Progress Toward Completion of the Mathematics Major

Applied Mathematics Concentration

Arts and Sciences students may be admitted to the math major after successfully completing a semester of multivariable calculus, a semester of linear algebra, and a 3- or 4-credit computer programming course. Applications are available in 310A Malott Hall.

Student's Name _____ **Net ID** _____ **Faculty Advisor** _____

Courses needed to complete the major

_____ initials _____

_____ date _____

Math majors must complete **9 courses** for the major, as described in items 1–3 below, with a **minimum grade of C–**. MATH courses numbered 5000–5999 do not count. No course may be used to satisfy more than one requirement.

_____ At least two of the MATH courses taken must be at the 4000 level (or above).

1. Two Courses in Algebra. (___ transfer credit applied, see reverse)

_____ MATH 3320 Introduction to Number Theory
_____ MATH 3340* Abstract Algebra
_____ MATH 3360* Applicable Algebra
_____ MATH 4310* Linear Algebra
_____ MATH 4315* Linear Algebra with Supplements
_____ MATH 4330* Honors Linear Algebra
_____ MATH 4340* Honors Introduction to Algebra
_____ MATH 4370 Computational Algebra
_____ MATH 4500 Matrix Groups
_____ MATH 4560 Geometry of Discrete Groups

2. Two Courses in Analysis. (___ transfer credit applied, see reverse)

_____ MATH 3110* Introduction to Analysis
_____ MATH 3210 Manifolds & Differential Forms
_____ MATH 3230* Introduction to Differential Equations
_____ MATH 4130* Honors Intro Analysis I
_____ MATH 4140 Honors Intro Analysis II
_____ MATH 4180* Complex Analysis
_____ MATH 4200* Differential Equations and Dynamical Systems
_____ MATH 4210* Nonlinear Dynamics and Chaos [also MAE 5790]
_____ MATH 4220* Applied Complex Analysis
_____ MATH 4250 Numerical Analysis and Differential Equations [also CS 4210]
_____ MATH 4260 Numerical Analysis: Linear & Nonlinear Equations [also CS 4220; co-meets w/CS 5223]
_____ MATH 4280* Introduction to Partial Differential Equations

***Forbidden Overlaps:** Due to an overlap in content, students will receive credit for only one course in each group:
(1) MATH 3110, 4130; (2) MATH 3230, 4280; (3) MATH 3340, 3360; (4) MATH 3340, 4340; (5) MATH 4180, 4220; (6) MATH 4200, 4210; (7) MATH 4310, 4315, 4330; (8) MATH 4710, ECON 3130, BTRY 3080; (9) MATH 4720, ECON 3130, BTRY 4090; (10) MATH 4810, 4860.

Of the 9 courses used to fulfill requirements (1), (2), (3 iii), and (3 iv) of the math major, at least one course must be taken from three of the four Groups A, B, C, and D described on the next page. Non-MATH courses in these groups may be used toward the math modeling requirement (3 iv).

3. Concentration in Applied Mathematics. (___ transfer credit applied, see below)

Five additional courses from (iii) and (iv) below.

(iii) At least three MATH courses numbered 3000 or above:

_____ _____

_____ _____

_____ _____

_____ _____

(iv) At least one course dealing with mathematical models. Any course from outside mathematics with serious mathematical content and dealing with scientific matters may be used. Serious mathematical content includes, but is not limited to, extensive use of calculus or linear algebra. Any course from another department that would satisfy one of the other concentrations may be used.

_____ _____

_____ _____

or one of the following:

_____ CS 2110 Object-Oriented Programming and Data Structures [also ENGRD 2110]
_____ MATH 3610 Mathematical Modeling
_____ PHYS 1116 Physics I: Mechanics and Special Relativity
_____ PHYS 2208 Fundamentals of Physics II
_____ PHYS 2213 Physics II: Electromagnetism
_____ PHYS 2217 Physics II: Electricity and Magnetism [also AEP 2170]

Other 1000-level physics courses and PHYS 2207 may *not* be used. AP credit may *not* be used.

_____ _____ (approved by faculty advisor)

Transfer Credit / Study Abroad Courses Applied to the Major

Course Number &Title	Institution	Requirement

***Forbidden Overlaps:** Due to an overlap in content, students will receive credit for only one course in each group:
(1) MATH 3110, 4130; (2) MATH 3230, 4280; (3) MATH 3340, 3360; (4) MATH 3340, 4340; (5) MATH 4180, 4220; (6) MATH 4200, 4210; (7) MATH 4310, 4315, 4330; (8) MATH 4710, ECON 3130, BTRY 3080; (9) MATH 4720, ECON 3130, BTRY 4090; (10) MATH 4810, 4860.

Applied Mathematics Concentration

Of the 9 courses used to fulfill requirements (1), (2), (3 iii), and (3 iv) of the math major, at least one course must be taken from three of the four Groups A, B, C, and D below.

Group A. Differential equations

_____ MATH 3230* Introduction to Differential Equations
_____ MATH 4200* Differential Equations and Dynamical Systems
_____ MATH 4210* Nonlinear Dynamics and Chaos [also MAE 5790]
_____ MATH 4280* Introduction to Partial Differential Equations

Group B. Discrete mathematics and combinatorics

_____ MATH 3360 Applicable Algebra
_____ MATH 4370 Computational Algebra
_____ MATH 4410 Introduction to Combinatorics I
_____ MATH 4420 Introduction to Combinatorics II
_____ CS 4820 Introduction to Analysis of Algorithms
_____ ORIE 3300 Optimization I
_____ ORIE 4330 Discrete Models
_____ ORIE 4350 Introduction to Game Theory

Group C. Numerical and computational methods

_____ MATH 4250 Numerical Analysis and Differential Equations [also CS 4210]
_____ MATH 4260 Numerical Analysis: Linear and Nonlinear Problems [also CS 4220; co-meets w/CS 5223]
_____ CEE 5290 Heuristic Methods for Optimization [also CS 5722, ORIE 5340]
_____ CS 4620 Introduction to Computer Graphics [co-meets with CS 5620]
_____ CS 4670 Introduction to Computer Vision [co-meets with CS 5670]
_____ CS 5643 Physically Based Animation for Computer Graphics
_____ MAE 4700 Finite Element Analysis for Mechanical and Aerospace Design [co-meets w/MAE 4701]
_____ ORIE 4320 Nonlinear Optimization

Group D. Probability and statistics

_____ MATH 4710* Basic Probability
_____ MATH 4720* Statistics
_____ ECON 3130* Statistics and Probability (formerly ECON 3190)
_____ ORIE 3500 Engineering Probability and Statistics II
_____ STSCI 3080* Probability Models and Inference [also BTRY 3080, ILRST 3080]
_____ STSCI 3100 Statistical Sampling [also BTRY 3100, ILRST 3100]
_____ STSCI 4030 Linear Models with Matrices [also BTRY 4030]
_____ STSCI 4100 Multivariate Analysis [also BTRY 4100, ILRST 4100]

***Forbidden Overlaps:** Due to an overlap in content, students will receive credit for only one course in each group:
(1) MATH 3110, 4130; (2) MATH 3230, 4280; (3) MATH 3340, 3360; (4) MATH 3340, 4340; (5) MATH 4180, 4220; (6) MATH 4200, 4210;
(7) MATH 4310, 4315, 4330; (8) MATH 4710, ECON 3130, BTRY 3080; (9) MATH 4720, ECON 3130, BTRY 4090; (10) MATH 4810, 4860.