

ITT Technical Institute
MA3310
Calculus I
Onsite and Online Course

SYLLABUS

Credit hours: 4.5


Contact/Instructional hours: 56 (34 Theory Hours, 22 Lab Hours)

Prerequisite(s) and/or Corequisite(s):

Prerequisites: MA1310 College Mathematics II or equivalent

Course Description:

This course is an introduction to differential and integral calculus. Topics include limits, continuity, derivatives, antiderivatives and both definite and indefinite integrals.



COURSE SUMMARY

COURSE DESCRIPTION

This course is an introduction to differential and integral calculus. Topics include limits, continuity, derivatives, antiderivatives and both definite and indefinite integrals.

MAJOR INSTRUCTIONAL AREAS

1. Functions and their limits
2. Derivatives and their applications
3. Integrals and their applications
4. Derivatives and integrals of transcendental functions (such as trigonometric, exponential, and logarithmic functions)

COURSE LEARNING OBJECTIVES

By the end of this course, you should be able to:

1. Define and apply the concepts of functions and limits to introductory problems.
2. Differentiate algebraic and transcendental functions using the basic derivative rules.
3. Solve application problems involving derivatives.
4. Integrate algebraic and transcendental functions using the basic integration rules.
5. Solve application problems involving integrals.
6. Create a presentation of a problem solution.
7. Use the ITT Tech Virtual Library to research calculus topics as assigned.

COURSE OUTLINE

MODULE 1: FUNCTIONS AND LIMITS

COURSE LEARNING OBJECTIVES COVERED

- Define and apply the concepts of functions and limits to introductory problems.

TOPICS COVERED

- Review of Functions
- Trigonometric Functions
- Introduction to Limits

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
Reading: Read <i>Calculus</i> , Chapters 1 and 2 (pp. 32–56).	No	5.0 hrs.
Lesson: Study the lesson.	No	1.5 hrs.
Exercise: Complete the exercise titled “Review of Functions and Limits.”	Yes	1.5 hrs.
Lab: Complete the lab titled “Functions and Limits.”	Yes	N/A
Preparation for Quiz: Prepare for Quiz 1.	No	1.5 hrs.
Read and Begin the Project: Start work on the project.	No	0.5 hr.

Total Out-Of-Class Activities: 10.0 Hours

MODULE 2: INFINITE LIMITS AND DERIVATIVES

COURSE LEARNING OBJECTIVES COVERED

- Define and apply the concepts of functions and limits to introductory problems.
- Differentiate algebraic and transcendental functions using the basic derivative rules.

TOPICS COVERED

- Infinite Limits
- Continuity
- Introduction to Derivatives
- Rules of Differentiation
- The Product and Quotient Rule

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
Reading: Read <i>Calculus</i> , Chapter 2 (pp. 56–92) and Chapter 3 (pp. 99–126).	No	6.5 hrs.
Lesson: Study the lesson.	No	2.0 hrs.
Exercise 1: Complete the exercise titled “Infinite Limits and Derivatives.”	Yes	2.5 hrs.
Exercise 2: Complete the exercise titled “Infinite Limits and Rules of Differentiation.”	Yes	2.5 hrs.
Lab: Complete the lab titled “Problem Solving—Infinite Limits and Derivatives.”	Yes	N/A
Quiz: Attempt Quiz 1.	Yes	N/A
Preparation for Quiz: Prepare for Quiz 2.	No	2.0 hrs.
Project: Continue to work on the project.	No	2.0 hrs.

Total Out-Of-Class Activities: 17.5 Hours

MODULE 3: DERIVATIVES

COURSE LEARNING OBJECTIVES COVERED

- Differentiate algebraic and transcendental functions using the basic derivative rules.
- Solve application problems involving derivatives.
- Integrate algebraic and transcendental functions using the basic integration rules.

TOPICS COVERED

- Derivatives of Trigonometric Functions
- Derivatives as the Rate of Change
- The Chain Rule
- Implicit Differentiation
- Maxima and Minima
- Graphing Functions
- Antiderivatives

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
Reading: Read <i>Calculus</i> , Chapter 3 (pp. 129–169) and Chapter 4 (pp. 177–225 and pp. 240–248).	No	10.0 hrs.
Lesson: Study the lesson.	No	2.0 hrs.
Exercise: Complete the exercise titled “More on Derivatives.”	Yes	2.0 hrs.
Lab: Complete the lab titled “Problem Solving–More on Derivatives.”	Yes	N/A
Quiz: Attempt Quiz 2.	Yes	N/A
Project: Continue to work on the project.	No	2.0 hrs.
Preparation for Quiz: Prepare for Quiz 3.	No	2.0 hrs.

Total Out-Of-Class Activities: 18.0 Hours

MODULE 4: INTEGRATION

COURSE LEARNING OBJECTIVES COVERED

- Integrate algebraic and transcendental functions using the basic integration rules.
- Create a presentation of a problem solution.
- Use the ITT Tech Virtual Library to research calculus topics as assigned.

TOPICS COVERED

- Approximating Areas Under Curves
- Definite Integrals
- Fundamental Theorems of Calculus
- Working with Integrals
- Substitution Rule

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
Reading: Read <i>Calculus</i> , Chapter 5.	No	7.0 hrs.
Lesson: Study the lesson.	No	2.0 hrs.
Exercise: Complete the exercise titled “Fundamental Theorems of Calculus.”	Yes	3.0 hrs.
Lab: Complete the lab titled “Fundamentals of Calculus and Integration by Substitution.”	Yes	N/A
Quiz: Attempt Quiz 3.	Yes	N/A
Preparation for Quiz: Prepare for Quiz 4.	No	2.0 hrs.
Project: Submit the project.	Yes	3.0 hrs.

Total Out-Of-Class Activities: 17.0 Hours

MODULE 5: APPLICATIONS OF INTEGRATION

COURSE LEARNING OBJECTIVES COVERED

- Solve application problems involving integrals.

TOPICS COVERED

- Velocity Net Change
- Region Between Curves
- Volume by Slicing
- Volume by Shells
- Length by Curves
- Physical Applications of Integration

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF-CLASS TIME
Reading: Read <i>Calculus</i> , Chapter 6.	No	7.0 hrs.
Lesson: Study the lesson.	No	2.5 hrs.
Exercise 1: Complete the exercise titled “Physical Applications of Integration.”	Yes	3.0 hrs.
Exercise 2: Complete the exercise titled “Evaluation of Volume by Integration.”	Yes	3.0 hrs.
Lab: Complete the lab titled “Applications of Integration.”	Yes	N/A
Quiz: Attempt Quiz 4.	Yes	N/A

Total Out-Of-Class Activities: 15.5 Hours

MODULE 6: DIFFERENTIATION AND INTEGRATION OF FUNCTIONS

COURSE LEARNING OBJECTIVES COVERED

- Define and apply the concepts of functions and limits to introductory problems.
- Differentiate algebraic and transcendental functions using the basic derivative rules.
- Solve application problems involving derivatives.
- Integrate algebraic and transcendental functions using the basic integration rules.
- Solve application problems involving integrals.

TOPICS COVERED

- Inverse Functions
- Inverse Trigonometric Functions
- The Natural Logarithmic and Exponential Functions
- Logarithmic and Exponential Functions with Other Bases
- Exponential Models

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
Reading: Read <i>Calculus</i> , Chapter 7.	No	6.0 hrs.
Lesson: Study the lesson.	No	2.0 hrs.
Lab: Complete the lab titled “Integration of Trigonometric, Logarithmic, and Exponential Functions.”	Yes	N/A
Preparation for the Final Exam: Prepare for the final exam.	No	5.0 hrs.
Final Exam: Take the final exam.	Yes	N/A

Total Out-Of-Class Activities: 13.0 Hours

EVALUATION AND GRADING

EVALUATION CRITERIA

The graded assignments will be evaluated using the following weighted categories:

Category	Weight
Exercise	30%
Project	10%
Lab	25%
Quiz	20%
Final Exam	15%
TOTAL	100%

GRADE CONVERSION

The final grades will be calculated from the percentages earned in the course, as follows:

Grade	Percentage
A (4.0)	90–100%
B+ (3.5)	85–89%
B (3.0)	80–84%
C+ (2.5)	75–79%
C (2.0)	70–74%
D+ (1.5)	65–69%
D (1.0)	60–64%
F (0.0)	<60%

LEARNING MATERIALS AND REFERENCES

REQUIRED RESOURCES

COMPLETE TEXTBOOK PACKAGE

- Briggs, Cochran, Thomas, & Weir. (2013). *Calculus (Custom 2nd ed.)*. Boston, MA: Pearson Custom.
- Briggs (2012). MyMathLab. Boston, MA: Pearson Education. Retrieved from <http://www.mymathlab.com/>.

OTHER ITEMS

- TI89+ Graphing Calculator

RECOMMENDED RESOURCES

- Books and Professional Journals
 - Bronson, R., & Costa, G. (2010). *Schaum's outline of differential equations (3rd ed.)*. New York, NY: McGraw-Hill.
 - Farlow, S. J. (1993). *Partial differential equations for scientists and engineers*. Mineola, NY: Dover.
 - Perloff, J. M. (2013). *Microeconomics: Theory and applications with calculus (3rd ed.)*. Upper Saddle River, NJ: Prentice Hall.
 - Straffin, P. D. (1996). *Applications of calculus*. Washington, DC: Mathematical Association of America.
- Professional Associations and Journals
 - Journal of Electrical Engineering (<http://www.jee.ro/>)
 - Springer Science + Business Media (<http://www.springer.com/mathematics/analysis/journal/526>)
 - The International Journal of Engineering (<http://www.ijee.ie/articles/Vol18-1/ljee1262.pdf>)

- ITT Tech Virtual Library (accessed via Student Portal | <https://studentportal.itt-tech.edu>)
 - School of Study> General Education Information> Databases
 - Gale Virtual Reference: General Education
This link offers a wide variety of resources applicable to research related to general education courses; topics include math, environmental science, contemporary social issues, and statistics.
 - School of Study> General Education Information > Recommended Links
 - MathWorld
This link offers a mathematics encyclopedia covering algebra, applied mathematics, calculus, discrete mathematics, geometry, history, number theory, probability, statistics, and more.
 - The Math Forum
This forum offers a review of math resources by topic.
 - School of Study> General Education Information > Research Guides> Tips for Math Success
 - Schaum's Outline of Theory and Problems of Basic Mathematics with Applications to Science and Technology
It offers resources for applied technology problems.
 - Basic Search
 - Exner, G. R. (2000). *Inside calculus*. New York, NY: Springer.
- Other References
 - Khan Academy
<http://www.khanacademy.org/math/calculus>
This website covers calculus topics, including differential calculus, integral calculus, and multivariable calculus.

NOTE: All links are subject to change without prior notice.

INSTRUCTIONAL METHODS AND TEACHING STRATEGIES

The curriculum employs a variety of instructional methods that support the course objectives while fostering higher cognitive skills. These methods are designed to encourage and engage you in the learning process in order to maximize learning opportunities. The instructional methods include but are not limited to lectures, collaborative learning options, use of technology, and hands-on activities.

To implement the above-mentioned instructional methods, this course uses several teaching strategies, such as online lessons and labs. Your progress will be regularly assessed through a variety of assessment tools including quizzes, exercises, labs, project, and final exam.

OUT-OF-CLASS WORK

For purposes of defining an academic credit hour for Title IV funding purposes, ITT Technical Institute considers a quarter credit hour to be the equivalent of: (a) at least 10 clock hours of classroom activities and at least 20 clock hours of outside preparation; (b) at least 20 clock hours of laboratory activities; or (c) at least 30 clock hours of externship, practicum or clinical activities. ITT Technical Institute utilizes a “time-based option” for establishing out-of-class activities which would equate to two hours of out-of-class activities for every one hour of classroom time. The procedure for determining credit hours for Title IV funding purposes is to divide the total number of classroom, laboratory, externship, practicum and clinical hours by the conversion ratios specified above. A clock hour is 50 minutes.

A credit hour is an artificial measurement of the amount of learning that can occur in a program course based on a specified amount of time spent on class activities and student preparation during the program course. In conformity with commonly accepted practice in higher education, ITT Technical Institute has institutionally established and determined that credit hours awarded for coursework in this program course (including out-of-class assignments and learning activities described in the “Course Outline” section of this syllabus) are in accordance with the time-based option for awarding academic credit described in the immediately preceding paragraph.

ACADEMIC INTEGRITY

All students must comply with the policies that regulate all forms of academic dishonesty or academic misconduct. For more information on the academic honesty policies, refer to the Student Handbook and the School Catalog.

INSTRUCTOR DETAILS

Instructor Name	
Office Hours	
Contact Details	

(End of Syllabus)