

MATHEMATICS (MAT)

MAT-101 Elementary Algebra (3 credits)

The subject matter includes arithmetic and algebraic operations, linear equations and inequalities, quadratic equations, two equations and two unknowns, elementary coordinate geometry and word problems. It does not fulfill the core requirement for math and is not open to those with credit in any other math courses unless recommended by the Learning Center. Required for students who have an SAT Math Sub-score 520-540 or ACT 23.

Course Types: Quantitative Literacy

MAT-102L Mathematics in Biology: Models, Data and Relations (1 credits)

This course introduces the connections between mathematics and biology. Students will explore both mathematical relation and operations and statistical measures through various data sets taken from biological sciences. Covered are direct proportions, inverse proportions, linear, quadratic, rational, exponential, and logarithmic functions, mean, median, mode, standard deviation, scatterplots, linear regression in one variable, and some probability rules.

Course Types: Mathematics; Natural Sciences; Quantitative Literacy

MAT-105 Problem Solving for Chemistry (3 credits)

MAT-117 Topics in Mathematics (3 credits)

Topics are selected to exemplify a broad view of mathematics. The subject matter includes logic, numbers, functions, geometry, probability and topology.

MAT-120 Statistical Reasoning for Healthcare Professionals (3 credits)

This course in statistical literacy provides an overview of introductory statistical methods, with an emphasis on interpretation of results and decision-making based on statistics. Computer software such as StatCrunch or Excel is used to facilitate simple data analysis. Taught in a computer lab, information will be presented in lecture format, including demonstrations using statistical software. Large and small group discussion will be incorporated when reviewing scholarly literature. An online version of the course is open ONLY for students enrolled in a fully online program.

Course Types: Mathematics; Quantitative Literacy

MAT-122 Algebra & Trigonometry (3 credits)

The course explores concepts and graphs of basic function, including polynomial, rational, radical, logarithmic, exponential and trigonometric functions. Not open to those who have taken MAT-125.

MAT-123 Introduction to Applied Statistics (4 credits)

This course includes the underlying fundamental mathematical principles and their application to a wide range of statistical methods and tests. Included are the following: sampling, frequency distributions, probability, regression, confidence intervals, hypothesis testing, t-test, analysis of variance, chi-square and correlation. Existent computer software such as MiniTab is utilized by students to aid and facilitate the analysis of results. Not open to those who have taken MAT-120

MAT-124 Intermediate Applied Statistics (4 credits)

This course continues and expands the material present in MAT-123. The course will cover hypothesis testing for variances, symmetric versus asymmetric distributions, non-parametric methods for one, two or multiple samples, measures of association, multifactor analysis of variance, and analysis of covariance. The material focuses on the application of known methods. Large data sets will be employed to explore the methods presented in class. The course will employ one of SPSS, MINITAB or SAS.

Course Types: Technological Competency

Prerequisite(s): Take MAT-123 with a minimum grade of C.

MAT-125 Calculus I (4 credits)

Basic theory of functions, limits, continuity, derivatives and integrals are taught. Some emphasis is placed on the structure of the real number system.

Course Types: Quantitative Literacy

Prerequisite(s): Take MAT-122 or have an SAT Math Sub-score 600+ or ACT 26+.

MAT-126 Calculus II (4 credits)

The course explores the basic techniques for integration as well as elementary transcendental functions and the applications of differential and integral calculus.

Prerequisite(s): Take MAT-125

MAT-183 Statistics for Social Change (3 credits)

Building and maintaining a strong community depends on a solid understanding of the strengths and challenges of the community. This course explores the application of statistical methods and data analysis tools to solve community problems. Topics covered include the fundamentals of planning and conducting research, an overview of quantitative data analysis methods including descriptive and inferential statistics, using statistical software such as SAS or SPSS for data analysis, as well as interpreting, summarizing, and presenting statistical results. Students will formulate a unique research question tied to health disparities and social justice and answer the question using an existing public-access data set. They will summarize their results in group papers and research posters, which they will present to the class.

Course Types: Critical Analysis; Foundational Gen Ed; Mathematics; Topics; Thinking Process

Corequisite(s): Take MAT-183L

MAT-183L Statistics for Social Change Lab (1 credits)

Building and maintaining a strong community depends on a solid understanding of the strengths and challenges of the community. This course explores the application of statistical methods and data analysis tools to solve community problems. Topics covered include the fundamentals of planning and conducting research, an overview of quantitative data analysis methods including descriptive and inferential statistics, using statistical software such as SAS or SPSS for data analysis, as well as interpreting, summarizing, and presenting statistical results. Students will formulate a unique research question tied to health disparities and social justice and answer the question using an existing public-access data set. They will summarize their results in group papers and research posters, which they will present to the class.

Course Types: Foundational Gen Ed; Mathematics; Teamwork; Topics

Corequisite(s): Take MAT-183

MAT-188 Voting: How It Works (3 credits)

We have elections because we don't all think alike. Since we cannot all have things our way, we vote. But voting is only the first half of the story. The second half of the story - the counting - that is at the heart of the democratic process. How well does the process work? Is the process always fair? Another topic we discuss is a fair division. The problem of dividing an object or a set of objects among the member of a group is a practical problem that comes up regularly in our daily lives. We look at fair division from a mathematical perspective.

Course Types: Critical Analysis; Foundational Gen Ed; Mathematics; Topics

MAT-188L Voting: How It Works Lab (1 credits)

MAT 188 is a hybrid history and math lab (we will be covering more history than math) centered on the U.S. Constitution and apportionment. More specifically, we will analyze why the U.S. Constitution was created, the debates surrounding the U.S. Constitution in 1787-88, historical and contemporary issues linked to the U.S. Constitution, and the different methods used to determine the number of seats each state receives in the House of Representatives.

Course Types: Foundational Gen Ed; Mathematics; Teamwork; Topics

MAT-189 Topics in Critical Inquiry (3 credits)

Critical inquiry is the process of gathering and evaluating information, ideas, and assumptions from multiple perspectives to produce well-reasoned analysis and understanding, and leading to new ideas, applications and questions. This course is intended to introduce new students to intellectual inquiry at the university by engaging them in in-depth study of a single topic utilizing a variety of perspectives and methods. The course emphasizes the essential role of critical and creative thinking to their lives as students, citizens, future professionals, and productive members of their communities.

Course Types: Critical Analysis; Topics; Thinking Process

Corequisite(s): Take MAT-189L

MAT-189L Topics in Critical Inquiry - Lab (1 credits)

Critical inquiry is the process of gathering and evaluating information, ideas, and assumptions from multiple perspectives to produce well-reasoned analysis and understanding, and leading to new ideas, applications and questions. This course is intended to introduce new students to intellectual inquiry at the university by engaging them in in-depth study of a single topic utilizing a variety of perspectives and methods. The course emphasizes the essential role of critical and creative thinking to their lives as students, citizens, future professionals, and productive members of their communities. The lab for the course is an interdisciplinary application lab, wherein students work in teams to demonstrate what they learned in the didactic portion of the course through the creation of a project, presentation, art object/installation, play, podcast, short film, co-authored reflection (debrief) on a simulation experience, etc. Faculty who design the didactic portion of the course together will design this portion as a 5-week experiential component of the course, which might include community partnerships or field trips. Students who take the course and lab will be invited to display their project results in a one-afternoon presentation at the end of each semester (to be arranged by college events personnel).

Course Types: Teamwork; Topics

Corequisite(s): Take MAT-189

MAT-201 Biostatistics (3 credits)

This course is an introduction to applied statistics with a focus on applications in biology and related sub-disciplines, including ecology, physiology, genetics, evolution, behavior, and public health. Statistical software such as R, SAS, or SPSS is used for data analysis.

Course Types: Critical Analysis; Mathematics

Prerequisite(s): Take MAT-102L

MAT-202 Calculus III (4 credits)

The subject matter includes multivariate calculus, infinite series, differential equations and matrix algebra.

Prerequisite(s): Take MAT-126

MAT-220 Applied Regression Analysis (3 credits)

The course covers the ideas behind, application of, and evaluation of regression processes, which are used to explore the relationships between variables. This course will cover simple linear regression, multiple linear regression, regression diagnostics, use of qualitative variables as predictors, transformations of variables, collinear data, and logistical regression. The material focuses on the application of known methods. Large data sets will be employed to explore the methods presented in class. The course will employ one of SPSS, MINITAB, or SAS.

Course Types: Quantitative Literacy

Prerequisite(s): Take MAT-124 and achieve a minimum grade of C.

MAT-222 Statistical Computing (3 credits)

Students will learn about various types of relational database programs and understand the fundamental aspects of SQL (Structured Query Language). This course covers database concepts, design concepts, database administration, and web-based databases. Students will receive an introduction to the SAS programming language with a focus on manipulation, summarizing, and basic statistical analysis of large data sets.

Course Types: Technological Competency

Prerequisite(s): Take MAT-123 and achieve a minimum grade of C; Take 1 CSC course - CSC-151 is preferred.

MAT-224 Biostatistics (3 credits)

This course provides an introduction to common experimental designs in the health sciences, such as clinical trials, case-control studies, and cohort studies, and the statistical methods used in those studies, including odds ratios, relative risk, logistic regression, longitudinal analysis, and survival analysis. Emphasis is placed on practical data analysis in biology and medicine. The course will employ one of SPSS, MINITAB or SAS.

Course Types: Quantitative Literacy

Prerequisite(s): Take MAT-220 and achieve a minimum grade of C

MAT-228 Applied Statistical Inquiry (3 credits)

The course will cover the process of statistical inquiry, including defining the problem, hypotheses development, selection of appropriate variables, test selection, interpretation of results, and reporting of conclusions. Large data sets will be employed to explore the methods presented in class. Group projects and oral presentations will simulate real life job experiences in the analytics industry. This course will employ one of SPSS, MINITAB or SAS.

Course Types: Problem-Solving; Thinking Process

Prerequisite(s): Take MAT-220 MAT-222 MAT-224 and achieve a minimum grade of C

MAT-280 The Gambles We Take (3 credits)

This course covers introductory probability through gambling. Various games of chance are studied and played. Students begin with a base number of chips. While playing the games, students will gamble and either win or lose their chips. Through this, the course covers the equal likelihood model of probability and its limitations, probability rules, odds, expected outcomes, simulation, and personal impact. The course then connects gambling to psychology, community, and insurance.

Course Types: Foundational Gen Ed; Mathematics; Quantitative Literacy; Themed

MAT-289 Special Topics (3 credits)

Course Types: Quantitative Literacy; Themed

MAT-300 Introduction to Mathematical Reasoning (3 credits)

This course introduces the student to abstract mathematics and proofs. Topics covered in the course include logic, sets, relations, functions, proofing methods (including proof by induction, contrapositive and contradiction) and cardinality.

Prerequisite(s): Take MAT-126

MAT-301 Real Analysis I (3 credits)

The study of real-valued functions of one variable properties include continuity, uniform continuity and differentiation.

Prerequisite(s): Take MAT-202 MAT-300

MAT-302 Real Analysis II (3 credits)

This course studies Riemann-Stieltjes integration and selected topics.

Prerequisite(s): Take MAT-301

MAT-303 Foundations of Geometry I (3 credits)

This course is a study of symmetry and isometry in two- and three-dimensional space from both the Euclidean and Cartesian viewpoints. Inversion geometries will also be covered as well as group of transformations.

Prerequisite(s): Take MAT-202 MAT-300

MAT-304 Foundations of Geometry II (3 credits)

This course covers affine, projective, absolute and hyperbolic geometries as well as vectors and differential geometries. Students will cover some topological problems. Prerequisite: MAT-303

Prerequisite(s): Take MAT-303

MAT-310 Foundations of Mathematics (3 credits)

This course is a survey of the development of mathematical thought. Prerequisites: MAT-126 and MAT-300.

Prerequisite(s): Take MAT-126 MAT-300

MAT-315 Linear Algebra (3 credits)

An introduction to linear systems including matrices, determinants, linear transformations, vector spaces and linear independence. The student will perform most of the computation on a computer, so that familiarity with at least one higher-level programming language is presupposed. Applications include linear programming, graph theory, least squares, Markov chains and differential equations.

Prerequisite(s): Take MAT-126 MAT-300

Corequisite(s): Take CSC-151 or IT-111

MAT-318 Discrete Math (3 credits)

Discrete mathematics includes topics that are particularly important in computer science. This course provides the student with an introduction to elementary combinatorics (counting methods and graph theory), elementary Boolean algebra and automata theory.

Prerequisite(s): Take MAT-126

MAT-321 Differential Equations (3 credits)

This course will describe the classical methods for solving first order differential equations, systems of first order differential equations and equations of higher degree.

Prerequisite(s): Take MAT-126 MAT-300

MAT-375 Math Modeling in Biology (3 credits)

Techniques for expressing biological molecules and concepts as mathematical expressions for analysis and comparison.

Prerequisite(s): Take MAT-125; Take 1 computer science (CSC or IT) course. CSC-151 or IT-111 preferred.; Take (BIO-102 BIO-102L) or (BIO-303 BIO-303L)

MAT-388 Mathematics of Networks (3 credits)

In this course, students will learn how to use graphs and the mathematical theory of graphs to solve real-life situations such as routing problems, traveling salesman problem, networks, weighted networks and scheduling. Students will recognize a real-life situations, apply mathematical modeling, prescribe algorithms and summarize their findings. For example, how do UPS drivers design a route that minimizes the total amount of wasted travel?

Course Types: Foundational Gen Ed; Mathematics; Quantitative Literacy; Themed

MAT-389 Special Topics (1-3 credits)

This course represents an opportunity to study a selected topic in mathematics. Topics originate with faculty or students.

MAT-390 Special Topics (1-3 credits)

This course represents an opportunity to study a selected topic in mathematics. Topics originate with faculty or students.

MAT-401 Abstract Algebra I (3 credits)

In this course, you will cover groups, quotient groups, homomorphisms, rings and fields.

Prerequisite(s): Take MAT-126 MAT-300

MAT-402 Abstract Algebra II (3 credits)

This course covers vector spaces, extension fields, elements of Galois theory.

Prerequisite(s): Take MAT-401

MAT-403 Probability (3 credits)

This course is an introduction to probability and basic distribution theory, mathematical expectation, discrete and continuous functions, and generating function.

Prerequisite(s): Take MAT-126 MAT-300

MAT-404 Mathematical Statistics (3 credits)

The theory of the mathematics of statistics; sampling distributions; point and interval estimation; theory and application of testing hypotheses, regression and correlation will all be covered in this course.

Prerequisite(s): Take MAT-403

MAT-407 Senior Seminar I (2 credits)

This course provides an opportunity for dialogue between the senior mathematics major and faculty and peers on mathematical questions. A research paper of a theoretical nature is developed by the student and presented in the group. Prerequisites: Senior status in major or permission of the instructor; Offered as needed.

MAT-408 Senior Seminar II (2 credits)

This course provides an opportunity for dialogue between the senior mathematics major and faculty and peers on mathematical questions. A research paper of a theoretical nature is developed by the student and presented in the group. Prerequisites: Senior status in major or permission of the instructor; Offered as needed.

MAT-410 Number Theory (3 credits)

Number Theory is an introductory course in number theory, divisibility, congruences, Diophantine equations, continued fractions and Gaussian Integers. Prerequisites: MAT-126 and MAT-300

Prerequisite(s): Take MAT-126 MAT-300

MAT-412 General Topology (3 credits)

This course covers metric spaces, continuous mappings, topological spaces, compactness, separation and connectedness. Prerequisites: MAT 301

Prerequisite(s): Take MAT-301

MAT-414 Complex Analysis (3 credits)

This course studies analytic functions, complex integration and infinite series. Prerequisites: MAT-202 and MAT-300

Prerequisite(s): Take MAT-202 MAT-300

MAT-417 Introduction to Graph Theory (3 credits)

This course will provide a first introduction to the theories and applications of graphs. Topics covered in the course include basic definitions and examples, paths, cycles, trees, planarity, graph colorings, digraphs and matching.

Prerequisite(s): Take MAT-126 MAT-300

MAT-420 Introduction to Linear Models (3 credits)

Method of least squares, correlation, residual analysis, multiple linear regression, and introduction to generalized linear models. Prerequisite: MAT-404 or permission of instructor.

Prerequisite(s): Take MAT-404 or Permission of Instructor

MAT-421 Design of Experiments (3 credits)

Methods of designing, conducting, and analyzing experiments, overview of sampling methods, sampling distributions, ANOVA, sample size calculations, nonparametric methods, randomized blocks, Latin squares, factorial designs, and the random effects model.

Prerequisite(s): Take MAT-404 or Permission of Instructor

MAT-424 Numerical Analysis (3 credits)

Numerical solutions to the applications of calculus and linear algebra are covered in this course. Economic and scientific interpretations of functions are stressed. Prerequisites: MAT-126 and either CSC-151 or IT-111.

Prerequisite(s): Take MAT-126; Take CSC-151 or IT-111

MAT-443 Methods of Teaching Mathematics (3 credits)

This course covers current issues in mathematics education, secondary school mathematics curricula and contemporary approaches to the teaching of mathematics.

Prerequisite(s): Take MAT-126 MAT-300

MAT-479 Data Analysis Methods (3 credits)

Topics will be chosen by the instructor.

Prerequisite(s): Take MAT-126 MAT-300

MAT-480 Statistical Applications (3 credits)

Topics will be chosen by the instructor.

Prerequisite(s): Take MAT-126 MAT-300 MAT-479

MAT-499 Capstone Experience (1-2 credits)

Course Types: Capstone

MAT-602 Statistics Seminar (1 credits)

This specialized course is designed to provide students with the intermediate level statistics information needed to enroll in GRA-601. It includes two hours of computer laboratory per week.