DEPARTMENT OF MATHEMATICS
COLLEGE OF ARTS AND SCIENCES

Faculty

George Moss (2009). Associate Professor of Mathematics and Department Chair. B.S., Auburn University; Ph.D., Virginia Polytechnic Institute and State University.

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

Richard Dehn (1969). Associate Professor of Ma 4.0Dd5.woT3 1 Tf10 0 0 10 113.48f76Lan.i8Dg

D. For additional information, see the Assistant Dean for Teacher Education and Accreditation.

IV. Minor in Mathematics—21 hours

A.

Graduation with Discipline-Specific Honors in Mathematics requires the student must:

- Complete degree requirements with a minimum 3.50 mathematics GPA ,
- Complete each honors contract course with a grade of 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.

Greater detail for admissions, honors contract requirements, and other program specifics is provided at .

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

@201. Applied Calculus (3) As Needed
Prerequisite: MAT 111 or its equivalent.
Topics include a review of algebra principles, development of differential calculus with an emphasis on applications of the derivative to business and biological sciences, and an introduction to integral calculus with elementary applications of the definite integral. Is not recommended for students that have taken MAT 211-12.

205. Discrete Mathematics (3) F—As Needed
Prerequisite: MAT 111 or its equivalent.
Topics include elementary logic, sets, proof techniques including induction, relations and graphs, recurrence relations, basic counting techniques, equivalence relations, Boolean algebra, and algebraic structures.

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) W—Even Years, S
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 indefinite 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 integration, and the calculus of parameterized curves.

213. Calculus and Analytic Geometry III (4) F, S
Prerequisite: MAT 212.
Topics include infinite series, polar coordinates, vectors in three-space, functions of several variables, partial derivatives, multiple integrals, and line integrals.

305. Statistical Methods (3) S—Odd Years
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. History of Mathematics (3) S—Even Years
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. Differential Equations (3) S
Prerequisite: MAT 213.
Topics include linear first-order differential equations and applications, higher-order differential equations, and applications.

315. Linear Algebra (3) W—Odd Years, S
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. Introduction to Complex Variables (3) F—Even Years
Prerequisite: MAT 213.
Algebraic properties of the complex number system, complex transformations, analytic functions, complex integration, residues, and series representations of functions.

360. Numerical Analysis (3) F—Odd Years
Prerequisite: CSC 115 or 255 or EGR 109; MAT 213
An introduction to the theory and application of numerical approximation techniques. Topics include roots of equations, linear and nonlinear systems of equations, interpolation, numerical integration and differentiation, and differential equations.

400. SOA Exam P Preparation (1) S—Odd Years or as Needed
Prerequisite: MAT 213.
Pre- or Corequisite: MAT 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. Actuarial Mathematics I (3) F—Odd Years or as Needed
Prerequisite: MAT 400
Measures of interest, annuities-certain, amortization schedules, sinking funds and bonds. Introduction to life tables, life annuities and life insurance.

402. Actuarial Mathematics II (3) S—Even Years or as Needed
Prerequisite: 401.
Actuarial models, including survival models, stochastic processes, and loss models. Applications to insurance and annuity contracts.

405. Mathematical Statistics (3) As Needed
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. Introduction to Analysis (3) Three-semester rotation
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. Analysis II (3) As Needed
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. College Geometry (3) Three-semester rotation
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. 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 rings, permutation groups, cyclic groups, subgroups, Lagrange's theorem, normal subgroups, quotient groups, homomorphisms and isomorphisms, subrings, integral domains, fields, and characteristic.

416. Abstract Algebra II (3) As Needed
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. Mathematics Seminar (1 or 2) 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.