DEPARTMENT OF MATHEMATICS
COLLEGE OF ARTS AND SCIENCES

Faculty

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

D   (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.

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

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

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

G   (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.

(2010). Assistant Professor of Mathematics. B.A., Bethel University; M.S. and Ph.D., University of Minnesota.

(1993, 2000). Professor of Mathematics. B.S., University of South Dakota; M.A., and Ph.D., University of Nebraska-Lincoln.

Mission Statement

Union's mathematics program seeks to further students in their quest for increased understanding of Creation and the created order and to equip students to serve God, church and society through excellence in thinking and the use of mathematics. We do this through a curriculum that develops the student's ability to think logically, analytically, 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 D   A   is given to the senior who places first in the Major Field Test for Mathematics as partial fulfillment of MAT 498.

. A   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.

35

A.

A. MAT 211 and 212, 208, 305, and 405
B. One of: MAT 213, 314, 315; CSC 115 or 255.

A. Prerequisites (applicable to major): MAT 211, 212, 213, 305, 315, 401, 402.
B. ACC 211, 212; ECO 211, 212; FIN 320.
C. ECO 411 or 412.
D. MAT 400.

A. 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.
B. MAT 212, 213, 305, 315.
C. 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 prep_2 1 Tf -0.024 ,d byallto tointET Eum EMC /Span <</MCID 9759 >>BDC BT 6T1_2 1 Tf 0.034 To

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.

Student Organizations

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.

_____ is 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.

Course Offerings in Mathematics (MAT)

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

@101.   E   (3) F,
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.   ~   A   (3)F,
This course is designed to introduce the student to the basic concepts of several areas of mathematics. Topics of focus will include counting techniques, descriptive statistics, probability and geometry.

@*111. C   A   (3) F, , ;   A
Prerequisite: Two years of high school algebra.
Topics include equations in two variables, functions, graphing techniques, systems of equations and inequalities, exponential and logarithmic functions, matrices, and the theory of polynomial equations.

@*112.   (3)   A
Prerequisite: MAT 111.
Topics include the definition of the trigonometric functions, radian measure, linear and angular velocity, graphing techniques, trigonometric identities and equations, the inverse trigonometric functions, and solving triangles.

@114.   (3)
F, , ;   A
Prerequisite: Two years of high school algebra.
Descriptive statistics with introduction to inferential statistics. Topics include organization of data into frequency distribution tables and histograms, measures of central tendency, standard deviation, basic probability, continuous distributions through the normal distribution,

305. _____ (3) _
Prerequisite: MAT 208.
Parametric and non-parametric statistical methods with an emphasis on applications. Topics include correlation and regression, analysis of variance, Chi-square distribution, contingency tables, and applications to the social sciences, life sciences, and business.

310. _____ (3) _ E
Prerequisite: MAT 212.
A survey of the major developments in the history of mathematics with special emphasis to the areas usually discussed in high school and undergraduate mathematics courses: geometry, algebra, trigonometry, and calculus.

314. D _____ E _____ (3) F,
Prerequisite: MAT 213.
Topics include linear first-order differential equations and applications, higher-order differential equations, and applications.

315. ˜ ___ A ____ (3) ; _ A
Prerequisite: MAT 212.
Topics include systems of linear equations, matrices, determinants, linear transformations, diagonalization of matrices, and major applications to business and the sciences.

320. _____ C _ ᵖ _____ (3) F E
Prerequisite: MAT 213.
Algebraic properties of the complex number system, complex transformations, analytic functions, complex integration, residues, and series representations of functions.

360. _____ A ____ (3) F
Prerequisite: CSC 115 or 255; MAT 207 and 213.
Numerical computations, roots of equations, simultaneous nonlinear and linear simultaneous equations, numerical integration and differentiation, and power series calculations.

400. A E _____ ᵖ _____ (1) A
Prerequisite: MAT 213 and 305.
Application of calculus and statistics to risk management problems relevant to the Society of Actuaries first exam. Sitting for the SOA Exam P is required for successful completion of the course. Pass/Fail.

401. A _____ (3) A
Prerequisite: MAT 400
Measures of interest, annuities-certain, amortization schedules, sinking funds and bonds. Introduction to life tables, life annuities and life insurance.

402. A _____ (3) A
Prerequisite: 401.
Actuarial models, including survival models, stochastic processes, and loss models. Applications to insurance and annuity contracts.

405. _____ (3) A
Prerequisites: MAT 305 and 212.
A calculus-based introduction to the theory of probability and statistics. Topics include conditional probability and independence, random variables, mathematical expectations, discrete and continuous distributions, central limit theorem, and sampling theory.

411. _____ A ____ (3) _ -
Prerequisite: MAT 207 and 213.
A proof-based course in traditional topics in real analysis, including the real number system, sequences, limits of functions, continuity, differentiation, and integration.

412. A ____
Prerequisite: MAT 411
A continuation of MAT 411. Topics include sequences of functions, infinite series, and further development of the theory of integration and other topics from MAT 411. Additional topics at the discretion of the instructor.

413. C ____ G _____ (3) _ -
Prerequisite: MAT 207 and 212.
Topics include axiomatic foundations of Euclidean and non-Euclidean geometry, models for incidence geometries, and development of theorems in the geometries of the Euclidean plane and the hyperbolic plane.

415. A _____ A ____ (3) _ -
Prerequisite: MAT 207 and 212.
An introduction to the theory of groups and rings. Topics include elementary properties of groups and rings, permutation groups, cyclic groups, subgroups, Lagrange's theorem, normal subgroups, quotient groups, homomorphisms and isomorphisms, subrings, integral domains, fields, and characteristic.

416. A _____ A
Prerequisites: MAT 315 and 415
A continuation of MAT 415. Topics include polynomial rings, ideals, quotient rings, extension fields, and finite fields. Additional advanced algebra topics at the discretion of the instructor.

498. _____ (2 3) F
Prerequisite: 20 hours of MAT course work and Senior standing.
This course provides an appropriate setting for reviewing major topics in the mathematics curriculum and administering the Major Field Test, discussing how worldviews might contribute to our understanding of the Christian faith and demonstrating awareness of the nature of mathematics and its unifying principles through the presentation of current mathematical literature. The 3-credit option is reserved for students participating in discipline-specific honors.

* Six hours maximum may be applied toward graduation from MAT 111-2, 116.
@ Does not apply toward the major or minor.

179-279-379-479. E   D   -
       (1-3) A

All courses and their applications must be de ned and approved prior to registering.

180-280-380-480.   A   (1-4)

All courses and their application must be de ned and approved prior to travel.

195-6-7. ℘   (1-4)
295-6-7. ℘   (1-4)

Lower-level group studies which do not appear in the regular departmental offerings.

395-6-7. ℘   (1-4)

Upper-level group studies which do not appear in the regular departmental offerings.

495-6-7. ℘   (1-4)

Individual research under the guidance of a faculty member(s).

497-9.   (1-3)

To be used at the discretion of the department.