

ITT Technical Institute
MA3410T
Calculus II
Onsite and Online Course

SYLLABUS

Credit hours: 4.5

Contact/Instructional hours: 67 (41 Theory Hours, 26 Lab Hours)

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

Prerequisites: MA3310T Calculus I or equivalent

Course Description:

A continuation of Calculus I, this course introduces methods of integration, partial derivatives and double integration, integration and differentiation of the trigonometric and logarithmic functions, series and progressions, the Laplace transform, and differential equations.

COURSE SUMMARY

COURSE DESCRIPTION

A continuation of Calculus I, this course introduces methods of integration, partial derivatives and double integration, integration and differentiation of the trigonometric and logarithmic functions, series and progressions, the Laplace transform, and differential equations.

MAJOR INSTRUCTIONAL AREAS

1. Integration Techniques
2. Sequences and Series
3. Parametric and Polar Curves
4. Functions of Several Variables
5. Differential Equations
6. The Laplace Transform

COURSE LEARNING OBJECTIVES

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

1. Integrate functions using specialized methods.
2. Solve first- and second-order differential equations.
3. Compute and apply sequences and series summation.
4. Solve problems with parametric and polar curves.
5. Solve problems involving vector-valued functions.
6. Differentiate and analyze functions of several variables.
7. Integrate functions of several variables.
8. Create a presentation of a problem solution.
9. Use the ITT Tech Virtual Library to research calculus topics as assigned.

COURSE OUTLINE

MODULE 1: INTEGRATION TECHNIQUES

COURSE LEARNING OBJECTIVES COVERED

- Integrate functions using specialized methods.

TOPICS COVERED

- Integration by Parts
- Integrating Trigonometric Functions and Trigonometric Substitutions
- Integration with Partial Fractions
- Using the Table of Integrals
- Using Numerical Methods
- Integrating Using Trigonometric Functions and Trigonometric Substitutions

| MODULE LEARNING ACTIVITIES | GRADE D | OUT-OF- CLASS TIME |
|--|------------|--------------------------|
| Reading: <i>Calculus</i> , Chapter 8, pp. 442-487 | No | 5 hrs. |
| Lesson: Study lesson. | No | 1.5 hrs. |
| Exercise: Submit the exercise titled “Trigonometric Integrals.” | Yes | 1.5 hrs. |
| Lab: Complete the lab titled “Integration Techniques.” | Yes | N/A |
| Quiz: Prepare for Quiz 1. | No | 2 hrs. |

Total Out-Of-Class Activities: 10 Hours

MODULE 2: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORM

COURSE LEARNING OBJECTIVES COVERED

- Solve first- and second-order differential equations.
- Create a presentation of a problem solution.
- Use the ITT Tech Virtual Library to research calculus topics as assigned.

TOPICS COVERED

- General First-Order Differential Equations
- Applications of First-Order Linear Differential Equations
- Homogenous and Nonhomogenous Second-Order Linear Differential Equations
- Applications of Second-Order Linear Differential Equations
- Solving Homogenous and Nonhomogenous Second-Order Linear Differential Equations Using the Laplace Transform

| MODULE LEARNING ACTIVITIES | GRADE D | OUT-OF-CLASS TIME |
|--|---------|-------------------|
| Reading: <i>Calculus</i> , Chapter 8, pp. 502–508; Chapter 16, pp. 1050–1070; and Chapter 17, pp. 1087–1108 | No | 5 hrs. |
| Reading: “Laplace Transform” Handout | No | 1 hr. |
| Lesson: Study lesson. | No | 2 hrs. |
| Quiz: Attempt Quiz 1. | Yes | N/A |
| Exercise: Submit the exercise titled “Differential Equations and the Laplace Transform.” | Yes | 3 hrs. |
| Lab: Complete the lab titled “Differential Equations and the Laplace Transform.” | Yes | N/A |
| Quiz: Prepare for Quiz 2. | No | 2 hrs. |
| Project: Read and begin project. | No | 2 hrs. |

Total Out-Of-Class Activities: 15 Hours

MODULE 3: SEQUENCES AND SERIES

COURSE LEARNING OBJECTIVES COVERED

- Compute and apply sequences and series summation.

TOPICS COVERED

- The Notion of Sequences and Series
- Methods for Determining Infinite Series Convergence and Divergence
- Approximating Functions with Polynomials
- Taylor Series Representation of Functions

| MODULE LEARNING ACTIVITIES | GRADE D | OUT-OF- CLASS TIME |
|---|------------|--------------------------|
| Reading: <i>Calculus</i> , Chapter 9, pp. 515-565; and Chapter 10, pp. 578-617 | No | 8 hrs. |
| Lesson: Study lesson. | No | 2 hrs. |
| Quiz: Attempt Quiz 2. | Yes | N/A |
| Exercise: Submit the exercise titled "Sequences and Series." | Yes | 3 hrs. |
| Lab: Complete the lab titled "Sequences and Series." | Yes | N/A |
| Lab: Complete the lab titled "Power Series." | Yes | N/A |
| Quiz: Prepare for Quiz 3. | No | 2 hrs. |
| Project: Continue work on project. | No | 3 hrs. |

Total Out-Of-Class Activities: 18 Hours

MODULE 4: PARAMETRIC EQUATIONS AND POLAR COORDINATES

COURSE LEARNING OBJECTIVES COVERED

- Solve problems with parametric and polar curves.

TOPICS COVERED

- The Notion of Parametric Equations
- Parametric Equations in Cartesian Coordinates
- Converting Between Cartesian and Polar Coordinates
- Curves in Polar Coordinates
- Conic Sections
- Equations of Four Standard Parabolas
- Equations of Standard Ellipses
- Equations of Standard Hyperbolas

| MODULE LEARNING ACTIVITIES | GRADE D | OUT-OF- CLASS TIME |
|---|------------|--------------------------|
| Reading: <i>Calculus</i> , Chapter 11, pp. 623–662 | No | 7 hrs. |
| Lesson: Study lesson. | No | 3 hrs. |
| Quiz: Attempt Quiz 3. | Yes | N/A |
| Exercise: Submit the exercise titled “Parametric Equations, and Equations in Polar Coordinates.” | Yes | 3 hrs. |
| Lab: Complete the lab titled “Parametric Equations, and Equations in Polar Coordinates.” | Yes | N/A |
| Lab: Complete the lab titled “Conic Sections.” | Yes | N/A |
| Quiz: Prepare for Quiz 4. | No | 2 hrs. |
| Project: Continue work on project. | No | 3 hrs. |

Total Out-Of-Class Activities: 18 Hours

MODULE 5: VECTORS AND FUNCTIONS OF SEVERAL VARIABLES

COURSE LEARNING OBJECTIVES COVERED

- Solve problems involving vector-valued functions.
- Differentiate and analyze functions of several variables.
- Create a presentation of a problem solution.
- Use the ITT Tech Virtual Library to research calculus topics as assigned.

TOPICS COVERED

- Vectors in the Plane
- Vectors in Three Dimensions
- Applications of Vector Dot Products
- Applications of Vector Cross Products
- Equations of Planes
- Parallel and Orthogonal Planes
- Applications of Functions of Two Variables
- Applications of Partial Derivatives

| MODULE LEARNING ACTIVITIES | GRADE D | OUT-OF- CLASS TIME |
|---|------------|--------------------------|
| Reading: <i>Calculus</i> , Chapter 12, pp. 669–707; and Chapter 13, pp. 763–807 | No | 8 hrs. |
| Lesson: Study lesson. | No | 2 hrs. |
| Quiz: Attempt Quiz 4. | Yes | N/A |
| Exercise: Submit the exercise titled “Vectors.” | Yes | 3 hrs. |
| Lab: Complete the lab titled “Functions of Several Variables and Partial Derivatives.” | Yes | N/A |
| Project: Submit project. | Yes | 4 hrs. |

Total Out-Of-Class Activities: 17 Hours

MODULE 6: MULTIPLE INTEGRATION

COURSE LEARNING OBJECTIVES COVERED

- Integrate functions using specialized methods.
- Solve first- and second-order differential equations.
- Compute and apply sequences and series summation.
- Solve problems with parametric and polar curves.
- Solve problems involving vector-valued functions.
- Differentiate and analyze functions of several variables.
- Integrate functions of several variables.

TOPICS COVERED

- Double Integrals over Rectangular Regions
- Double Integrals over General Regions
- Double Integrals in Polar Coordinates
- Triple Integrals in Rectangular Coordinates

| MODULE LEARNING ACTIVITIES | GRADE D | OUT-OF- CLASS TIME |
|---|------------|--------------------------|
| Reading: <i>Calculus</i> , Chapter 14, pp. 865–906 | No | 5 hrs. |
| Lesson: Study lesson. | No | 2 hrs. |
| Lab: Complete the lab titled “Multiple Integration.” | Yes | N/A |
| Final Exam: Prepare for the final exam. | No | 5 hrs. |
| Final Exam: Take the final exam. | Yes | N/A |

Total Out-Of-Class Activities: 12 Hours

EVALUATION AND GRADING

EVALUATION CRITERIA

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

| Category | Weight |
|------------|--------|
| Exercise | 20% |
| Lab | 30% |
| Project | 15% |
| Quiz | 15% |
| Final Exam | 20% |
| 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, W., Cochran, L., Thomas, G. B., Weir, M. D., Hass, J., & Giordano, F. (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

NOTE: This is a carryover from the prerequisite course.

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
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 > Math World
A mathematics encyclopedia covering algebra, applied mathematics, calculus, discrete mathematics, geometry, history, number theory, probability, statistics, and more.
 - School of Study > General Education Information > Recommended Links > The Math Forum
This offers a review of math resources by topic.
 - School of Study > General Education Information > Research Guides > Tips for Math Success > Online Books > Schaum's Outline of Theory and Problems of Basic Mathematics with Applications to Science and Technology
This offers resources for applied technology problems.
 - Basic Search >
Exner, G. R. (1999). *Inside Calculus*. New York, NY: Springer.
- Other References
 - Khan Academy
<http://www.khanacademy.org/math/calculus>
This 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 hands-on labs. Your progress will be regularly assessed through a variety of assessment tools including exercises, quizzes, 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)