

# FAST TRACK MATHEMATICS, BS AND MATHEMATICS, MS

## Program Description

The university allows the opportunity for high-achieving students to count a select number of graduate credits toward their undergraduate degree and thereby obtain a graduate degree at an accelerated pace. Students interested in the Fast Track in Mathematics must meet the following application criteria:

- Currently seeking a BS in Mathematics at A&M-Corpus Christi.
- Minimum of a 3.25 GPA (no grades below C in math classes) in the last 60 SCH at the time of Fast Track application.
- Classified as a Senior with successful completion of at least 90 SCH, including MATH 4301 Introduction to Analysis (3 sch) and MATH 4306 Modern Algebra (3 sch).

Students accepted into the Fast Track program will be given permission to enroll in up to six hours of prescribed graduate courses during their last semester of undergraduate studies. The hours for these graduate courses will “double-count” toward both the undergraduate and graduate programs. The BS and MS degrees will be awarded sequentially (i.e., upon completion of each degree) and not simultaneously. Students will be allowed to continue enrollment in the graduate program upon successful completion of the undergraduate degree.

## Admissions Requirements

Applicants must provide the following at the time of application:

- A completed application form. Application fees are waived for Fast Track applicants.
- Official transcripts of all college and university coursework.
- An essay, 300-500 words in length, should discuss the applicant’s educational and professional goals, pertinent work and undergraduate experience, and other factors relating to the chosen option for graduate study.
- One or more letters of recommendation specifically addressing an applicant’s ability to do graduate level study of mathematics may be submitted to strengthen an application. The letters should be submitted directly to the Department at the time of application.
- A note from a faculty member willing to serve as their graduate advisor. Applicants will not be admitted to the program without a graduate advisor

No criterion is weighted more heavily than any other criterion. Applications received or completed after the deadline for admission during one semester may be considered for admission in the following semester at the applicant’s request. Applicants will be notified of the outcome of their application by email.

## Academic Preparation

Applicants are expected to enter the program with adequate academic preparation. If the graduate committee determines that an applicant’s preparation is deficient, the individual will be required to complete course work to remedy these deficiencies. Such course work will be regarded as leveling work, and will not count as credit towards the total required for completion of the MS degree in mathematics.

## Fast Track Curriculum in the Senior Year

BS, Mathematics students accepted in the Fast Track will substitute six semester credit hours their senior year. Students will take any two core courses applicable to the MS program Track for which they are applying.

See the Graduate Catalog for a complete description of the degree requirements for the MS in Mathematics.

## Courses

### **MATH 0099 Math Non-Course Based Development 0 Semester Credit Hours**

PREPARATION WORKSHOP TO HELP STUDENTS ACHIEVE COLLEGE READINESS IN MATHEMATICS UNDER THE TEXAS SUCCESS INITIATIVE. TOPICS INCLUDE FIVE GENERAL AREAS: FUNDAMENTAL MATHEMATICS, ALGEBRA, GEOMETRY, STATISTICS, AND PROBLEM SOLVING.

### **MATH 0200 Brief Developmental Mathematics 1-2 Semester Credit Hours (1-2 Lecture Hours)**

TOPICS AS IN MATH 0300. FOR STUDENTS WHO HAVE COMPLETED MOST TOPICS IN MATH 0300. REQUIRES PERMISSION OF MATH DEPARTMENT. (NOT COUNTED TOWARD GRADUATION) FALL, SPRING, MAYMESTER, SUMMER.

**Co-requisite:** MATH 1314, MATH 1442.

### **MATH 0214 Brief Developmental Mathematics-Algebra 2 Semester Credit Hours (2 Lecture Hours)**

THIS COURSE IS CO-REQUISITE COURSE SUPPORTING FOR MATH 1314. SUPPORT WILL FOCUS ON ESSENTIAL SKILLS REQUIRED FOR SUCCESS IN COLLEGE ALGEBRA (MATH 1314). SUPPORTING TOPICS INCLUDE REVIEW OF INTERMEDIATE ALGEBRA, POLYNOMIAL EQUATIONS, GRAPHING TECHNIQUES, AND APPLICATIONS. COURSE PROVIDES THE NECESSARY ACADEMIC SUPPORT FOR TSI LIABLE STUDENTS CONCURRENTLY ENROLLED IN MATH 1314 AS THE CO-REQUISITE WITH MATH 0214. STUDENTS WHO REGISTER FOR MATH 0214 MUST CO-REGISTER IN MATH 1314. MATH 0214 IS NOT COUNTED TOWARD GRADUATION. FALL, SPRING, SUMMER.

**Co-requisite:** MATH 1314.

### **MATH 0224 Brief Developmental Mathematics-Business Mathematics 2 Semester Credit Hours (2 Lecture Hours)**

THIS COURSE IS THE CO-REQUISITE COURSE SUPPORTING FOR MATH 1324. SUPPORT WILL FOCUS ON ESSENTIAL SKILLS REQUIRED FOR SUCCESS IN BUSINESS MATH (MATH 1324). SUPPORTING TOPICS INCLUDE THE USE OF CALCULATORS AND TECHNOLOGY. TOPICS FOCUS ON BASIC REVIEW OF MATHEMATICAL SKILLS, ELEMENTARY ALGEBRA, MATHEMATICAL AND LOGICAL REASONING, PROBABILITY, AND FINANCIAL MANAGEMENT, WHILE PROVIDING THE NECESSARY ACADEMIC SUPPORT FOR TSI LIABLE STUDENTS CONCURRENTLY ENROLLED IN MATH 1324 AS THE CO-REQUISITE WITH MATH 0224.

STUDENTS WHO REGISTER FOR MATH 0224 MUST CO-REGISTER IN MATH 1324. MATH 0224 IS NOT COUNTED TOWARD GRADUATION. FALL, SPRING, SUMMER.

**Co-requisite:** MATH 1324.

**MATH 0232 Brief Developmental Mathematics-Contemporary Mathematics****2 Semester Credit Hours (2 Lecture Hours)**

THIS COURSE IS CO-REQUISITE COURSE SUPPORTING FOR MATH 1332. SUPPORT WILL FOCUS ON ESSENTIAL SKILLS REQUIRED FOR SUCCESS IN CONTEMPORARY MATHEMATICS (MATH 1332). SUPPORTING TOPICS INCLUDE A BASIC REVIEW OF MATHEMATICAL SKILLS, ELEMENTARY ALGEBRA, MATHEMATICAL AND LOGICAL REASONING, PROBABILITY, AND DESCRIPTIVE STATISTICS, WHILE PROVIDING THE NECESSARY ACADEMIC SUPPORT FOR TSI LIABLE STUDENTS CONCURRENTLY ENROLLED IN MATH 1332 AS THE CO-REQUISITE WITH MATH 0232. STUDENTS WHO REGISTER FOR MATH 0232 MUST CO-REGISTER IN MATH 1332. MATH 0232 IS NOT COUNTED TOWARD GRADUATION. FALL, SPRING, SUMMER.

**Co-requisite:** MATH 1332.

**MATH 0242 Brief Developmental Mathematics-Statistics****2 Semester Credit Hours (2 Lecture Hours)**

THIS COURSE IS CO-REQUISITE COURSE SUPPORTING FOR MATH 1442. SUPPORT WILL FOCUS ON ESSENTIAL SKILLS REQUIRED FOR SUCCESS IN STATISTICS FOR LIFE (MATH 1442). SUPPORTING TOPICS INCLUDE THE USE OF CALCULATORS AND TECHNOLOGY. TOPICS FOCUS ON DESCRIPTIVE AND INFERENCE STATISTICS, PROBABILITIES INCLUDING NOTATION, WHILE PROVIDING THE NECESSARY ACADEMIC SUPPORT FOR TSI LIABLE STUDENTS CONCURRENTLY ENROLLED IN MATH 1442 AS THE CO-REQUISITE WITH MATH 0242. STUDENTS WHO REGISTER FOR MATH 0242 MUST CO-REGISTER IN MATH 1442. MATH 0242 IS NOT COUNTED TOWARD GRADUATION. FALL, SPRING, SUMMER.

**Co-requisite:** MATH 1442.

**MATH 0300 Developmental Mathematics****3 Semester Credit Hours (3 Lecture Hours)**

TOPICS INCLUDE NUMBER CONCEPTS, COMPUTATION, ELEMENTARY ALGEBRA, GEOMETRY, AND MATHEMATICAL REASONING. ALSO, LINEAR EQUATIONS AND INEQUALITIES, RATIONAL EXPRESSIONS, EXPONENTS AND RADICALS, QUADRATICS AND WORD PROBLEMS. MAY BE REPEATED FOR CREDIT AS NEEDED TO COMPLETE MASTERY OF ALL TOPICS. (NOT COUNTED TOWARD GRADUATION.) FALL, SPRING, SUMMER.

**MATH 0310 Development Mathematics-Algebra****3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)**

3 SEM. HRS. (2:2) TOPICS INCLUDE NUMBER CONCEPTS, COMPUTATION, ELEMENTARY ALGEBRA, AND GEOMETRY. ALSO, LINEAR EQUATIONS AND INEQUALITIES, RATIONAL EXPRESSIONS, EXPONENTS AND RADICALS, QUADRATICS AND WORD PROBLEMS. MAY BE REPEATED FOR CREDIT AS NEEDED TO COMPLETE MASTERY OF ALL TOPICS. (NOT COUNTED TOWARD GRADUATION.) FALL, SPRING, SUMMER.

**MATH 0398 Introduction to Algebra****3 Semester Credit Hours (3 Lecture Hours)**

NUMBER CONCEPTS, COMPUTATION, ELEMENTARY ALGEBRA, GEOMETRY, AND MATHEMATICAL REASONING.

**MATH 0399 Intermediate Algebra****3 Semester Credit Hours (3 Lecture Hours)**

TOPICS INCLUDE LINEAR EQUATIONS AND INEQUALITIES, RATIONAL EXPRESSIONS, EXPONENTS AND RADICALS, QUADRATICS AND WORD PROBLEMS.

**Prerequisite:** MATH 0398.

**MATH 1314 College Algebra****3 Semester Credit Hours (3 Lecture Hours)**

QUADRATIC EQUATIONS, INEQUALITIES, GRAPHS, LOGARITHMS AND EXPONENTIALS, THEORY OF POLYNOMIAL EQUATIONS, SYSTEMS OF EQUATIONS.

**Prerequisite:** MATH 0300, minimum score of 530 in 'SAT MATH SECTION', minimum score of 19 in 'ACT1 Math', MATH 0320 or minimum score of 350 in 'TSI Math'.

**TCCNS:** MATH 1314

**MATH 1316 Trigonometry****3 Semester Credit Hours (3 Lecture Hours)**

TRIGONOMETRIC FUNCTIONS, IDENTITIES, EQUATIONS INVOLVING TRIGONOMETRIC FUNCTIONS, SOLUTIONS OF RIGHT AND OBLIQUE TRIANGLES.

**Prerequisite:** (MATH 1314, minimum score of 550 in 'SAT MATH SECTION' or minimum score of 21 in 'ACT1 Math') or minimum score of 21 in 'ACT Math'.

**TCCNS:** MATH 1316

**MATH 1324 Mathematics for Business and Social Sciences****3 Semester Credit Hours (3 Lecture Hours)**

STUDENTS WILL LEARN HOW THE PROPERTIES AND LANGUAGE OF MATHEMATICS CAN BE USED IN BUSINESS AND REAL-WORLD PROBLEM SOLVING AND UNDERSTAND THE TECHNIQUES AND APPLICATIONS OF FINANCE PROBLEMS, BASIC MATRIX OPERATION, BASIC COUNTING PRINCIPLES, AND PROBABILITY ANALYSIS IN MODELING REAL-WORLD SCENARIOS.

**Prerequisite:** minimum score of 550 in 'SAT MATH SECTION', minimum score of 21 in 'ACT Math' or minimum score of 21 in 'ACT1 Math'.

**TCCNS:** MATH 1324

**MATH 1325 Calculus for Business & Social Sciences****3 Semester Credit Hours (3 Lecture Hours)**

STUDENTS WILL DEVELOP AND COMBINE THE CONCEPTS IN AND RELATIONSHIPS BETWEEN MATHEMATICS AND BUSINESS FROM THE FUNDAMENTALS OF CALCULUS AND OPTIMIZATION IN ALL BUSINESS FIELDS. STUDENTS ARE EXPECTED TO LEARN THE MATERIALS ALGEBRAICALLY WITH TECHNOLOGY. STUDENTS WILL COMBINE THE CONCEPTS OF LIMITS, CONTINUATION, DIFFERENTIATION AND INTEGRATION TECHNIQUES TO SOLVE PROBLEMS IN BUSINESS, ECONOMICS, AND SOCIAL SCIENCES.

**Prerequisite:** MATH 1324, minimum score of 550 in 'SAT Math', minimum score of 21 in 'ACT Math' or minimum score of 21 in 'ACT1 Math'.

**TCCNS:** MATH 1325

**MATH 1332 Contemporary Mathematics****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE SERVES AS A TERMINAL COURSE AND SUPPLIES A BRIEF OVERVIEW OF SEVERAL TOPICS IN MATHEMATICS. TOPICS MAY INCLUDE INTRODUCTORY TREATMENTS OF SETS, LOGIC, NUMBER SYSTEMS, NUMBER THEORY, RELATIONS, FUNCTIONS, PROBABILITY AND STATISTICS. APPROPRIATE APPLICATIONS ARE INCLUDED. THIS COURSE EMPHASIZES USING CRITICAL THINKING TO MAKE DECISIONS BASED ON INFORMATION.

**TCCNS:** MATH 1332

**MATH 1390 Introduction to Mathematical Topics****1-3 Semester Credit Hours (1-3 Lab Hours)**

A COURSE TO INTRODUCE STUDENTS TO MATHEMATICAL TOPICS IN A FORMAL SETTING. THE COURSE MAY SUPPORT PROBLEM SOLVING, OR SYSTEMATIC INVESTIGATIONS OF TOPICS OUTSIDE THE CURRENT MATHEMATICAL CATALOG. MAY NOT BE SUBSTITUTED FOR REGULARLY SCHEDULED OFFERINGS.

**MATH 1442 Statistics for Life****4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

AN INTRODUCTION TO STATISTICAL CONCEPTS AND METHODS USED IN ALL DISCIPLINES TO ENHANCE DECISION MAKING BASED ON DATA ANALYSIS, INCLUDING: BASIC EXPERIMENTAL DESIGN MODELS, MEASUREMENT AND DATA COLLECTION THROUGH SAMPLING; DISPLAY AND SUMMARY OF INFORMATION, AND ASSESSMENT OF RELATIONSHIP THROUGH DESCRIPTIVE TECHNIQUES; PROBABILITY CONCEPTS LEADING TO ESTIMATION AND HYPOTHESIS TESTING OF MEANS, VARIANCE AND PROPORTIONS, REGRESSION ANALYSIS, ONE-FACTOR ANOVA AND CHI-SQUARE TEST OF INDEPENDENCE; AND APPLICATIONS THROUGH CASE STUDIES. THE LABORATORY COMPONENT OF THE COURSE OFFERS APPLICATIONS OF THE THEORY PRESENTED DURING THE CLASSROOM SESSIONS.

**Prerequisite:** MATH 0300, minimum score of 530 in 'SAT MATH SECTION', minimum score of 19 in 'ACT1 Math', MATH 0310, 0320, minimum score of 350 in 'TSI Math' or minimum score of 19 in 'ACT Math'.

**TCCNS:** MATH 1442

**MATH 2305 Discrete Mathematics I****3 Semester Credit Hours (3 Lecture Hours)**

AN INTRODUCTION TO TOPICS IN DISCRETE MATHEMATICS WITH AN EMPHASIS ON APPLICATIONS IN MATHEMATICS AND COMPUTER SCIENCE. TOPICS INCLUDE FORMAL LOGIC, GRAPHS, TREES AND RELATED ALGORITHMS, AND COMBINATORICS AND DISCRETE PROBABILITY.

**Prerequisite:** MATH 2413, minimum score of 620 in 'SAT Math', minimum score of 620 in 'SAT1 Mathematics', minimum score of 640 in 'SAT MATH SECTION', minimum score of 27 in 'ACT Math' or minimum score of 27 in 'ACT1 Math'.

**TCCNS:** MATH 2305

**MATH 2312 Precalculus****3 Semester Credit Hours (3 Lecture Hours)**

A MORE RAPID TREATMENT OF THE MATERIAL IN MATH 1314 AND MATH 1316, THIS COURSE IS DESIGNED FOR STUDENTS WHO WISH A REVIEW OF THE ABOVE MATERIAL, OR WHO ARE VERY WELL PREPARED. FUNCTIONS, GRAPHS, TRIGONOMETRY, AND ANALYTIC GEOMETRY.

**Prerequisite:** MATH 1314, minimum score of 550 in 'SAT MATH SECTION', minimum score of 21 in 'ACT Math' or minimum score of 21 in 'ACT1 Math'.

**TCCNS:** MATH 2312

**MATH 2413 Calculus I****4 Semester Credit Hours (4 Lecture Hours, 2 Lab Hours)**

LIMITS, CONTINUITY, DERIVATIVES, APPLICATIONS OF THE DERIVATIVE, AND AN INTRODUCTION TO INTEGRALS. CONTAINS A LABORATORY COMPONENT.

**Prerequisite:** MATH 1316, 2312, minimum score of 640 in 'SAT MATH SECTION' or minimum score of 27 in 'ACT1 Math'.

**TCCNS:** MATH 2413

**MATH 2414 Calculus II****4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

TECHNIQUES OF INTEGRATION, APPLICATIONS OF INTEGRALS, SEQUENCES, SERIES, TAYLOR POLYNOMIALS AND SERIES. PARAMETRIC EQUATIONS. CONTAINS A LABORATORY COMPONENT.

**Prerequisite:** MATH 2413.

**TCCNS:** MATH 2414

**MATH 2415 Calculus III****4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)**

VECTORS AND SPACE CURVES, PARTIAL DERIVATIVES, MULTIPLE INTEGRALS, SPECIAL COORDINATE SYSTEMS, LINE AND SURFACE INTEGRALS, GREEN'S, STOKES', AND THE DIVERGENCE THEOREMS. CONTAINS A LABORATORY COMPONENT.

**Prerequisite:** MATH 2414.

**TCCNS:** MATH 2415

**MATH 3300 Geospatial Mathematical Techniques****3 Semester Credit Hours (3 Lecture Hours)**

CHARACTERISTICS OF GEOGRAPHIC/SPATIAL INFORMATION; OVERVIEW OF RELEVANT SECTIONS OF NUMBERS, ALGEBRA AND GEOMETRY, PLANE AND SPHERICAL TRIGONOMETRY, MATRICES, DETERMINANTS AND VECTORS, CURVES AND SURFACES, INTEGRAL AND DIFFERENTIAL CALCULUS, PARTIAL DERIVATIVES, WITH AN EMPHASIS ON GEOSPATIAL APPLICATIONS. CONCEPTS OF GEOSPATIAL COORDINATE SYSTEMS AND GEOSPATIAL COORDINATE TRANSFORMATIONS; OVERVIEW OF SPATIAL STATISTICS AND BEST-FIT SOLUTIONS WITH GEOSPATIAL APPLICATIONS. STUDENTS MAY NOT RECEIVE CREDIT FOR BOTH MATH 3300 AND GISC 3300.

**Prerequisite:** MATH 2413 and 2414.

**MATH 3301 Introduction to Complex Analysis****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE INTRODUCES FUNCTIONS OF A COMPLEX VARIABLE AND THEIR APPLICATIONS. CONTENTS INCLUDE DIFFERENTIATION AND INTEGRATION; ZEROS, POLES AND RESIDUES; CONFORMAL MAPPINGS.

**Prerequisite:** (MATH 2415) or (MATH 2414 and 3314).

**MATH 3310 Mathematical Analysis for Mechanical Engineering****3 Semester Credit Hours (3 Lecture Hours)**

APPLICATIONS OF FUNDAMENTALS OF LINEAR ALGEBRA, VECTOR ANALYSIS, NUMERICAL METHODS, COMPUTER PROGRAMMING AND PROBABILITY AND STATISTICS INTO MECHANICAL ENGINEERING. MAY NOT COUNT TOWARDS THE MATH MAJOR. STUDENTS MAY NOT RECEIVE CREDIT FOR BOTH MATH 3310 AND MEEN 3310.

**Prerequisite:** MATH 3315.

**MATH 3311 Linear Algebra****3 Semester Credit Hours (3 Lecture Hours)**

FUNDAMENTALS OF LINEAR ALGEBRA AND MATRIX THEORY. TOPICS INCLUDE VECTORS, MATRIX OPERATIONS, LINEAR TRANSFORMATIONS, FUNDAMENTAL PROPERTIES OF VECTOR SPACES, SYSTEMS OF LINEAR EQUATIONS, EIGENVALUES AND EIGENVECTORS. APPLICATIONS.

**Prerequisite:** MATH 2413.

**MATH 3312 College Geometry****3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)**

A CAREFUL STUDY OF THE FOUNDATIONS OF EUCLIDEAN GEOMETRY BY SYNTHETIC METHODS WITH AN INTRODUCTION TO NON-EUCLIDEAN GEOMETRIES. AN INTRODUCTION TO TRANSFORMATIONAL GEOMETRY.

**Prerequisite:** MATH 2413.

**MATH 3313 Foundations of Number Theory****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE ASSISTS A STUDENT'S TRANSITION TO ADVANCED MATHEMATICS. FUNDAMENTALS OF LOGIC AND PROOF ARE REVIEWED AND APPLIED TO TOPICS FROM ELEMENTARY NUMBER THEORY.

**Prerequisite:** MATH 2305 and 2414.

**MATH 3314 Foundations of Real Numbers****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE ASSISTS A STUDENT'S TRANSITION TO ADVANCED MATHEMATICS. FUNDAMENTALS OF LOGIC AND PROOF ARE REVIEWED AND APPLIED TO DEVELOPMENT OF THE REAL NUMBER LINE.

**Prerequisite:** MATH 2414 and 2305.

**MATH 3315 Differential Equations****3 Semester Credit Hours (3 Lecture Hours)**

AN INTRODUCTION TO BOTH THEORETICAL AND APPLIED ASPECTS OF ORDINARY DIFFERENTIAL EQUATIONS. TOPICS INCLUDE: FIRST ORDER EQUATIONS, LINEAR SECOND ORDER EQUATIONS, ELEMENTARY NUMERICAL METHODS, AND THE LAPLACE TRANSFORM.

**Prerequisite:** MATH 2414.

**MATH 3342 Applied Probability and Statistics****3 Semester Credit Hours (3 Lecture Hours)**

A CALCULUS BASED INTRODUCTION TO PROBABILITY AND STATISTICS. EMPHASIS WILL BE ON DEVELOPMENT OF STATISTICAL THINKING AND WORKING WITH DATA. TOPICS INCLUDE PROBABILITY THEORY, DESCRIPTIVE STATISTICS, COMMON DISTRIBUTIONS, AND STATISTICAL INFERENCE.

**Prerequisite:** MATH 2413.

**MATH 3345 Statistical Modeling and Data Analysis****3 Semester Credit Hours (3 Lecture Hours)**

AN INTRODUCTION TO PROBABILITY/STATISTICAL MODELING AND DATA ANALYSIS TECHNIQUES TO INVESTIGATE DATA. TOPICS INCLUDE: EXPLORATORY DATA ANALYSIS, PROBABILITY MODELS AND SIMULATION, SAMPLING DISTRIBUTIONS, STATISTICAL INFERENCE. APPLICATIONS TO REAL WORLD PROBLEMS. STUDENTS WILL BE EXPECTED TO PRESENT AND JUSTIFY RESULTS ORALLY AND IN WRITING.

**Prerequisite:** MATH 2413 and (COSC 1330 or 1435).

**MATH 3347 Introduction to Probability****3 Semester Credit Hours (3 Lecture Hours)**

THIS IS AN INTRODUCTION TO PROBABILITY. IN THE COURSE, KEY FUNDAMENTAL CONCEPTS OF PROBABILITY, RANDOM VARIABLES AND THEIR DISTRIBUTIONS, EXPECTATIONS, AND CONDITIONAL PROBABILITIES WILL BE COVERED. TOPICS INCLUDE COUNTING RULES, COMBINATORIAL ANALYSIS, SAMPLE SPACES, AXIOMS OF PROBABILITY, CONDITIONAL PROBABILITY AND INDEPENDENCE, DISCRETE AND CONTINUOUS RANDOM VARIABLES, JOINTLY DISTRIBUTED RANDOM VARIABLES, CHARACTERISTICS OF RANDOM VARIABLES, LAW OF LARGE NUMBERS AND CENTRAL LIMIT THEOREM, RANDOM PROCESSES, MARKOV CHAINS, MARKOV CHAIN-MONTE CARLO, POISSON PROCESS AND ENTROPY.

**Prerequisite:** MATH 2415.

**MATH 3385 Linear Optimization and Decisions****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE INTRODUCES THE LINEAR PROGRAMMING AND OPTIMIZATION PROBLEMS ARISING IN MANY APPLICATIONS. CONTENTS INCLUDE LINEAR PROGRAMMING MODELS WITH SOLUTIONS, THE SIMPLEX METHOD, DUALITY THEORY AND ITS USE FOR MANAGEMENT DECISION MAKING, DUAL SIMPLEX METHOD AND SENSITIVITY ANALYSIS.

**Prerequisite:** MATH 3311 and 2413.

**MATH 3390 Problem Solving in Mathematics****1-3 Semester Credit Hours (1-3 Lecture Hours)**

A PROBLEM SOLVING COURSE FOR STUDENTS WHO WANT TO PARTICIPATE IN MATH PROBLEM SOLVING COMPETITIONS, TRAIN FOR THE ACTUARIAL OR OTHER PROFESSIONAL EXAMINATIONS, WORK ON RESEARCH AIMED AT CONFERENCE PRESENTATIONS, OR PERFORM RESEARCH PROJECTS AT THE JUNIOR LEVEL THAT ARE NOT AT THE LEVEL OF DIRECTED INDEPENDENT STUDY MATERIAL.

**Prerequisite:** MATH 2414.

**MATH 4185 Senior Mathematics Seminar****1 Semester Credit Hour (1 Lecture Hour)**

THIS COURSE INTRODUCES A WEEKLY MATHEMATICS SEMINAR. STUDENTS WILL GENERATE A VIABLE PROJECT FOR THE CAPSTONE COURSE.

**MATH 4285 Mathematics Major Capstone****2 Semester Credit Hours (2 Lecture Hours)**

DEVELOPMENT OF PROJECTS AS PROPOSED IN MATH 4185, AS WELL AS MATHEMATICS COMMUNICATION SKILLS. STUDENTS WILL PRESENT THEIR PROJECTS, AND TAKE A NATIONAL LEVEL ASSESSMENT.

**Prerequisite:** MATH 4185.

**MATH 4301 Introduction to Analysis****3 Semester Credit Hours (3 Lecture Hours)**

AN ADVANCED TREATMENT OF THE FOUNDATIONS OF CALCULUS STRESSING RIGOROUS PROOFS OF THEOREMS. TOPICS INCLUDE: ELEMENTS OF PROPOSITIONAL AND PREDICATE LOGIC, TOPOLOGY OF THE REAL NUMBERS, SEQUENCES, LIMITS, THE DERIVATIVE, AND THE RIEMANN INTEGRAL.

**Prerequisite:** MATH 2415 and 3314.

**MATH 4306 Modern Algebra****3 Semester Credit Hours (3 Lecture Hours)**

FUNDAMENTALS OF SET OPERATIONS, MAPS AND RELATIONS, GROUPS, RINGS AND FIELD THEORY. TOPICS INCLUDE PERMUTATION GROUPS, COSETS, HOMOMORPHISMS AND ISOMORPHISMS, DIRECT PRODUCT OF GROUPS AND RINGS, INTEGRAL DOMAINS FIELD OF QUOTIENTS, FUNDAMENTAL PROPERTIES OF INTEGERS, THE RING OF INTEGERS MODULO  $N$ , AND RINGS OF POLYNOMIALS. APPLICATIONS.

**Prerequisite:** MATH 3311 and 3313.

**MATH 4312 Differential Geometry****3 Semester Credit Hours (3 Lecture Hours)**

DIFFERENTIAL FORMS ON  $R^1$ ,  $R^2$ ,  $R^3$ , AND  $R^n$ ; INTEGRATION AND DIFFERENTIATION OF DIFFERENTIAL FORMS; STOKES' THEOREM; MANIFOLDS; GAUSSIAN CURVATURE AND THE GAUSS-BONNET THEOREM.

**Prerequisite:** MATH 2415.

**MATH 4315 Partial Differential Equations****3 Semester Credit Hours (3 Lecture Hours)**

AN INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS EMPHASIZING THE WAVE, DIFFUSION AND POTENTIAL (LAPLACE) EQUATIONS. A FOCUS ON UNDERSTANDING THE PHYSICAL MEANING AND MATHEMATICAL PROPERTIES OF SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS. METHODS INCLUDE FUNDAMENTAL SOLUTIONS AND TRANSFORM METHODS FOR PROBLEMS ON THE LINE, AND SEPARATION OF VARIABLES USING ORTHOGONAL SERIES FOR PROBLEMS IN REGIONS WITH BOUNDARY. ADDITIONAL TOPICS INCLUDE HIGHER DIMENSIONAL PROBLEMS AND SPECIAL TOPICS LIKE HARMONIC FUNCTIONS, THE MAXIMUM PRINCIPLE, GREEN'S FUNCTIONS ETC.

**Prerequisite:** MATH 3315 and 2415.

**MATH 4321 Applied Regression Analysis****3 Semester Credit Hours (3 Lecture Hours)**

INTRODUCTION TO THE FORMULATION OF LINEAR MODELS AND THE ESTIMATION OF THE PARAMETERS OF SUCH MODELS, WITH PRIMARY EMPHASIS ON LEAST SQUARES. APPLICATION OF MULTIPLE REGRESSION AND CURVE FITTING AND THE DESIGN OF EXPERIMENTS FOR FITTING REGRESSION MODELS.

**Prerequisite:** MATH 1342, 2342 or 1470.

**MATH 4328 Discrete Mathematics II****3 Semester Credit Hours (3 Lecture Hours)**

A CONTINUED STUDY OF TOPICS FROM DISCRETE MATHEMATICS I WITH ADDITIONAL TOPICS FROM DISCRETE MATHEMATICS THAT HAVE STRONG APPLICATION TO THE FIELD OF COMPUTER SCIENCE. ADDITIONAL TOPICS INCLUDE: RECURRENCE RELATIONS, FORMAL LANGUAGES, AND FINITE-STATE MACHINES.

**Prerequisite:** MATH 2305 and COSC 2437.

**MATH 4342 Introduction to Mathematical Statistics****3 Semester Credit Hours (3 Lecture Hours)**

THIS IS A FIRST COURSE IN MATHEMATICAL STATISTICS, TOPICS INCLUDE: MOMENT-GENERATING FUNCTIONS, FUNCTIONS OF RANDOM VARIABLES, SAMPLING DISTRIBUTIONS, METHODS OF ESTIMATION INCLUDING BAYESIAN ESTIMATION, CHARACTERISTICS OF ESTIMATORS, INTERVAL ESTIMATION, HYPOTHESIS TESTING, NEYMAN-PEARSON LEMMA, LIKELIHOOD RATIO TEST, TESTS INVOLVING MEANS AND VARIANCES, REGRESSION AND CORRELATION, MULTIPLE LINEAR REGRESSION, INTRODUCTION TO ANOVA, NON-PARAMETRIC TESTS.

**Prerequisite:** MATH 2415.

**MATH 4385 Applied Modeling****3 Semester Credit Hours (3 Lecture Hours)**

CAPSTONE COURSE FOR MATHEMATICS MAJORS. THE CONSTRUCTION OF MATHEMATICAL MODELS FROM AREAS SUCH AS ECONOMICS, REFINING, BIOLOGY AND MARICULTURE, ETC. WHERE POSSIBLE, LOCAL PHENOMENA WILL BE MODELED WITH THE ASSISTANCE OF OUTSIDE CONSULTANTS.

**Prerequisite:** MATH 3315 and 3342 or MATH 3345.

**MATH 4390 Selected Topics****3 Semester Credit Hours (3 Lecture Hours)**

OFFERED ON SUFFICIENT DEMAND.

**MATH 4696 Directed Independent Study****1-6 Semester Credit Hours**

SEE COLLEGE DESCRIPTION.

**MATH 5310 Topics in Mathematics****3 Semester Credit Hours (3 Lecture Hours)**

MAY NOT BE USED FOR GRADUATE CREDIT TOWARDS THE MS IN MATHEMATICS. COURSE INCLUDED TO PROVIDE A SUITABLE VEHICLE FOR ANTICIPATED FUTURE SERVICE COURSES.

**MATH 5315 STATISTICAL MTHDS IN RSRCH I****3 Semester Credit Hours (3 Lecture Hours)**

STATISTICAL METHODS IN RESEARCH I This course is for graduate students in other disciplines and is designed to prepare them to use statistical methods in their research. This is a non-calculus exposition of the concepts, methods and usage of statistical data collection and analysis. Topics include descriptive statistics, the t-test, the one and two-way analysis of variance, multiple comparison tests, and multiple regression. Students also learn how to conduct these analyses using computer software and how to properly report their findings.

**MATH 5316 STATISTICAL MTHDS IN RSRCH II****3 Semester Credit Hours (3 Lecture Hours)**

STATISTICAL METHODS IN RESEARCH II This course is a continuation of MATH 5315. Topics include: statistical experimental design, randomized blocks and factorial analysis, multiple regression, chi-squared tests, analysis of covariance, non-parametric methods and sample surveys. Emphasis will be placed on the computer analysis of research data and how to properly report statistical findings.

**Prerequisite:** MATH 5315.

**MATH 5321 PROBLEM SOLVING AND MATHEMATICAL REASONING FOR TEACHERS****3 Semester Credit Hours (3 Lecture Hours)**

AN INVESTIGATION OF PROBLEMS THAT SPAN A VARIETY OF DOMAINS WITH A FOCUS ON MAKING AND EVALUATING MATHEMATICAL ARGUMENTS, USING TOOLS SUCH AS MANIPULATIVES AND TECHNOLOGY, IDENTIFYING AND ANALYZING THE CONNECTIONS WITHIN AND OUTSIDE OF MATHEMATICS-, AND USING SYMBOLS AND REPRESENTATIONS TO COMMUNICATE MATHEMATICAL IDEAS.

**MATH 5322 Mathematics Assessment****3 Semester Credit Hours (3 Lecture Hours)**

A HISTORICAL OVERVIEW OF ASSESSMENT OF MATHEMATICS, STATISTICAL DESCRIPTION OF NORM- AND CRITERION-REFERENCE TESTS, SCALING OF STANDARDIZED EXAMS, VARIETIES OF ASSESSMENT AND RUBRICS, THE MATHEMATICAL ANALYSIS OF ERROR PATTERNS, AND EQUITY.

**MATH 5323 Mathematics instruction and Mentoring****3 Semester Credit Hours (3 Lecture Hours)**

A STUDY OF HOW THE USE OF APPROPRIATE MATHEMATICAL CONTENT CAN CREATE AND SUPPORT A MATHEMATICS CLASSROOM ENVIRONMENT IN WHICH STUDENTS ARE ENGAGED IN MATHEMATICAL PROBLEM SOLVING AND HOW TO USE THESE UNDERSTANDINGS TO BE EFFECTIVE IN SUPPORTING TEACHER DEVELOPMENT.

**MATH 5324 Principles of Reforming Mathematics Instruction****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE INTRODUCES PARTICIPANTS TO THE THEORY AND PRACTICE OF TEACHER-LED INQUIRY WITHIN MATHEMATICS EDUCATION. THE COURSE PREPARES TEACHERS TO ENGAGE IN A SCHOOL-BASED MATHEMATICS EDUCATION ACTION RESEARCH PROJECT. IT IS INTENDED FOR IN-SERVICE MATHEMATICS TEACHERS.

**MATH 5325 Structure of Number Concepts****3 Semester Credit Hours (3 Lecture Hours)**

AN IN-DEPTH INVESTIGATION OF REAL AND COMPLEX NUMBER SYSTEMS, BASE TEN AND OTHER NUMBER BASES, OPERATIONS AND ALGORITHMS, DIVISIBILITY, EUCLIDEAN ALGORITHM, CONGRUENCE, MODULAR ARITHMETIC, AND THE FUNDAMENTAL THEOREM OF ARITHMETIC, WITH AN EMPHASIS ON QUANTITATIVE AND QUALITATIVE REASONING.

**MATH 5326 STRUCTURE OF PATTERNS AND ALGEBRA****3 Semester Credit Hours (3 Lecture Hours)**

ALGEBRAIC REASONING INCORPORATING THE USE OF TECHNOLOGY. THIS COURSE INCLUDES INVESTIGATIONS OF PATTERNS, RELATIONS, FUNCTIONS, AND ANALYSIS, WITH A FOCUS ON REPRESENTATIONS AND THE RELATIONSHIPS AMONG THEM.

**MATH 5327 STRUCTURE OF GEOMETRY AND MEASUREMENT****3 Semester Credit Hours (3 Lecture Hours)**

AN INVESTIGATION OF CONCEPTS AND PRINCIPLES IN GEOMETRY AND MEASUREMENT WITH EMPHASES ON DEDUCTIVE REASONING AND ON INDUCTIVE REASONING WITH THE USE OF DYNAMIC GEOMETRY SOFTWARE.

**MATH 5328 Structure of Probability and Statistics****3 Semester Credit Hours (3 Lecture Hours)**

AN INVESTIGATION OF THE PRINCIPLES AND APPLICATIONS OF PROBABILITY AND DESCRIPTIVE AND INFERENTIAL STATISTICS.

**MATH 5329 Structure of Modeling with Rates of Change****3 Semester Credit Hours (3 Lecture Hours)**

A STUDY OF RATES OF CHANGE THROUGH MODELING. DIRECT APPLICATIONS OF RATES OF CHANGE TO NUMBER CONCEPTS, ALGEBRA, GEOMETRY, PROBABILITY, AND STATISTICS.

**MATH 5331 Evolution of Mathematical Systems****3 Semester Credit Hours (3 Lecture Hours)**

COVERS THE EVOLUTION OF MATHEMATICAL CONCEPTS AND THOUGHT FROM ANCIENT TO MODERN TIMES, INCLUDING WOMEN AND MEN WHO PLAYED KEY ROLES, FROM ORIGINAL AND SECONDARY SOURCES. PROVIDES A BETTER UNDERSTANDING OF THE HISTORICAL DEVELOPMENT OF LARGER CONTEXT FOR TOPICS STUDIED IN OTHER COURSES, AND DEEPENS UNDERSTANDING AND APPRECIATION OF THESE TOPICS. THIS COURSE IS INTENDED TO BENEFIT CURRENT AND FUTURE MATHEMATICS TEACHERS.

**Prerequisite:** MATH 5321.

**MATH 5332 Integrating Technology in Mathematics Education****3 Semester Credit Hours (3 Lecture Hours)**

AN INTRODUCTION TO TECHNOLOGY APPROPRIATE FOR THE MATHEMATICS CLASSROOM, INCLUDING CALCULATORS, CAS SYSTEMS, HANDHELDS, COMPUTER SOFTWARE AND MULTIMEDIA. THIS COURSE IS INTENDED FOR IN-SERVICE MATHEMATICS TEACHERS AT THE MIDDLE/HIGH SCHOOL LEVEL.

**Prerequisite:** MATH 5321.

**MATH 5333 Numerical Linear Algebra****3 Semester Credit Hours (3 Lecture Hours)**

DIRECT METHODS FOR LINEAR SYSTEMS. LEAST SQUARE SOLUTIONS. SYMMETRIC AND NONSYMMETRIC EIGENVALUE PROBLEMS. ITERATIVE METHODS. ALGORITHMS.

**Prerequisite:** MATH 3311.

**MATH 5336 Advanced Differential Equations****3 Semester Credit Hours (3 Lecture Hours)**

A CONTINUATION OF MATH 3315, DIFFERENTIAL EQUATIONS. RELYING HEAVILY ON LINEAR ALGEBRA CONCEPTS, THIS COURSE COVERS LINEAR SYSTEMS OF DIFFERENTIAL EQUATIONS; INTRODUCTORY OPERATOR THEORY; EXISTENCE, UNIQUENESS AND CONTINUITY OF SOLUTIONS; STABILITY OF EQUILIBRIA; PLANAR NONLINEAR SYSTEMS; AND THE POINCARÉ-BENDIXSON THEOREM. SEVERAL APPLICATIONS ARE COVERED TO ILLUSTRATE THE MATHEMATICAL CONCEPTS.

**Prerequisite:** MATH 3311 and 3315.

**MATH 5337 Theory and Applications of Partial Differential Equations****3 Semester Credit Hours (3 Lecture Hours)**

THE PURPOSE OF THIS COURSE IS TO STUDY THE MATHEMATICAL THEORY AND REAL-WORLD APPLICATIONS OF THE THREE MAJOR CATEGORIES OF PARTIAL DIFFERENTIAL EQUATIONS: ELLIPTIC EQUATIONS, PARABOLIC EQUATIONS, AND HYPERBOLIC EQUATIONS. SPECIFIC TOPICS TO BE COVERED INCLUDE: FIRST-ORDER EQUATIONS, SECOND-ORDER ELLIPTIC EQUATIONS, SECOND-ORDER PARABOLIC EQUATIONS, AND SECOND-ORDER HYPERBOLIC EQUATIONS.

**Prerequisite:** MATH 3311, 3315, 4301 and 4315.

**MATH 5339 Numerical Analysis****3 Semester Credit Hours (3 Lecture Hours)**

ERROR ESTIMATION. SOLUTION OF NON-LINEAR EQUATIONS. INTERPOLATION. NUMERICAL DIFFERENTIATION AND INTEGRATION. FINITE DIFFERENCES AND FINITE ELEMENTS. NUMERICAL METHODS FOR ODE'S AND PDE'S.

**Prerequisite:** MATH 3311, 3315, 3470 and 4315 and (COSC 5311 or 1435).

**MATH 5341 Statistical Methods and Data Analysis****3 Semester Credit Hours (3 Lecture Hours)**

INTRODUCTION TO THE BASIC CONCEPTS OF PROBABILITY, COMMON DISTRIBUTIONS, STATISTICAL METHODS, DATA ANALYSIS AND A WIDE VARIETY OF STATISTICAL INFERENCE TECHNIQUES. DEMONSTRATIONS OF THE INTERPLAY BETWEEN PROBABILITY MODELS AND STATISTICAL INFERENCE. DATA SETS WILL BE ANALYZED USING THE R SOFTWARE PACKAGE.

**Prerequisite:** (MATH 3342 or 3345).

**MATH 5342 Linear Statistical Models****3 Semester Credit Hours (3 Lecture Hours)**

REVIEW OF BASIC CONCEPTS IN PROBABILITY THEORY. PRINCIPLES OF ESTIMATION AND MODEL BUILDING. LINEAR MODELS, ESPECIALLY ANOVA AND REGRESSION. NON-PARAMETRIC ALTERNATIVES.

**Prerequisite:** MATH 3311, 3342 and 3470.

**MATH 5343 Mathematical Theory of Statistics****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE IS INTENDED FOR GRADUATE STUDENTS THAT NEED A SOLID BACKGROUND ON STATISTICAL THEORY. THIS IS A ONE-SEMESTER COURSE IN PROBABILITY AND MATHEMATICAL STATISTICS. TOPICS INCLUDE: BASIC PROBABILITY, RANDOM VARIABLES, TRANSFORMATIONS AND EXPECTATIONS, DISTRIBUTIONS AND IMPORTANT FAMILIES THEREOF, MULTIPLE RANDOM VARIABLES, RANDOM SAMPLES, NOTIONS OF CONVERGENCE, AND AN OVERVIEW OF POINT ESTIMATES AND HYPOTHESIS TESTS.

**Prerequisite:** MATH 3311, 3342 and 3470.

**MATH 5344 ENVIRONMENTAL STATISTICS****3 Semester Credit Hours (3 Lecture Hours)**

**SPATIAL STATISTICS** An introduction to methods of spatial statistics commonly used in scientific settings. Topics include the nature of geospatial sampling, analysis and modeling of spatial point patterns, and development and analysis of common continuous spatial models such as kriging. Additional topics to be covered, as time and student interest permit, include Bayesian modeling, hierarchical environmental modeling, and spatiotemporal modeling. Use of appropriate software is emphasized.

**Prerequisite:** MATH 3342 or 5315.

**MATH 5345 Computational Methods for Statistics****3 Semester Credit Hours (3 Lecture Hours)**

AN INTRODUCTION TO COMPUTING TOOLS NEEDED BY THE MODERN STATISTICIAN. TOPICS INCLUDE: FLOATING POINT NUMBERS, REFORMATTING LARGE DATASETS, IMPORTANT STATISTICAL ALGORITHMS, AND PARALLEL PROCESSING.

**MATH 5348 Optimization****3 Semester Credit Hours (3 Lecture Hours)**

UNCONSTRAINED OPTIMIZATION, NECESSARY AND SUFFICIENT CONDITIONS FOR SOLUTIONS, BASIC ALGORITHMS. CONSTRAINED OPTIMIZATION, KKT CONDITIONS, LINEAR PROGRAMMING, CONVEX PROGRAMMING, ALGORITHMS.

**Prerequisite:** MATH 4301.

**MATH 5351 Real Analysis****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE INCLUDES SUCH TOPICS AS SEQUENCES AND SERIES OF CONSTANTS AND FUNCTIONS, THE RIEMANN INTEGRAL, FOURIER SERIES, AND AN INTRODUCTION TO LEBESGUE MEASURE AND INTEGRATION.

**Prerequisite:** MATH 4301.

**MATH 5360 Combinatorics and Graph Theory****3 Semester Credit Hours (3 Lecture Hours)**

TOPICS TO INCLUDE BASIC COUNTING RULES, CONNECTIVITY, GRAPH COLORING AND APPLICATIONS, CHROMATIC POLYNOMIALS, TREES AND THEIR APPLICATIONS TO SEARCHING AND SORTING, GENERATING FUNCTIONS, RECURRENCE RELATIONS, THE PIGEONHOLE PRINCIPLE, EULERIAN AND HAMILTONIAN CHAINS AND PATHS, AND APPLICATIONS.

**Prerequisite:** MATH 2305 and 3313.

**MATH 5370 Modeling of Natural Systems****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE IS DESIGNED TO EXPOSE SCIENCE AND TECHNOLOGY MAJORS TO MODELS OF REAL PROBLEMS ARISING IN THE ENVIRONMENT AND ECOLOGY. STUDENTS WILL LEARN HOW TO CREATE SOLVABLE MODELS OF THE REAL WORLD SITUATIONS AND HOW TO FIND ANSWERS ON THE POSTED QUESTIONS BY USING TOOLS OF MATHEMATICS AND COMPUTING. THERE WILL BE MODELING AND SIMULATIONS OF TIDES IN THE GULF OF MEXICO, MULTI-SPECIES MODELS OF THE FOOD CHAINS, CIRCULATION OF CARBON, WATER, AND OXYGEN. STUDENTS WILL LEARN SOME NEW TOOLS BASED ON CALCULUS AND ELEMENTARY STATISTICS SUCH AS NUMERICAL ALGORITHMS, MONTE-CARLO METHODS, MARKOV PROCESSES, MULTIVARIATE ANALYSIS, EVALUATION OF STABILITY, METHODS OF EXTRAPOLATION (PREDICTIONS) AND INTERPOLATIONS.

**Prerequisite:** (MATH 1442 or 2342) and (MATH 2413 or 5329).

**MATH 5375 Applied Analysis****3 Semester Credit Hours (3 Lecture Hours)**

TOPICS TO INCLUDE BASIC THEORY OF EUCLIDEAN, BANACH AND HILBERT SPACES, CALCULUS OF VARIATIONS AND OPTIMAL CONTROL, ELEMENTS OF SYSTEM ANALYSIS, AND ELEMENTS OF COMPLEX ANALYSIS. ALL THEORETICAL TOPICS WILL BE ILLUSTRATED BY REAL APPLICATION.

**Prerequisite:** MATH 4301 or 5351.

**MATH 5378 Mathematical Modeling****3 Semester Credit Hours (3 Lecture Hours)**

MODELING OF APPLIED PROBLEMS USING ANALYTICAL, STOCHASTIC, AND DYNAMICAL METHODS.

**MATH 5390 Special Topics****1-3 Semester Credit Hours (1-3 Lecture Hours)**

AN ADVANCED STUDY OF A MATHEMATICAL TOPIC. MAY BE REPEATED WITH FULL CREDIT IN ANOTHER AREA OF MATHEMATICS. TOPICS VARY BY SEMESTER AND OFFERING.

**MATH 5393 LITERATURE REVIEW AND RESEARCH****3 Semester Credit Hours (3 Lecture Hours)**

**METHODOLOGY** Reading, analyzing, and synthesizing mathematics education research literature for the purpose of informing teaching practice. Includes a study of qualitative research with a focus on the components of a research study (research question(s), literature review, conceptual framework, methods, analysis, findings) and the relationships among them.

**MATH 5394 RESEARCH METHODS IN MATH****1-3 Semester Credit Hours**

**EMATICS** This course develops an ability to independently investigate a technical topic of interest, and the skills necessary to successfully communicate on that topic. The student learns how to find, organize, assimilate, and report on technical information derived from published sources. Specific areas of study include literature searches, technical word processing, technical writing style, and oral presentation techniques. The instructor and selected additional faculty members review and critique oral and written reports submitted throughout the semester. A final paper and a formal presentation are submitted in lieu of a final exam in the final semester. This course is a co-requisite for all other courses (except thesis) taken by students in the Environmental Modeling option.

**MATH 5396 Directed independent Study****3 Semester Credit Hours**

STUDY IN AREAS OF CURRENT INTEREST. SEE COLLEGE DESCRIPTION FOR FURTHER DETAILS.

**MATH 5993 Literature Review and Research****1-9 Semester Credit Hours**

READING, ANALYZING, AND SYNTHESIZING APPROPRIATE MATHEMATICS AND/OR MATHEMATICS EDUCATION RESEARCH LITERATURE UNDER SUPERVISION. MAY BE REPEATED FOR CREDIT.

**MATH 5994 Proposal Research****1-9 Semester Credit Hours**

THIS COURSE DEVELOPS AN ABILITY TO INDEPENDENTLY INVESTIGATE A TECHNICAL TOPIC OF INTEREST, AND THE SKILLS NECESSARY TO SUCCESSFULLY COMMUNICATE ON THAT TOPIC. THE STUDENT LEARNS HOW TO FIND, ORGANIZE, ASSIMILATE, AND REPORT ON TECHNICAL INFORMATION DERIVED FROM PUBLISHED SOURCES. SPECIFIC AREAS OF STUDY INCLUDE LITERATURE SEARCHES, TECHNICAL WORD PROCESSING, TECHNICAL WRITING STYLE, AND ORAL PRESENTATION TECHNIQUES. A FINAL PAPER AND A FORMAL PRESENTATION ARE SUBMITTED IN LIEU OF A FINAL EXAM IN THE FINAL SEMESTER.

**MATH 5995 Thesis****1-9 Semester Credit Hours**

STUDENTS WORK WITH AN ADVISOR TO COMPLETE AND PRESENT THEIR PROPOSED THESIS. STUDENTS MAY REGISTER FOR 3 TO 9 SEMESTER HOURS PER SEMESTER. ONLY 3 HOURS TOTAL WILL COUNT TOWARD THE MS DEGREE IN MATHEMATICS.

**Prerequisite:** MATH 5994.

**MATH 5997 Project****1-9 Semester Credit Hours**

STUDENTS WORK WITH AN ADVISOR TO COMPLETE AND PRESENT THEIR PROPOSED RESEARCH PROJECT. STUDENTS MAY REGISTER FOR 3 TO 9 SEMESTER HOURS OF DIRECTED RESEARCH PER SEMESTER. ONLY 3 HOURS TOTAL WILL COUNT TOWARD THE MS DEGREE IN MATHEMATICS.

**Prerequisite:** MATH 5994.

**MATH 6315 Statistical Methods in Research I****3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)**

THIS COURSE IS FOR GRADUATE STUDENTS IN OTHER DISCIPLINES AND IS DESIGNED TO PREPARE THEM TO USE STATISTICAL METHODS IN THEIR RESEARCH. THIS IS A NON-CALCULUS EXPOSITION OF THE CONCEPTS, METHODS AND USAGE OF STATISTICAL DATA COLLECTION AND ANALYSIS. TOPICS INCLUDE DESCRIPTIVE STATISTICS, THE T-TEST, THE ONE AND TWO-WAY ANALYSIS OF VARIANCE, MULTIPLE COMPARISON TESTS, AND MULTIPLE REGRESSION. STUDENTS ALSO LEARN HOW TO CONDUCT THESE ANALYSES USING COMPUTER SOFTWARE AND HOW TO PROPERLY REPORT THEIR FINDINGS.

**Prerequisite:** MATH 1442 or 3342.

**MATH 6316 Statistical Methods Research II****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE IS A CONTINUATION OF MATH 6315 . TOPICS INCLUDE: STATISTICAL EXPERIMENTAL DESIGN, RANDOMIZED BLOCKS AND FACTORIAL ANALYSIS, MULTIPLE REGRESSION, CHI-SQUARED TESTS, ANALYSIS OF COVARIANCE, NON-PARAMETRIC METHODS AND SAMPLE SURVEYS. EMPHASIS WILL BE PLACED ON THE COMPUTER ANALYSIS OF RESEARCH DATA AND HOW TO PROPERLY REPORT STATISTICAL FINDINGS.

**Prerequisite:** MATH 6315.

**MATH 6317 Mixed Effects Models for Scientists****3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE WILL DEAL WITH EXTENSIONS TO THE REGRESSION AND ANOVA THAT ARE FREQUENTLY USEFUL IN DEALING WITH ECOLOGICAL DATA. TOPICS INCLUDE: USING BOOTSTRAPPING FOR SIGNIFICANCE TESTING; GENERALIZED ADDITIVE MODELS; USING GENERALIZED LEAST SQUARES TO DEAL WITH NON-HOMOGENEOUS DATA; WORKING WITH FIXED AND RANDOM FACTORS; HANDLING TEMPORALLY CORRELATED AND SPATIALLY CORRELATED DATA; AND THE GENERALIZED LINEAR MODEL (POISSON, LOGISTIC, AND NEGATIVE BINOMIAL REGRESSION).

**Prerequisite:** MATH 6315 or 6316.

**MATH 6318 An Introduction to Bayesian Statistics****3 Semester Credit Hours (3 Lecture Hours)**

AN INTRODUCTION TO BAYESIAN STATISTICS FOR SCIENTISTS. TOPICS INCLUDE: BAYESIAN PARADIGM, WITH ADVANTAGES AND DISADVANTAGES; BRIEF COVERAGE OF PROBABILITY AND CALCULUS; BASICS OF MARKOV CHAIN MONTE CARLO METHODS, INCLUDING THE GIBBS SAMPLER AND THE METROPOLIS-HASTINGS ALGORITHM; VALIDATING, COMPARING, AND INTERPRETING BAYESIAN MODELS; AND EXAMPLES FROM LITERATURE RELEVANT TO STUDENTS INTERESTS. THE COURSE ASSUMES NO PRIOR EXPOSURE TO CALCULUS OR PROGRAMMING.

**MATH 6344 Spatial Statistics****3 Semester Credit Hours (3 Lecture Hours)**

AN INTRODUCTION TO METHODS OF SPATIAL STATISTICS COMMONLY USED IN SCIENTIFIC SETTINGS. TOPICS INCLUDE THE NATURE OF GEOSPATIAL SAMPLING, ANALYSIS AND MODELING OF SPATIAL POINT PATTERNS, AND DEVELOPMENT AND ANALYSIS OF COMMON CONTINUOUS SPATIAL MODELS SUCH AS KRIGING. ADDITIONAL TOPICS TO BE COVERED, AS TIME AND STUDENT INTEREST PERMIT, INCLUDE BAYESIAN MODELING, HIERARCHICAL ENVIRONMENTAL MODELING, AND SPATIOTEMPORAL MODELING. USE OF APPROPRIATE SOFTWARE IS EMPHASIZED.

**Prerequisite:** MATH 3342 or 5315.