

The **Mathematical Sciences Program** is designed to provide broad training in basic mathematics together with some specialization in an area of application of mathematics. Each student must select one of the eight Program Options as a special area. Because the program options have somewhat more specific requirements, careful planning and frequent consultation with your advisor are essential to ensure timely completion of the program. The concentration program must include at least nine courses: four basic courses (**II.**), three courses from one of the Program Options (**III.**), and two additional courses (**IV.**) as described below. At least two of the five (optional and additional) courses must be MATH courses.

**I. Prerequisites\*\* (3 courses) {must be completed with C- or better}**

Instructions	Course(s)	Student Elections (enter your course selections here)
Select <b>one</b> of the following <b>course pairs</b> :	Math 215 & 217 Math 285 & 217 Math 205 & 217 Math 295 & 296	1. _____ 2. _____
<b>EECS 183 or working knowledge</b> of a high-level computer language (Fortran, C, or C++)	EECS 183 or working knowledge of a high-level computer language (Fortran, C, or C++) <b>*Students are strongly encouraged to take EECS 280 and EECS 281 as well.</b>	3. _____

**II. Basic Courses\*\* (4 courses) {must be completed with C- or better}**

Instructions	Course(s)	Student Elections (enter your course selections here)
Select <b>one</b> of the following <b>Differential Equations</b> courses:	Math 316    Math 286	1. _____
Select <b>one</b> of the following <b>Discrete Math/Modern Algebra</b> courses:	Math 312    Math 465 Math 412    Math 493	2. _____
Select <b>one</b> of the following <b>Analysis</b> courses: ( <i>Students in Mathematical Economics should choose Math 351 or 451 as their Analysis course.</i> )	Math 351    Math 354 Math 451    Math 450 Math 454	3. _____
Select <b>one</b> of the following <b>Probability</b> courses:	Math 425    Math 525	4. _____

\*\* More advanced students, such as those who have completed Math 396, may substitute higher-level courses with the approval of a concentration advisor. All students are strongly encouraged to include in their program one of the more theoretical courses: Math 412, 451, 493, 494, or 525.

### III. Program Options: Control Systems

A student in the **Mathematical Sciences Program** must choose one of the eight options and complete at least three courses listed under that option. This requirement is designed to provide focus and depth to the program and can only be waived by a departmental advisor in favor of a program that provides this depth in some equivalent way. An acceptable program must include some of the more difficult courses. Advice should be sought from a departmental advisor before selecting an option.

Control Systems is a fascinating field; practitioners can be found in such diverse fields as automotive pollution control, avionics, and process control in manufacturing. A control designer will need to interface with the modeling group to develop a mathematical description of the system to be controlled, and with the testing group to characterize disturbances or other uncertainties affecting the system. The required performance of the system will then be ascertained from the intended use and translated into a set of mathematical specifications for a closed-loop system. At this stage the designer will select from an arsenal of tools for the controller analysis and synthesis—this generally requires a solid foundation in linear algebra, differential equations, real analysis, and probability.

Instructions	Course(s)	Student Elections (enter your courses here)	
Select <b>three</b> of the following courses:	Math 354 - Fourier Analysis Math 420 - Adv Linear Algebra Math 451 - Advanced Calc I Math 454 - Bound. Va.I Prob. for PDE Math 462 - Math Models Math 471 - Intro Numerical Methods Math 555 - Intro Cmplx Var Math 561 - Linear Prog I Math 562 - Cont Optimization Methods STATS 426 - Intro to Thyr Stats	EECS 376 - Found. of Comp Sci. EECS 460 - Control Sys Analys./Des. EECS 476 - Data Mining EECS 560 - Linear Sys Thry EECS 561 - Digital Control Sys EECS 562 - Nonlinear Systems EECS 565 - Linear Feedback EECS 567 - Robot Kinematics & Design ROB 380 - Intro. Auto. Robotics ROB 422 - Intro. Algo. Robotics ROB 530 - Mobile Robotics	1. _____ 2. _____ 3. _____

### IV. Advanced Courses (2 courses)

To complete the major program, each student should elect two additional advanced courses in mathematics or a related area. In all cases, **approval from a departmental advisor is required**. This is a very flexible requirement designed to accommodate special interests and may be satisfied by a broad range of courses in other departments (generally numbered 300 or above) or by mathematics courses numbered 400 or above.

Instructions	Course(s)	Student Elections (enter your course selections here)
Select <b>two Advanced</b> courses:	<i>Selected with approval from a mathematical sciences advisor</i>	1. _____ 2. _____

### V. Requirements

At least two of the courses in III. and IV. must be MATH courses.

At least one must be a cognate course numbered 300 or above taught outside the department that emphasizes applying significant mathematical tools (at least at the level of Math 215) in another discipline.