MATH 125 – Calculus I

Credits, contact hours, categorization of credits:	3 credits, 45 contact hours, Math
Instructor's or course coordinator's name:	Various sections and instructors
Textbook, title, author and year:	Calculus Single Variable; Sixth Edition by Hughes-Hallett et al (2018).; published byWiley and access to the online homework system, WebAssign. – The package is available through the Inclusive Access Program offered by the UA Bookstore.
Other Supplemental materials:	Graphing calculator
2021-2022 catalog description:	An accelerated version of MATH 122B. Introduction to calculus with an emphasis on understanding and problem solving. Concepts are presented graphically and numerically as well as algebraically. Elementary functions, their properties and uses in modeling; the key concepts of derivative and definite integral; techniques of differentiation, using the derivative to understand the behavior of functions; applications to optimization problems in physics, biology and economics. A graphing calculator is required for this course. We recommend the TI-83 or TI-84 models. Calculators that perform symbolic manipulations, such as the TI-89, NSpire CAS, or HP50g, cannot be used. Except as per University policy on repeating a course, credit will not be given for this course if the student has credit in a higher level math course. Such students may be dropped from the course. Examinations are proctored.
Prerequisites:	PPL 92+ or SAT I MSS 730+ or ACT MATH 32+ or MATH 125 AP credit or UA Math 121B (UA Online) with C or higher. Test scores expire after 1 year.
Co-requisites:	None
Required, Elective, or Selected Elective:	Required (Math 122A/B or Math 125 required)
Instruction Outcomes:	Upon completion of the course, the student will: • Use derivatives to analyze and graph algebraic and transcendental functions;

- Select and apply models and differentiation techniques to applications involving, but not limited to, optimization and related rates;
- Apply the Fundamental Theorem of Calculus to evaluate integrals;
- Use estimation techniques to approximate rates of change, area, and total change.

Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Topics covered:

- Limits and Continuity
- The Derivative at a Point
- The Derivative Function
- Interpretations of the Derivative
- The Second Derivative
- Differentiability
- Powers and Polynomials
- The Exponential Function
- The Product and Quotient Rules
- The Chain Rule
- Trigonometric Functions
- The Chair Rule and Inverse
- Implicit Functions
- Linear Approximations
- Using First and Second Derivatives
- Optimization
- Optimization and Modeling
- Families of Functions and Modeling
- Rates and Related Rates
- L'Hopital's Rule, Growth and Dominance
- The Definite Integral
- The Fundamental Theorem and Interpretations
- Theorems About Definite Integrals
- Antiderivatives Graphically and Numerically
- Constructing Antiderivates Analytically
- Differential Equations and Motion
- Integration by Substitution
- Second Fundamental Theorem of Calculus