Math 2261
Departmental Course Syllabus

The following are the core objectives for this course that are assessed at the University level.
<u>VSU General Education Outcomes:</u>

<u>Area A2:</u> Students will demonstrate mathematical proficiency by analyzing a variety of functions and solving various equations.

Area D: Students will demonstrate understanding of the physical universe and the nature of science, and the will use scientific methods and/or mathematical reasoning and concepts to solve problems.

<u>Critical Thinking:</u> Students will identify, evaluate, and apply appropriate models, concepts, or principles to issues, and they will produce viable solutions or make relevant inferences.

Topics & Suggested Pacing Guide---<u>Course Outline:</u> (Not including Testing & Review)

1.1*	Functions and their Graphs	3.7	Implicit Differentiation
1.2*	Combining Functions; Shifting and Scaling Graphs	3.8	Derivatives of Inverse Functions and Logarithms
1.3*	Trigonometric Functions	3.9	Inverse Trigonometric Functions
1.4*	Graphing with Calculators and Computers	3.10	Related Rates
1.5*	Exponential Functions	3.11	Linearization and Differentials *(optional)*
1.6*	Inverse Functions and Logarithms	4.1	Extreme Values of Functions
2.1	Rates of Change and Tangents to Curves	4.2	The Mean Value Theorem *(optional)*
2.2	Limit of a Function and Limit Laws	4.3	Monotonic Functions and the First Derivative Test
2.3	The Precise Definition of Limit	4.4	Concavity and Curve Sketching
2.4	One-Sided Limits	4.5	Indeterminate Forms and L'Hôpital's Rule
2.5	Continuity	4.6	Applied Optimization
2.6	Limits Involving Infinity; Asymptotes of Graphs	4.7	Newton's Method *(optional)*
3.1	Tangents and the Derivative at a Point	4.8	Antiderivatives

3.2	The Derivative as a Function	5.1	Area and Estimating with Finite Sums
3.3	Rules for Polynomials, Exponentials, Products, and Quotients	5.2	Sigma Notation and Limits of Finite Sums
3.4	The Derivative as a Rate of Change	5.3	The Definite Integral
3.5	Derivatives of Trigonometric Functions	5.4	The Fundamental Theorem of Calculus
3.6	The Chain Rule	5.5	Indefinite Integrals and the Substitution Method

*__Note__: 5.6 is not covered in MATH 2261

- **Timeline** (Please note, it is important to cover all non-optional material, including chapter 5, in order to properly prepare students for MATH 2262). All chapter and section numbers refer to Thomas' Calculus: Early Transcendentals, 13ed.
  - Chapter 1. Functions…….. 2—9 hours
    - Included topics: Review of Pre-calculus – functions, domain and range, combining and transforming functions, graphs, trigonometric functions, exponential and logarithmic functions, inverse functions.
  - Chapter 2. Limits and Continuity……..9—12 hours
    - Included topics: Limits, continuity, asymptotes.
  - Chapter 3. Differentiation……. 12—20 hours
    - Included topics: Definition of derivative, tangent lines, derivative of polynomials, exponential, logarithmic, and trigonometric functions, product and quotient rules, chain rule, derivative of inverse functions, rates of change, implicit differentiation, related rates, linearization (optional).
  - Chapter 4. Applications of Derivatives……. 9—12 hours
    - Included topics: Maximum and minimum values, concavity, graphing using Calculus, L'Hôpital's rule, optimization, Newton's method (optional), antiderivatives.
  - Chapter 5. Integration…….. 6—9 hours
    - Included topics: Riemann sums, area and distance, definite and indefinite integral, fundamental theorem of Calculus, substitution rule.

- **Sample Lecture Schedule.** The following schedule represents one possible way to structure the material of MATH 2261. Individual instructors have the freedom to adjust their own schedules as they see fit, and to include review and test days as necessary. Topics indicated by a star are optional, however this sample schedule includes every topic.

  - *Week 1.* 1.1—3 (Functions and graphs*; Combining, shifting, and scaling graphs*; Trigonometric functions*)

  - *Week 2.* 1.4—6 (Graphing calculators*; Exponential functions*; Logarithms and other inverse functions*)

  - *Week 3.* 2.1—2 (Rates of change and tangent lines; Limits)

  - *Week 4.* 2.3—4 (Precise definition of limit; One-sided limits)

  - *Week 5.* 2.4—6 (Continuity; Limits and infinity)

  - *Week 6.* 3.1—2 (Derivative at a point; Derivative as a function)

  - *Week 7.* 3.3—4 (Derivative rules; Derivative as a rate of change)

  - *Week 8.* 3.5—6 (Derivatives of trigonometric functions; Chain rule)

  - *Week 9.* 3.7—9 (Implicit differentiation; Derivatives of inverse functions; Derivatives of inverse trigonometric functions)

  - *Week 10.* 3.10—11 (Related rates; Linearization*)

  - *Week 11.* 4.1—3 (Extreme values; Mean Value Theorem*; First derivative test)

  - *Week 12.* 4.4—5 (Concavity; L'Hôpital's rule)

  - *Week 13.* 4.6—8 (Optimization; Newton's method*; Antiderivatives)

  - *Week 14.* 5.1—3 (Estimating area; Sigma notation; Definite integrals)

  - *Week 15.* 5.4—5 (Fundamental Theorem of Calculus; Indefinite integrals and substitution method)

Math 2261 Analytic Geometry and Calculus
3 Credit Hours Nevins Hall
Mathematics Department
Valdosta State University

Pre-requisites: Pre-requisites: MATH 1112 or MATH 1113, with a C or higher.

Required Text: Required Textbook: Thomas, Weir, and Hass. Thomas' Calculus: Early Transcendentals, Single Variable plus MyMathLab, 13ed. Addison Wesley (Pearson). ISBN: 978-0321952875. Book may not be current – see your instructor. Text Summary for Thomas' Calculus: Early Transcendentals, 13ed. Required Calculator: TI-83/84 Plus graphing calculator.

Course Description: Introduction to limits, derivatives, integration, the fundamental theorem of calculus, and applications.

Student Learning Outcomes:
In this course the student will learn the methods and applications of differential calculus and the motivation for the integral calculus. Properly using the language and notation of calculus, students will analyze functions and solve applied problems. Upon completion of the course, the intent of the instructor is that the students will be able to:

1. Compute the limits of algebraic transcendental functions.
2. State, use and interpret the definitions of continuity and the derivative in terms of limits.
3. Formulate derivatives of algebraic and transcendental functions using the power, product, quotient, and chain rules.
4. Analyze and construct graphs of functions by using and combining calculus and precalculus methods.
5. Apply the derivative to calculate rates of change and solve applied optimization problems.
6. Demonstrate how antidifferentiation and Riemann sums relate to the integral calculus.
7. Use the Fundamental Theorem of Calculus and substitution to compute definite and indefinite integrals.

Departmental Final Exam:
The final exam is mandatory for all students and comprehensive. The final exam comprises 20-30% of the overall course grade.

Attendance & Tardiness: Attendance is expected. A student who misses more than 20% of the classes will be subject to receiving a failing grade in the course.

Accommodations Statement: Students with disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The Access Office is located in Farber Hall. The phone numbers are 229-245-2498 (V), 229-375-5871 (Video Phone) and 229-219-1348 (TTY). For more information, please visit http://www.valdosta.edu/student/disability/ or email: access@valdosta.edu.

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Student Success Center: The Student Success Center (SSC) provides free peer tutoring in core courses, including math. It also offers time management and study skills workshops as well as provides free professional academic advising and on-campus job information in one location: Langdale Residence Hall. Call 333-7570 to make an appointment, or visit the website: www.valdosta.edu/ssc.