

# DEPARTMENT OF MATHEMATICS

## COLLEGE OF ARTS AND SCIENCES

### Faculty

Bryan Dawson(1998). Professor of Mathematics and Department Chair. B.S. and M.S., Pittsburg State University; Ph.D., University of North Texas.

Richard Dehn(1969). Associate Professor of Mathematics. B.S., University of Memphis; M.A.T., Purdue University; M.S., University of Arkansas, Additional study, University of Wisconsin, University of Arkansas, University of Missouri-Rolla.

Chris Hail (1995). Professor of Mathematics. B.S., Campbellsville College; M.A., Morehead State University; Ed.D., University of Kentucky.

Dwayne Jennings(1981). Associate Professor of Mathematics and Computer Science. B.S., Union University; M.S. (Mathematics) and M.S. (Computer Science), University of Memphis.

Matt Lunsford (1993). Professor of Mathematics. B.G.S., Louisiana Tech University; M.S., University of Nebraska; Ph.D., Tulane University.

George Moss(2009). Associate Professor of Mathematics and Assistant Dean of the College of Arts and Sciences. B.S., Auburn University; Ph.D., Virginia Polytechnic Institute and State University.

Tanalytically, and abstractly; to pursue a body of knowledge

whose basis is independent of both empirical observation and culture; and to learn humility and a sense of wonder at the complexity, beauty, and applicability of mathematics.

### Student Awards

A Departmental Award is given to the senior who places first in the Major Field Test for Mathematics as partial fulfillment of MAT 498.

The Wolfram Research Inc. Award is awarded to a freshman calculus student chosen by the Department of Mathematics based upon demonstrated outstanding achievement, enthusiasm, ingenuity, and creativity in mathematics.

### Curriculum

The department offers a major in mathematics and minors in mathematics, mathematics with emphasis in statistics, and actuarial science. Students majoring in mathematics may select from the following tracks: mathematics, teacher licensure in mathematics for secondary education (grades 7-12), or actuarial science. The offerings of the major provide a foundation for beginning graduate study in mathematics, for entry into mathematics-related work fields, and for teaching mathematics at the secondary level. Students majoring or minoring in mathematics begin their academic credit towards the major or minor with courses numbered MAT 205 or above. Students having a four-year high school mathematics program that included trigonometry should be able to begin the calculus sequence in their first semester.

- I. Major in Mathematics—35 hours
  - A. MAT 207, 208, 211, 212, 213, 315 and 498 are required.
  - B. Select one: MAT 411, MAT 415.
  - C. Select 9 hours from junior or senior MAT courses.
  - D. Independent Study (MAT 495) or Departmental Special Study (MAT 395) may be used for 3 of the 9 hours required in C.
  - E. Prerequisites: PHY 231, and CSC 115 or 255.
- II. Major in Mathematics with Discipline-Specific Honors—36 hours
  - A. MAT 207, 208, 211, 212, 213, 315\*—21 hours
  - B. MAT 411\* and MAT 415\*—6 hours
  - C. Upper Level MAT \*Elective hours—6 hours
  - D. Three 300 or 400 level MAT courses from \* above taken under honors-contract, as approved by the department, to include 411 or 415 with at least two completed prior to the semester in which the honors project is completed—9 hours
  - E. Independent Study (MAT 495) or Departmental Special Study (MAT 395) may be used for 3 of the 6 hours required in C.
  - F. Attend at least 4 honors colloquia during each of the junior and senior years, as approved by the Director of the Honors Community.
  - G. MAT 498—3 hours to include the honors project.
  - H. Admissions Standards met and Progression Standards continue to be met throughout the program.
  - I. Prerequisites: PHY 231, and CSC 115 or 255.
- III. Teacher Licensure in Mathematics (Grades 6–12)
  - A. Major requirements as shown above to include MAT 413.
  - B. Professional Education:
    1. Prior to Internship – EDU 150, EDU 305, PSY 213, PSY 318, PSY/SE 230.
    2. Fall of Internship Year – EDU 306, 340, 422, 440
    3. Spring of Internship Year – EDU 441 and 451
  - C. Completion of applicable portions of the Praxis II.
  - D. For additional information, see the Assistant Dean for Teacher Education and Accreditation.

- M. Minor in Mathematics—21 hours
- MAT 211 and 212
  - Select one: MAT 205, 207, 208, 213; CSC 115, 255
  - 6 hours of upper-level MAT courses.
  - The remaining must be 205 or higher.
- V. Minor in Mathematics with an Emphasis in Statistics—20 or 21 hours
- MAT 211 and 212, 208, 305, and 405
  - One of: MAT 213, 314, 315; CSC 115 or 255.
- VI. Minor in Actuarial Science as earned with a Math Major—19 hours
- Prerequisites (applicable to major): MAT 211, 212, 213, 305, 315, 401, 402.
  - ACC 211, 212; ECO 211, 212; FIN 320.
  - ECO 411 or 412.
  - MAT 400.
- VII. Minor in Actuarial Science as earned with a Business Major and BSBA—21 hours
- Prerequisites (applicable to other requirements): ACC 211, 212; ECO 211, 212; FIN 320; ECO 411 or 412; MAT 208, 211; CSC 115 or 255. Note: In the BSBA core MAT 208 substitutes for MAT 114, and CSC 115 or 255 for 105.
  - MAT 212, 213, 305, 315.
  - MAT 400, 401, 402.

## Admissions and Progression in the Major in Mathematics with Discipline-Specific Honors

Admission to the Program requires completion of at least 15 hours through Union University or transfer to include MAT 207 and MAT 213 with a minimum GPA of 3.50 both in all coursework and specifically in mathematics as well. Transfer students must complete at least one semester at Union University prior to application to include at least one course applicable to the major. Application is made during or immediately following the second semester of the sophomore year, or for a transfer student not at Union during the sophomore year, immediately following the first semester of the junior.

At least three full semesters, preferably four, must remain before graduation when application is made. The student makes application to the Office of the Director of the Honors Community but must be preceded by an appointment with the Chair of the Department of Mathematics.

To remain in the program the student must maintain the 3.50 minimum GPA both overall and in Mathematics, complete each honors contract course with a grade of B or better, and complete the requirements of the honors thesis in a timely manner as outlined below.

The honors contract for upper-level courses other than MAT 498 shall consist of work that helps the student develop skills in proving theorems and promotes understanding deeper than that required of other students. Possibilities include, but are not limited to, Option (1) completion of a collection of 20 proofs that are more difficult or probe the material more deeply than is required of other students, or Option (2) reading, understanding, and presenting a previously-published paper in the content area of the course. The department reserves the right to require an honors student to complete an honors contract of each type during the junior year. For each honors contract course, the student must:

- Come to agreement with the instructor of the course

- Complete each honors contract course with a grade of **Student Organizations**

B or better,

- Present the project at the Union University Scholarship Symposium,
- Apply to present the project at an off-campus meeting, and
- Submit an article based on the project.

Application, contract forms and other information can be found at <http://www.uu.edu/dept/math/honors.cfm>.

Kappa Mu Epsilon, honor society in mathematics, selects students who have achieved standards of scholarship, professional merit, and academic distinction. A student must have completed 3 semesters' rank in the upper 35%, completed 3 courses in MAT, to include calculus, and have a minimum 3.0 Math GPA.

Sigma Zeta's a national honorary science society for those who have completed 15 hours in natural science and math with a minimum GPA of 3.0 in these courses.

## Assessment of Majors

All senior mathematics majors must take the Major Field Test in mathematics as one requirement for MAT 498 (see below). Those majors completing a teacher licensure program are required to take the PRAXIS II.

## Course Offerings in Mathematics (MAT)

( ) Hours Credit; F–Fall, W–Winter; S–Spring; Su–Summer

©101. Mathematics for Elementary Teachers (3) F, S

This course is designed to introduce the student to problem solving strategies and the real number system. Topics will include the whole numbers, integers, fractions and decimals, functions and coordinate geometry.

©107. Mathematics for the Liberal Arts (3)F, S

This course is designed to introduce the student to the basic concepts of several areas of mathematics. Topics of focus will include counting

207. Transition Mathematics (3) F

Corequisite: MAT 212

An introduction to abstract mathematical reasoning, including reading and writing proofs. Topics include logic, types of proofs, set theory, functions and relations.

208. Statistics (3) F; S—As Needed

Prerequisite: MAT 201 or 211.

This is a calculus-based statistics course. Topics include descriptive statistics, probability theory, discrete and continuous random variables, common discrete distributions, the normal distribution, sampling distributions, and applications to confidence interval estimates and hypothesis testing.

211. Calculus and Analytic Geometry I (4) F, S

Prerequisite: Choose one of the following: 1) MAT 116; 2) MAT 111 and 112; 3) Math ACT of 29 or higher; or 4) a passing score on the Calculus Readiness Test (CRT). A Math ACT of 23 or higher is recommended for students taking the CRT.

Topics include basic concepts of plane analytic geometry, functions, limits, differentiation of algebraic and trigonometric functions, applications of the derivative, the definite and the definite integral, and the fundamental theorem of calculus.

212. Calculus and Analytic Geometry II (4) F, S

Prerequisite: MAT 211.

Topics include integration by substitution, numerical integration, applications of the definite integral, the calculus of transcendental functions, techniques of

415. Abstract Algebra (3) Three-semester rotation  
Prerequisite: MAT 207 and 212.  
An introduction to the theory of groups and rings.  
Topics include elementary properties of groups and

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