Fall 2020 Math Beauty Course Descriptions

- Math courses numbered MAT 130-139 and MAT 155 and higher fulfill the GEP Math Beauty requirement; please review prerequisites on these courses.
- Some Majors have specific GEP Math requirements; review your Major Guide and your DegreeWorks page.
- Please note: MAT 120 (Mathematics of Modeling/Pre-Calculus), MAT 118 (Statistics), and MAT 128 (Applied Statistics) do not fulfill the GEP Math Beauty requirement.

MAT 130 Whole Truth about Whole Number (3 credits)
This course involves studying properties of natural numbers and integers. Topics include divisibility, prime numbers, the Euclidean Algorithm and cryptography for putting messages into code.

MAT 131 Linear Methods (3 credits)
This course studies basic properties and applications of matrices and vectors. Then, matrices and vectors will be used in a variety of applications, including vector geometry, elementary graph theory, solving word problems involving systems of linear equations, least-squares functions, and geometric transformations. The course also covers some topics in basic logic, including logical operators, the conditional, truth tables, quantifiers, and syllogisms. Students in this course will be required to have a graphing calculator that can perform standard matrix operations.

MAT 132 Math of Games & Politics (3 credits)
This course will focus on both computational and theoretical aspects of probability theory, game theory and social choice theory. Topics include expected value, counting methods and conditional probability, dominant strategies, combinatorial games, Nash equilibria, social dilemmas and, for zero sum games, saddle points and the Minimax theorem. Social choice theory topics include voting methods, weighted voting, fairness criteria and impossibility theorems.

MAT 134 Math of Uncertainty: Rules/Prob (3 credits)
This course provides students with an in-depth introduction to probability and its many real-life applications. Students will study counting techniques including permutations, combinations, binomial coefficients, occupancy problems and runs within random orderings and will prove combinatorial identities. Students will study topics in probability including sample spaces, DeMorgan’s Laws, conditional probability, independent events, Bayes Theorem, random variables and expected value. Students will examine many of the classical problems in probability theory including Prisoner’s Dilemma, Gambler’s Ruin and the Birthday Problem as well as lotteries, card games and random walks.

MAT 138 Symmetry (3 credits)
"Symmetry" is a ubiquitous concept in modern mathematics and science. Certain shapes and images seem more symmetric than others, yet is not immediately obvious how to best measure and understand an object’s symmetry. In fact, the quest to more precisely quantify the concept of symmetry has been a driving force in science and mathematics, and will form the central theme of this course.

MAT 155 Fundamentals of Calculus (3 credits)
This course covers the fundamentals of differential calculus (limit, continuity, and the derivative) and introduces the antiderivative and the indefinite integral. In addition, we discuss the historical roots of calculus and the challenges faced in establishing a rigorous logical foundation for its concepts. This course fulfills the GEP Mathematics Requirement. Prerequisites: MAT 120 or Math Placement with a score of MAT 155 or higher.
MAT 161 Calculus I (4 credits)
Limits; slopes, rates of change and the derivative; techniques of differentiation; implicit differentiation; derivatives of transcendental functions; related rates; linear approximation; L’Hospital’s Rule; the Mean Value Theorem; applications of differentiation (including curve sketching and optimization); introduction to integration; the Fundamental Theorem of Calculus. This course fulfills the GEP Mathematics Requirement. Prerequisites: MAT 120 or Math Placement with a score of MAT 161 or higher.

MAT 162 Calculus II (4 credits)
Techniques of integration; applications of integration; improper integrals; exponential growth; infinite sequences and series; power series and Taylor series. This course fulfills the GEP Mathematics Requirement. Prerequisites: MAT 161 or Math Placement with a score of MA162