Doctor of Philosophy in Modeling and Simulation

The Doctor of Philosophy Degree Program in Modeling and Simulation focuses on developing the necessary skills and knowledge to enable the graduate to conduct and evaluate independent original research in an area of modeling and simulation. The goal of the program is to prepare students for careers in teaching and research at academic institutions, as well as the conduct or leadership of research and development in public and private organizations. Degree requirements include a minimum of 54 credit hours of graduate course work and a minimum of 18 credit hours of dissertation research.

Core M&S Courses (21 hours):
- MOD 501 Survey of Modeling and Simulation
- CS 545 Introduction to Computer Graphics
- ISE 547 Introduction to Systems Simulation or CS 581 Modeling & Simulation I
- MA 565 Intermediate Mathematical Modeling
- ISE 627 Engineering Systems or CS 650 The Software Engineering Process
- CS 630 Artificial Intelligence I
- ISE 690 Statistical Methods for Engineers

Students with approved transfer courses or documented proficiency in above areas may substitute elective courses.

Required Doctoral Core Courses (18 hours):
- CS 582 Modeling and Simulation II
- ISE 647 Advanced System Simulation
- One course from the following set:
  - CS 548 Human-Computer Interaction
  - CS 645 Computer Graphics
- One course from the following set:
  - CS 635 Computational Models of Cognition
  - CS 717 Advanced Algorithm Design & Analysis
  - CS 730 Artificial Intelligence II
- One course from the following set:
  - ISE 637 Systems Modeling and Analysis
  - ISE 726 Systems Modeling
  - CS 655 Formal Methods in Software Engineering
  - CS 750 Advanced Software Engineering Topics
- One course from the following set:
  - ISE 734 Value and Decision Theory
  - ISE 790 Advanced Statistical Applications

Elective Doctoral Courses (15 hours):
A minimum of 15 credit hours of elective graduate courses must be completed. These courses are selected to expand the background knowledge for the dissertation research and must be formally approved by the graduate program coordinator.

Dissertation: (18 hours minimum) MOD 799 Doctoral Dissertation

Distance Learning:
Currently (Fall 2010), some but not all of the courses within the Doctor of Philosophy degree are available through Distance Learning. Work towards offering the complete program via Distance Learning is ongoing. For additional information contact the Distance Learning Office at (256) 824-6976.

Further Information: Phone: Email:
Dr. Mikel D. Petty (Graduate Program Coordinator) (256) 824-4368 pettym@uah.edu

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I. ADMISSION REQUIREMENTS

a. Admission to the Ph.D. Program in Modeling and Simulation (M&S) is granted in accordance with University of Alabama in Huntsville requirements for doctoral programs, as specified in the Graduate Catalog. Specific additional requirements for the Modeling and Simulation Program include the following:

   (1) I. Bachelor’s degree in computer science, engineering, mathematics, or the physical or life sciences. 
   or
   II. Master’s degree in computer science, engineering, mathematics, or the physical or life sciences. Applicants with other than above degrees may still be admitted and may be required to complete additional coursework as determined by the admissions committee.

   (2) A minimum grade-point-average of 3.5/4.0. A student having a graduate coursework grade-point-average, greater than 3.3/4.0 and with evidence of a high level of professional capability may be eligible for admission upon submission of a petition to the graduate program coordinator.

   (3) A minimum total score of 1000 on the verbal plus quantitative portions of the Graduate Record Examination (GRE) and a minimum score of 3.0 on the analytical writing portion.

   (4) Submission of three letters of recommendation. At least two of the letters should be from faculty in the highest degree program completed when the application is made within five years of graduation from that program.

   (5) Submission of a resume and a statement of purpose, goals and objectives related to the doctoral program of study.

b. Applicants are expected to have the following foundation knowledge for admission to the Ph.D. Program in M&S:

   (1) Mathematics fundamentals including differential and integral calculus, and probability and statistics.

   (2) Computer Science fundamentals including the algorithmic approach to problem solving, and proficiency in an object-oriented programming language such as C++ or Java.

   Students who do not meet the above requirements may be admitted conditionally.

II. CURRICULUM

A minimum of 54 hours of graduate credit and 18 hours of dissertation research are required for the Ph.D. M&S degree, and must be included in the student’s Program of Study. The Program of Study must be formally approved by the graduate dean, the graduate program coordinator and the student’s dissertation supervisory committee.

III. PRELIMINARY EXAMINATION

The Preliminary Exam is used to assess the student’s ability to pursue the Ph.D. in M&S. Students should plan on taking the exam when they have completed the M&S prerequisite core courses, and before completing 9 credits of doctoral courses. Successful completion of six of the following seven exam topic areas is required: M&S fundamentals; discrete event simulation; probability and statistics; computer graphics; artificial intelligence; systems engineering; and software engineering. This exam may only be repeated once.

IV. QUALIFYING EXAMINATION AND DISSERTATION

The Qualifying Exam is designed to assess the student’s preparation to successfully conduct dissertation research. It is normally taken at the completion of the course work in the Program of Study, and is conducted in two distinct stages. The first stage is a demonstration, through written and oral examination, that the student is proficient in the subject matter in the Program of Study. This stage may be attempted no more than twice and must be passed before progressing to the second stage. The second stage of the Qualifying Exam is the dissertation proposal, where the student prepares a written report and makes a subsequent oral presentation describing the proposed dissertation research. Both the dissertation topic and the expected approach to the problem solution must be clearly delineated to the committee’s satisfaction in order for a pass to be granted. The dissertation proposal may be attempted no more than twice. Upon completion and approval of the dissertation by the supervisory committee, the student must present and defend it in a public forum.

V. ADDITIONAL REQUIREMENTS

Additional requirements and policies of the Graduate School may be found in the Graduate Catalog and must be observed.