Approved syllabus for MATH241

Analytic Geometry & Calculus A

Catalog Description

Functions, limits, continuity, derivatives. Polynomial, rational, exponential, hyperbolic, logarithmic, trigonometric and inverse trigonometric functions. Definite and indefinite integrals and the Fundamental Theorem of Calculus. Simple differential equations (separable ODE, linear ODE). ODE models leading to exponential growth and decay.

PREREQ: MATH117 or acceptable score on the Math Placement Exam. RESTRICTIONS: Credit cannot be received for both MATH241 and MATH 221.

Textbook

Calculus: Early Transcendentals, by James Stewart et al., 9th edition (USA)

Syllabus

Each "unit" below is a 55-minute class meeting with the primary instructor. A regular semester has approximately 41 lecture units and 27 discussion section units.

Review (3 units, some or all to be done in discussion section meetings)

- **Appendix D** Trigonometry (1 unit)
- **1.4** Exponential Functions (1 unit)
- **1.5** Inverse Functions and Logarithms (1 unit)

Chapter 2: Limits and Derivatives (9 units)

- **2.1** The Tangent and Velocity Problems (0.5)
- **2.2** The Limit of a Function (1)
- **2.3** Calculating Limits using the Limit Laws (1.5)
- **2.5** Continuity (2)
- **2.6** Limits at Infinity; Horizontal Asymptotes (1.5)
- **2.7** Derivatives and Rates of Change (1.5)

- **2.8** The Derivative as a Function (1)

Chapter 3: Differentiation Rules (12 units)

- **3.1** Derivatives of Polynomial and Exponential Functions (1)
- **3.2** The Product and Quotient Rules (1)
- **3.3** Derivatives of Trigonometric Functions (1)
- **3.4** The Chain Rule (1.5)
- **3.5** Implicit Differentiation (1.5)
- **3.6** Derivatives of Logarithmic Functions (1)
- **3.8** Exponential Growth and Decay (1)
- **3.9** Related Rates (2)
- **3.10** Linear Approximations and Differentials (*do linear approximations; differentials are optional*) (1)
- **3.11** Hyperbolic Functions (*optional*) (1)

Chapter 4: Applications of Differentiation (8 units)

- **4.1** Maximum and Minimum Values (1)
- **4.2** The Mean Value Theorem (1)
- **4.3** How Derivatives Affect the Shape of a Graph (1)
- **4.4** Indeterminate Forms and L'Hospital's Rule (3)
- **4.7** Optimization Problems (1)
- **4.9** Antiderivatives (1)

Chapter 5: Integrals (7 units)

- **5.1** Areas and Distances (1)
- **5.2** The Definite Integral (1)
- **5.3** The Fundamental Theorem of Calculus (2)
- **5.4** Indefinite Integrals and the Net Change Theorem (1)
- **5.5** The Substitution Rule (2)

Chapter 9: Differential Equations (2 units)

- **9.3** Separable Differential Equations (1)
- **9.4** Models for Population Growth (1)

➢ Updated by Cristina Bacuta and approved by Lou Rossi on August 1, 2012.
➢ Updated by Cristina Bacuta and approved by Lou Rossi and Gilberto Schleiniger on August 15, 2013, January 31, 2014, and August 8, 2014.
➢ Updated by Christopher Raymond on February 9, 2017 and August 11, 2017.
➢ Updated by Dominique Guillot on August 23, 2023.