

**SYSTEMS AND INFORMATION ENGINEERING  
MASTER OF SCIENCE (MS) HANDBOOK  
August 2008 – August 2009**

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## **1. Program Description**

Master of Science 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,
- research engineers,

and serves as a stepping stone towards the doctorate. The program consists of four 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.
- Research conducted under the guidance of a faculty advisor, and leading to a master's thesis.
- Colloquium, a regular meeting of graduate students and faculty for presentation and discussion of contemporary systems problems and research.

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 a thesis proposal.
- Author or coauthor at least one manuscript of a technical paper.
- Pass a final examination of the thesis.

## **2. Degree Requirements**

### **2.1 Plan of Study**

The nominal plan of study is shown below. A full-time student, who meets all the prerequisites (calculus, linear algebra, probability and statistics, computer language) and enters the program in the fall semester, normally fulfills the degree requirements in 24 months.

A student serving as a Graduate Teaching Assistant (GTA) or a Graduate Research Assistant (GRA) may find it difficult to take four regular courses in a semester. This does

not relieve the GTA or GRA from the requirement of carrying at least 12 credits in a semester. To meet this requirement while taking fewer than four regular courses, the GTA should register for

- SYS 897 Graduate Teaching Instruction,

and the GRA should register for

- SYS 898 Thesis;

the latter is appropriate when the research performed by the GRA is unrelated to the thesis. The credits earned in SYS 897 do not count toward the degree requirements.

A [detailed study plan](#) is prepared under the guidance of a faculty advisor and must be submitted for approval by the end of the first semester of study.

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

### **Fall Semester**

SYS 601 Introduction to Systems Engineering	3
SYS 603 Mathematical Programming	3
SYS 605 Stochastic Systems	3
GTA or GRA Credits	3
SYS 796 Systems Engineering Colloquium	1
Total Credits for the Semester	13
Total Credits towards the Degree	10

### **Spring Semester**

SYS XXX Systems Elective	3
Elective	3
Elective	3
GTA or GRA Credits	3
SYS 796 Systems Engineering Colloquium	1
Total Credits for the Semester	13
Total Credits towards the Degree	10

### **Fall Semester**

Elective	3
Elective	3
SYS 898 Thesis Research	3
GTA or GRA Credits	3
Total Credits for the Semester	12
Total Credits towards the Degree	9

### **Spring Semester**

SYS 898 Thesis Research	9
GTA or GRA Credits	3
Total Credits for the Semester	12
Total Credits towards the Degree	9

## 2.2 Requirements for the Plan of Study

Each student works with their advisor and M.S. committee to select the appropriate courses for their concentration area and research plan. The complete course plan is submitted via the Plan of Study form and must be approved by the advisor, the SIE Graduate Program Director and the SEAS Graduate Program Director.

The M.S. requirements are as follows:

32 Credits Minimum

- 2 credits of Colloquia (SYS 796) minimum
- 6 credits of MS Research (SYS 898) minimum
- 24 credits (8 courses) of coursework minimum while meeting the following requirement:
  - Minimum of 15 credits (5 courses) of the course credits must be from the SIE Department, while meeting the following distribution requirements:
    - At least 1 course in the “methodological” aspects of systems engineering:
      - SYS 601, SYS 602, SYS 621, SYS 623, SYS 650, SYS 701
    - At least 1 course in the “stochastic” aspects of systems engineering:
      - SYS 605, SYS 618, SYS 634, SYS 682 (Pattern Recognition)
    - At least 1 course in the “optimization” aspects of systems engineering:
      - SYS 603, SYS 742
    - No more than 3 credits of independent study (SYS 693 or SYS 793)
    - Supervised Project Research (SYS 695 or SYS 895) cannot be used as credit toward the degree
    - No more than 3 credits at the 500 level from the School of Engineering and Applied Science (Note: a 500 level course at from the Graduate School of Arts and Sciences is nominally equivalent to a 600 level course in the School of Engineering and Applied Science.)

## 2.3 Concentration Areas

Opportunities exist for specializing by taking the elective courses in one of the [graduate concentration areas](#). Further guidance with respect to specialization may be obtained from the lead faculty for the given concentration area.

## 2.4 Special Circumstances

- *Student does not have the prerequisites* (calculus, linear algebra, probability and statistics, computer language). The student should take articulation courses. These courses cannot be used to satisfy the degree requirements.
- *Student has transfer credit.* Up to 6 credits for graduate courses may be transferred. Only courses with a grade of B or better that have not been applied toward another degree may be transferred. [Form G112--Transfer of Graduate Courses for Master's Graduate Degrees](#)--must be completed and approved.
- *Student has taken a course equivalent to a core course.* If, prior to enrolling in our graduate program, a student has already taken a course equivalent to a core course, then he/she may petition the Graduate Program Director for the substitution of the core course by an elective course.

### **3. Thesis**

#### **3.1 Advisor and Topic Selection**

Immediately upon entering the program, the student should engage in a thorough and intensive planning effort in order to (i) crystallize his/her academic and career objectives, (ii) formulate a research topic, and (iii) develop working relations with faculty members whose research areas interest the student, and who may be willing to direct the student's research. Thereafter, the student should ask a faculty member to serve as his/her thesis advisor. Under the guidance of the advisor, the student prepares the plan of study, formulates a research topic, writes a thesis proposal, and makes an oral presentation of the thesis proposal at a colloquium. Nominally, this planning effort should be completed by the end of the first semester of study.

#### **3.2 Thesis Proposal**

The M.S. research proposal is prepared no later than 4 months prior to the final thesis defense. A written thesis proposal documents the research plan and should include the student's proposed committee, a statement of the problem, literature review, proposed approach, expected contribution and references. The proposal is submitted to the committee at least one week prior to an oral presentation of the proposed activity.

#### **3.3 Thesis Defense**

##### **• Document**

A written thesis documents the research. The research contribution should be of the caliber and scope that is sufficient for producing at least one paper for a refereed journal or advisor approved conference proceedings. A draft of such paper must be submitted along with the thesis to the advisory committee. Written instructions for thesis preparation are available in the Office of the Dean.

<http://www.seas.virginia.edu/advising/allforms.php>

- Examining Committee

The examining committee is composed of at least three faculty members. Two members (the thesis advisor and the committee chair) must be from the Systems and Information Engineering Department.

- Final Examination

The final examination is held after the student has submitted a thesis to the examining committee and fulfilled all other degree requirements. The final examination is open to the public and consists of an oral presentation and defense of the thesis. The student should plan and prepare for the examination with sufficient lead time. The following guidelines apply.

- *4 weeks before the defense:* The student notifies the committee members of his/her intent, schedules the final examination, and informs the graduate administrator about the location, date, and time of the examination. The student also prepares [form G105](#) with guidance from the graduate administrator.
- *2 weeks before the defense:* The student submits a copy of the thesis to each committee member and to the Department's Office, and submits an announcement of the final examination to the graduate administrator. The announcement should include the student's name, committee members, title, abstract, location, date, and time of the examination. At least 2 hours must be allotted for the examination. The presentation should last no longer than 30 minutes.
- *1 week before the defense:* The student submits the manuscript of a technical paper to the thesis advisor. The manuscript should be prepared for submission to a refereed journal or conference proceedings, and the student must be the author or a coauthor.

#### **4. Application for the Degree**

Application for the degree is due by the beginning of October for graduation in January, by the beginning of February for graduation in May, and by the beginning of June for graduation in August, but not earlier than 3 months before the expected date of graduation. The student must be registered to apply for the degree. In the event of failure to qualify for the degree by the designated date (e.g., the student has not completed the approved plan of study, has a grade point average below 3.0, did not pass the final examination of the thesis, or did not submit the approved thesis), reapplication is necessary at the appropriate time before the new expected date of graduation.

#### **5. Important Forms**

All necessary administrative paperwork, to be completed as the student pursues his/her degree, may be found at <http://www.sys.virginia.edu/students/forms.html> or may be obtained by stopping by Olsson 114. The required forms for the Master of Science are as follows:

- G101 - Program of study
- G104 - Appoint an advisor
- G105 - Examining committee
- G110 - Final examination
- G112 - Transfer credits
- G113 - Apply for degree
- G122 - Instructions for thesis preparation

Consult with your advisor about the timetable for filling out these forms.