

## Calculus and Analytic Geometry Math 1310

**Course Description:** MATH 1310 is a first semester Calculus course. Topics covered include limits, the derivative, differentiation techniques, applications of the derivative, integration, and applications of integration.

### Learning Objectives:

1. Evaluate the limits of functions numerically, graphically, and analytically.
2. Know and use the definition of the derivative to find slopes of tangent lines.
3. Determine continuity of a function at a point and on an interval.
4. Evaluate derivatives of polynomial, rational, trigonometric, logarithmic, exponential and other functions by applying differentiation techniques.
5. Use the derivatives to find maxima and minima of a function.
6. Use implicit differentiation method and related rates to find derivatives.
7. Evaluate anti-derivatives.
8. Use Riemann Sums to approximate definite integrals.
9. Use the Fundamental Theorem of Calculus to find derivatives and definite integrals.
10. Apply integrals to find areas, volumes, average value of a function.
11. Use integration by substitution technique to find indefinite and definite integrals of a function.

**Prerequisites:** In order to complete this course, a student must satisfy one of the following:

- Two years of high school algebra, one year of geometry, one-half year of trigonometry, ACT math score of 24 or higher and satisfactory score on department placement test.
- Grade of C or higher in MATH 1280 or MATH 1300.

**Important:** *This course uses algebraic skills and many concepts from Pre-Calculus. If you need to review the concepts or algebraic methods, you can use tools from the WebAssign, ask tutors at the Learning Commons, or review the skills using Chapter 1 from the textbook. Class time cannot be used to review Algebra.*

### Instructional Strategies:

- Interactive lecture
- Class discussions
- Small group work in class

### Student Learning Activities:

- Class discussions
- Interactive online activities
- Small group work
- Worksheet on differentiation and integration techniques

**Text**

Stewart - ACP Calculus: Early Transcendentals - **Volume 1, 8<sup>th</sup> edition** + Enhanced  
WebAssign Printed Access Card for Calculus, Multi-Term  
**ISBN Volume I – 9781337057301**

The books can be purchased directly from the Cengage Learning microsite for cheaper prices: <http://www.cengagebrain.com/course/2719905>

The following sections from the book will be covered in the course:

Chapter 2:

- 2.1 Tangent lines and velocities
- 2.2 Limit of a function
- 2.3 Calculating limits
- 2.5 Continuity of a function
- 2.6 Limits at infinity
- 2.7 Rates of change and derivatives
- 2.8 Definition of the derivative of a function

Chapter 3:

- 3.1 Derivatives of polynomial functions
- 3.2 The Product and the Quotient Rules
- 3.3 Derivatives of trigonometric functions
- 3.4 The Chain Rule
- 3.5 Implicit differentiation
- 3.6 Derivatives of logarithmic functions
- 3.7 Applications of derivatives
- 3.8 Exponential growth and decay
- 3.9 Related rates
- 3.10 Linear approximation

Chapter 4: sections 4.1 – 4.9

- 4.1 Maximum and minimum values
- 4.2 The mean value theorem
- 4.3 Derivatives through the graphs
- 4.4 Indeterminate forms
- 4.5 Curve sketching
- 4.7 Optimization problems
- 4.9 Anti-derivatives

Chapter 5: sections 5.1 – 5.5

- 5.1 Areas under the curves
- 5.2 The definite integral
- 5.3 The Fundamental Theorem of Calculus
- 5.4 Indefinite integrals
- 5.5 Integration by substitution

Chapter 6: sections 6.1, 6.2,

- 6.1 Areas between the curves

## 6.2 Calculating volumes with the integrals

Optional topics:

2.4 Precise definition of a limit

3.11 Hyperbolic functions

4.8 Newton's Method

6.3 Volumes by cylindrical shells

6.3 Work

6.5 Average value of a function

**Enhanced WebAssign (EWA):** used for online homework. The access code comes with the book and includes interactive e-book.

### **Course Learning Outcomes:**

1. Use graphical, numerical, and symbolic representations of a function to analyze it.
2. Evaluate the limits of a single-variable function graphically, numerically, and algebraically.
3. Apply the definition of a derivative of a function to differentiate a given function.
4. Use differentiation rules to find derivatives of functions, including polynomial, trigonometric, rational, exponential, logarithmic, and inverse trigonometric functions.
5. Find the intervals where a function is increasing/decreasing, is concave up/down.
6. Apply derivatives to solve optimization problems, related rates problems.
7. Understand and apply the Mean Value Theorem, including the conditions under which the theorem is valid.
8. Find anti-derivatives.
9. Apply the Fundamental Theorem of Calculus to definite integrals, including variable limits of integration.
10. Use integration techniques to applied problems such as finding areas and volumes.

### **BGP Learning Outcomes:**

1. Interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them.
2. Represent mathematical information symbolically, visually, numerically, and verbally.
3. Use arithmetical, algebraic, and graphical methods to solve problems.
4. Estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.
5. Recognize that mathematical methods are based on assumptions and have limits

**BGP learning outcomes will be measured by the BGP Assessment Exam during the Finals week.**

**Canvas:** The official grade book, assignment information, and general announcements will be maintained on Canvas in MyBGSU.

**Calculator:** A graphing calculator is required for this course. The TI-83 Plus will be used in class and you are encouraged to use a TI-82, TI-83, TI-84, or TI-83/84 Plus for this class.

**Attendance:** Regular attendance and participation is expected of each student. Absences from class will NOT result in additional time to complete assignments, excuse from assignments, or make-ups for quizzes or tests.

**Assessment:**

Throughout the whole course the students will be evaluated on the concepts they learn in various ways: through online EWA assignments, regular quizzes, BGP Assessment Test (on WebAssign), four in-class exams, and the comprehensive final exam. The format of the questions varies from multiple-choice to in-depth step-by-step solutions with justifications. Students should be able to demonstrate the mastery of the basic skills, such as finding limits and derivatives, conceptual understanding, critical thinking skills, and the ability to analyze problems and interpret their answers.

**Quizzes:** Expect at least 10 quizzes throughout the semester, usually held on Fridays unless announced to be different. Topics that the quiz will cover will be announced in class 2 days ahead. **There are absolutely no make-ups for missed quizzes.** Suggested homework will be given to prepare for the quiz.

**Exams:** There is no absolutely no make-up for exams. In case of an emergency contact me as soon as possible. Final exam schedule is available online. Missing the final exam will earn F for the course.

**Grading:** Standard 90-100 A, 80-89 B, etc. Your final grade is expected to be weighed as follows:

Homework on EWA	10%
In-class activities	10%
Quizzes (lowest one dropped)	15%
Four exams	50%
BGP Assessment Test	5%
Final exam (comprehensive)	10%

**Support for Student Success:** You are welcome to attend office hours (you do not need an appointment for this). If you want to meet with me outside of regular office hours you can contact me by e-mail to arrange a meeting time.

You are encouraged to visit Math and Stat Tutoring Center at the Learning Commons [www.bgsu.edu/learningcommons](http://www.bgsu.edu/learningcommons) where knowledgeable and qualified tutors are ready and willing to help.

There are multiple modes of support available through the WebAssign, including video lectures, examples, and live chat with a tutor.

Your success is in your hands. If you are willing to put effort you will succeed in this class.

**Disability Policy:** In accordance with the University policy, if the student has a documented disability and requires accommodations to obtain equal access in this course, he or she should contact the instructor at the beginning of the semester and make this need known. Students with disabilities must verify their eligibility through the Office of Disability Services for Students, 38 College Park Bldg, 419-372-8495. (<http://www.bgsu.edu/offices/sa/disability/>)

**Student veteran-friendly campus:** BGSU educators recognize student veterans' rights when entering and exiting the university system. If you are a student veteran, please communicate with your instructor so reasonable accommodations can be made for absence when drilling or being called to active duty (See <http://www.bgsu.edu/veteran/> for more information).

**Codes of Conduct and Academic Honesty Policy:** The instructor and students in this course will adhere to the University's general Codes of Conduct defined in the *BGSU Student Handbook*. Specifically, the Code of Academic Conduct (Academic Honesty Policy) requires that students do not cheat, fabricate, plagiarize or facilitate academic dishonesty. Students who passively engage in cheating (i.e. allowing others to cheat off of them) may receive the same consequences as the person copying.

**Departmental Mediator:** Dr. Kit Chan, [kchan@bgsu.edu](mailto:kchan@bgsu.edu)

**Expectations for Learning:** Attend class. Read the book. Do homework and/or review your notes EVERY day. Ask questions in class, and/or stop by my office. Work on problems again, and again, and persevere. Remember, you already have the tools necessary to handle the material. Do not make the material harder than it is; bring your intuition and common sense with you to class each day. My goal is your success.

**A note about cell phones and other electronic devices: Typing messages, using a laptop or cell phone is not allowed during class.**