should be scheduled when the University is in regular session, i.e., between the first and last day of classes. The last dates are: December 1 in Fall semester, May 1 in Spring semester, and August 1 in Summer session.
- At least 2 hours must be allotted for the presentation.
- The announcement of the presentation to all SEAS faculty and SIE graduate students must be submitted to the department at least 14 days prior to the presentation.
- A copy of the thesis proposal must be available for reading in the department's office at least 14 days prior to the presentation.
- The student should prepare an oral presentation of the proposed research lasting about 20 minutes.
- A student whose proposal is rejected may, upon the recommendation of the advisory committee, be granted a further consideration.

6. THESIS

6.1 A written thesis documents the research. The research contribution should be of the caliber and scope sufficient for producing at least one technical paper for a refereed journal (or for conference proceedings approved by the advisor). The manuscript of such paper must be submitted along with the thesis to the advisor.

6.2 The thesis should be prepared in accordance with the instructions from the advisory committee.

6.3 The thesis must be submitted to the examining committee at least 14 days prior to the defense.

7. THESIS DEFENSE

7.1 The final examination consists of an oral presentation and defense of the thesis in a public forum. It is designed to assess the student's contribution to a field of research and to test the student's knowledge of that field.

7.2 The final examination can be offered only after the student has submitted the thesis to the examining committee with sufficient lead time and has met all other degree requirements. It should be planned and conducted in accordance with the following guidelines.

- The examining committee must be composed of at least 3 members, and must include the student's advisory committee. The request to appoint the examining committee must be submitted to the department at least 21 days prior to the examination date. The request must be approved by the Graduate Programs Director and by the Office of the Dean.
- The examination should be scheduled when the University is in regular session, and enough time remains for thesis submission. The last dates are: November 15 in Fall semester, April 15 in Spring semester, and July 15 in Summer session.
- At least 2 hours must be allotted for the examination.
- The announcement of the examination to all SEAS faculty and SIE graduate students must be submitted to the department at least 14 days prior to the examination.
- A copy of the thesis must be available for reading in the department's office at least 14 days prior to the examination.
- The student should prepare an oral presentation of the research lasting about 30 minutes.
- A student who does not give a satisfactory performance on the examination may, upon the recommendation of the examining committee, be granted a further examination.

8. THESIS SUBMISSION

8.1 After the defense, the student must revise the thesis in accordance with the report of the examining committee.

8.2 After the final version of the thesis is approved by the examining committee, the student must secure signatures of the committee members and the Dean on the approval sheet, which then must be scanned and inserted into the thesis behind the title page.

8.3 The thesis must be submitted electronically to Libra Electronic Thesis and Dissertation (ETD) repository by the date specified by the Office of the Dean.

9. APPLICATION FOR THE DEGREE

9.1 An application for the degree must be submitted in two forms (paper and electronic) by the date specified in the academic calendar. This is usually October 1 for January graduation, February 1 for May graduation, and June 1 for August graduation.

9.2 The student must be registered during the semester in which the application for the degree is submitted.

9.3 The student wishing to enter the doctoral program in systems engineering at the University of Virginia should request admission.

10. ADMINISTRATIVE FORMS

All forms that must be completed in the course of study may be obtained in Olsson Hall 114, or may be found at

<http://web.sys.virginia.edu/graduate/forms-and-documentation.html>
(departmental forms)

<http://www.seas.virginia.edu/advising/allforms.php>
(school forms)

All administrative requirements that must be met before graduation in the School of Engineering and Applied Science may be found at

http://www.seas.virginia.edu/advising/graduation_procedure_MS_PhD.php