ADDENDUM TO THE MLWGS 2020-2021 COURSE CATALOG

The following courses have been changed from VCU dual enrollment to "UNIV." These courses *will* carry weighted credit as with AP and dual enrollment, but they *will not* carry university credit. In some cases, some slight changes in the course descriptions have been made and are included below:

UNIV CALCULUS I (Formerly VCU MATH 200)
Course Number: TBA MLWGS Credit: 1
Prerequisites: Precalculus
Guidelines: B in prerequisite course

This course covers concepts and skills found in a first semester calculus course taught at the college level, and it provides the student with a comprehensive introduction to calculus. It begins with a thorough review of polynomial, rational, trigonometric, logarithmic, exponential, and piecewise-defined functions. The calculus topics emphasized include limits, continuity, derivatives, differentials, antiderivatives, definite integrals, and applications. The concepts and problems in the course are studied from multiple perspectives including geometric, numerical, analytical, and verbal. Exploring interdisciplinary applications by means of graphing calculators and computers is another important facet of the course. The historical development of calculus is often used to motivate conceptual ideas and applications. The primary difference between Calculus I and AP Calculus AB is pacing.

UNIV CALCULUS II (Formerly MATH VCU 201)
Course Number: TBA
Prerequisite: Calculus I (VCU Math 200) or AB Calculus
Guidelines: B in prerequisite course MLWGS Credit: 1

This course covers concepts and skills found in a second semester calculus course taught at the college level. The course begins with a review of the basic concepts of integration, including the Fundamental Theorem of Calculus and the substitution technique. Additional topics include applications of the definite integral, additional techniques of integration, l'Hôpital's Rule and improper integrals, slope fields and differential equations, polar and parametric functions, and infinite sequences and series (emphasizing power and Taylor series representation of functions). A graphing calculator and other technology are used to facilitate discovery and reflection. The historical development of calculus may be used to motivate conceptual ideas and applications.

UNIV MATH MODELING (Formerly OPER VCU 327)
Course Number: TBA
Prerequisite: AP Calculus or Calculus with Analytic Geometry
Guidelines: B in prerequisite course MLWGS Credit: 1

This course enhances problem-solving capabilities and introduces students to the modeling process. Modeling serves as a bridge between the study of mathematics and the applications of mathematics to various fields. The student investigates meaningful and practical problems from common experiences encompassing many academic disciplines, including the physical and life sciences, operations research, engineering, management, and government and international studies. All facets of the mathematical modeling process are covered, including creative and empirical model construction, data collection, and model analysis. Topics include linear and multiple regression models, differential equation models, probability and simulation models, optimization models, linear programming and case studies. Students are required to participate in the COMAP HiMCM modeling competition.

UNIV DISCRETE MATH (Formerly MATH VCU 131)
Course Number: TBA
Prerequisites: Precalculus
Guidelines: C in prerequisite course MLWGS Credit: 1

This course explores a broad range of interdisciplinary topics in discrete mathematics as applied to humanities, government, art, and the social and management sciences. Topics may include election theory, weighted voting, fair division, apportionment, scheduling, game theory, networks, probability, cryptography, and other topics as time permits. Students gain an appreciation of the value of mathematics in modern global society and confidence in their ability to apply their mathematical skills. Individual and group projects encourage the student to use their creativity along with their writing and verbal skills. Mathematical current event articles will help students keep up with today's mathematical world. This course offers an alternative to those students who do not wish to take calculus in high school, who plan to major in a field that does not require calculus, or who have taken or plan to take calculus, but wish to explore non-calculus-based mathematical modeling.

UNIV ENGINEERING (Formerly VCU ENGR 101)
Course Number: TBA
Grade: 11-12
Prerequisites: Algebra II
Guidelines: "B" in prerequisite course MLWGS Credit: 1

This course will provide an introduction to engineering through basic concepts of engineering theory and the design process. Students will solve problems by applying their knowledge of mathematics, natural sciences and technical theory to analyze and design structures, products, systems or processes of benefit to humans. The major engineering disciplines covered will include aerospace, chemical, civil, computer, electrical and mechanical engineering. As part of a team, students solve hands on problems typical of these disciplines, complete labs and other projects. Topics included are the design process, ethics in engineering, computer aided drawing (CAD), force analysis, circuit analysis, MATLAB, engineering economy, human factors engineering, project management and the techniques and methods of creative problem solving. In addition to technical skills, students will also practice technical writing and oral communication skills. Students will complete a team capstone project which will include a written report, poster, presentation and model. Lab fee required.

The following courses descriptions have changed slightly. Please note, in particular, the reconfiguration of the AP Calculus BC courses.

AP CALCULUS AB
Course Number: 3103 MLWGS Credit: 1
Prerequisites: Precalculus
Guidelines: "B" Precalculus Plus or "B+" in Precalculus

This course provides a comprehensive introduction to calculus equivalent to that of a first-semester college calculus course. The material is intended to be challenging and demanding and designed to be taught over a full academic year. The AP Calculus AB Curriculum Framework specifies the curriculum - what students must know, be able to do, and understand. AP Calculus AB is structured around the foundational themes: change, limits, and analysis of functions. Major units of study are limits, derivatives, and integrals In this course, the concept of limits is foundational; the understanding of this fundamental tool leads to the development of more advanced tools and concepts that prepare students to grasp the Fundamental Theorem of Calculus, a central idea of AP Calculus. Calculus is considered a fundamental tool in many fields of study including science, business, and engineering. This course emphasizes the concepts of differential and integral calculus and provides experience in the methods and applications of these concepts. The unifying themes are limits, derivatives, integrals, approximation, and modeling, and they are developed into a cohesive whole via the functions and skills learned in the MLWGS Core Curriculum. The Mathematical Practices for AP Calculus will be utilized frequently and in diverse contexts to enable students to establish mathematical lines of reasoning and to apply mathematical concepts and tools to solve problems. For example, the concepts and problems in this course are studied geometrically, numerically, analytically, and verbally. The graphing calculator and other technology is used to facilitate discovery and reflection, and the graphing calculator is required on the AP Examination. It is expected that students who complete this course will seek college credit and/or placement by taking the AP Calculus AB test in the spring. The score on the AP exam that is necessary for college credit or placement varies depending on the institution. (For more details on the AP Calculus AB and BC Course and Exam Description including the Curriculum Framework, please visit the college board website.

AP CALCULUS AB and BC (Formerly AB Calculus BC)
Course Number: 3113
Prerequisites: Precalculus Plus MLWGS Credit: 1
Guidelines: B+ in Precalculus Plus

This demanding course provides a comprehensive introduction to calculus comparable to a two semester single-variable calculus sequence at the college level, and topics are covered at a rapid pace. The curriculum of the College Board Advanced Placement Program for both AP Calculus AB and BC is followed; it specifies what students must know, be able to do, and understand. The AP Calculus AB and BC course of study is organized around the foundational concepts ("Big Ideas") of calculus: limits, derivatives, integrals and the Fundamental Theorem of Calculus, and series. The Mathematical Practices for AP Calculus will be utilized frequently and in diverse contexts to enable students to establish mathematical lines of reasoning and to apply mathematical concepts and tools to solve problems. For instance, concepts and problems in this course are studied geometrically, numerically, analytically, and verbally. A graphing calculator and other technology are used to facilitate discovery and reflection, and a graphing calculator is required on the AP Examination. It is expected that students who complete this course will seek college credit and/or placement by taking the AP Calculus BC Test in the spring. The score on the AP exam that is necessary for college credit or placement varies depending on the institution.
(For more details on the AP Calculus AB and BC Course and Exam Description including the Curriculum Framework, please go to https://secure-media.collegeboard.org/digitalServices/pdf/ap/ap-calculus-ab-and-bc-course-and-examdescription.pdf.)

AP CALCULUS BC (AP Calculus BC content *only*) MLWGS Credit: 1
Course Number: TBA
Prerequisite: Calculus I (VCU Math 200) or AP Calculus AB
Guidelines: B in prerequisite course

The curriculum of the College Board Advanced Placement Program for AP Calculus BC is followed; it specifies what students must know, be able to do, and understand. The AP Calculus course of study is organized around the foundational concepts ("Big Ideas") of calculus: limits, derivatives, integrals and the Fundamental Theorem of Calculus, and series. This AP Calculus BC begins with a review of the basic concepts of differentiation and integration that were studied in the prerequisite course. The course then covers applications of the definite integral, techniques of integration, l'Hôpital's Rule, improper integrals, slope fields, differential equations, polar and parametric functions, and infinite sequences and series (emphasizing power and Taylor series representation of functions). The Mathematical Practices for AP Calculus will be utilized frequently and in diverse contexts to enable students to establish mathematical lines of reasoning and to apply mathematical concepts and tools to solve problems. For instance, concepts and problems in this course are studied geometrically, numerically, analytically, and verbally. A graphing calculator and other technology are used to facilitate discovery and reflection, and a graphing calculator is required on the AP Calculus Examination. It is expected that students who complete this course will seek college credit and/or placement by taking the AP Calculus BC Test in the spring. The score on the AP exam that is necessary for college credit or placement varies depending on the institution.
(For more details on the AP Calculus AB and BC Course and Exam Description including the Curriculum Framework, please go to https://secure-media.collegeboard.org/digitalServices/pdf/ap/ap-calculus-ab-and-bc-course-and-examdescription.pdf.)

ADDITIONAL CHANGES:

VCU PSYC 401 (Physiological Psychology) now requires an additional prerequisite of at least a "3" on the AP Psychology exam.

The "pending VCU approval" note is rescinded for all remaining VCU dual enrollment courses. Please note that inclusion in the course catalog does not ensure that a particular course will be offered to students in a specific school year.