



University of
New Haven

Calculus III

Section I: Course Overview

Course Code: MATH245CDG

Subject Area(s): Mathematics

Prerequisites: None

Language of Instruction: English

Total Contact Hours: 60

Credits: 4

Course Fees: None.

Course Description

In this course you will cover material related principally to Calculus III dealing with functions of multivariable calculus. These mathematics are an important tool in science and engineering and an extensions of the concepts from Calculus I. The content of this course will thus focus on: curves and surfaces in Euclidean 3-space, length and curvature, area and volume; surfaces, partial derivatives, total differential, tangent planes to surfaces; gradient; vector-valued functions; path integral; Stokes' theorem, Green's Theorem, and Divergence Theorem.

In addition to the cognitive and knowledge skills listed above, students in this course will explore practical applications of math and science to the field of engineering.

Learning Objectives

Upon successful completion of this course, students are able to:

- Identify tangent and normal vectors and their geometric and physical interpretations.
- Compute partial derivatives, tangent planes, directional derivatives, gradients, three-dimensional integration, and integrals.
- Calculate vector fields, divergence, and curl.
- Evaluate basic mathematical and/or logical information numerically, graphically, and symbolically.

- Interpret mathematical and/or logical modes such as formulas, graphs, tables and schematics and draw inference from them.

Section II: Instructor & Course Details

Instructor Details

Name: Lecoq Raphael

Contact Information: rlecoq@ceacapa.com

Term: SUMMER 2026

Course Day and Time: Monday to Thursday, 15h – 17h15

Grading & Assessment

The instructor assesses students' mastery of course learning objectives by using the forms of assessment below. Each of these assessments is weighted toward the final grade. The Assessment Overview section provides further details for each.

Student Engagement 1	10%
Student Engagement 2	10%
Homework Presentation	20%
Summary sheets	10%
Midterm Examination	25%
Final Examination	25%

Assessment Overview

This section provides a brief description of each form of assessment listed above. Forms of assessment may be slightly modified in the term syllabus.

Student Engagement (20%): Students are expected to be engaged in class, and to have read the CEA CAPA Engagement Policy.

Homework Presentation (20%): Students will present their solutions to selected problems during the problem-solving classes. Student production may be evaluated individually or as part of group work, in which case, a collective grade may be attributed to the whole group. The two best contributions will be selected to account for the grade as long as the student (or its group) has presented three times throughout the semester.

Summary sheets (10%): Students will turn in a one-pager summing up important class content (formula, definition, theorem) at the end of each chapter. The goal will be for the student to review and assimilate the new concepts of the chapter and to create a useful resource for future studying (midterm and final exams).

Midterm Examination (25%): A comprehensive midterm examination will be administered in the middle of the term.

Final Examination (25%): A comprehensive final examination will be administered at the conclusion of the term.

Active Learning

Experiential learning is an essential component of education abroad, and participation in field studies is a required part of coursework. In this course, students explore the city in which they are studying using a variety of methods. This provides the opportunity to gain nuance and perspective on the host context and course content, as well as to collect information and resources for assigned papers, projects, and presentations.

- Guided Visit to *Arts et Métiers* Museum.

Readings and Resources

The below readings and resources are representative of what will be assigned as required in this course, but may vary slightly in the term syllabus.

All students are given access to the online library of the University of New Haven (UNH), accessible [here](#), and are expected to comply with [UNH Policies](#) regarding library usage.

Wherever possible, required readings are made accessible through the online library or Canvas. Students are responsible for obtaining all required readings.

Each course utilizes Canvas as its LMS. Students are expected to check Canvas regularly for updates and deadlines. Canvas is also the primary platform for contacting your instructor in case of questions or concerns about the course.

Required

Ron Larson, Bruce Edwards. *Calculus, Early Transcendental functions*, 8th edition, Cengage Learning, 2024

Course Calendar

Session X	DATE TBA
Required visit to the <i>Arts & Métiers</i> Museum	

Session 1	May 13 th 2026, 15:00 – 17:15
Topics	Introduction to course Review of Syllabus & Classroom Policies 10.1 & 10.2 & 10.3 Conics and Calculus Plane Curves and Parametric Equations Parametric Equations and Calculus
Activity	Lecture & Sample Problems
Readings & Assignments	Readings Read 2.4, 3.1-3.4, 5.1 – 5.3, 7.1, 7.4, 9.3 In class exercises 10.1 no. 15, 17, 25, 33, 37, 43 10.2 no. 13, 25, 53, 55 Recommended exercises from class 1 10.1 p. 696 no. 1-16, 19, 23, 29, 31, 41, 45, 51-58 10.2 p. 707 no. 3, 9, 15, 17, 23, 31, 45, 57-64, 69-72 Assignments Homework for May 20th

Session 2	May 18 th 2026, 15:00 – 17:15
Topics	10.3 & 10.4 & 10.5 & 10.6 Parametric Equations and Calculus Polar Coordinates and Polar Graphs Area and Arc Length in Polar Coordinates Polar Equations of Conics and Kepler's Laws
Activity	Lecture & Sample Problems
Readings & Assignments	Readings Read 1.3, 5.2, 7.4, 10.3 – 10.5 In class exercises 10.3 no. 5, 13, 19, 29, 35, 43, 51 10.4 no. 7, 17, 31, 37, 63, 69, 77 10.5 no. 9, 21, 27, 37, 55, 65 Recommended exercises from class 2 10.3 p. 715 no. 7, 9, 15, 27, 31, 41, 45, 65, 69 10.4 p.726 no. 3, 15, 25, 29, 33, 35, 39, 41, 43-52, 59, 65, 75, 79, 83, 85 10.5 p. 735 no. 1-4, 7, 15, 25, 45, 53

Session 3		May 19 th 2026, 15:00 – 17:15
Topics	10.6 & 11.1 & 11.2 Equations of Conics and Kepler's Laws Vectors in the Plane Space Coordinates and Vectors in Space	
Activity	Lecture & Sample Problems	
Readings & Assignments	Readings Read 1.3, 7.4, 7.6, 10.6, 11.1, 11.2 In class exercises 10.6 no. 15, 31 11.1 no. 5, 11, 21, 27, 35, 47, 49 11.2 no. 9, 25, 33, 39, 51, 63, 67, 79 Recommended exercises from class 3 10.6 10.6 p. 743 no. 1-4, 7-12, 13, 17, 33, 35, 37, 39, 41, 43 11.1 p. 759 no. 3, 7, 17, 19, 21-26, 33, 37, 39, 43, 45, 55, 69 11.2 p. 767 no. 3, 5, 13, 17, 19, 27, 35, 41, 47, 61, 69, 73	

Session 4		May 20 th 2026, 15:00 – 17:15
Topics	Problem Solving	
Activity	Collective problem-solving & Presenting solutions to the given set of exercises	
Readings & Assignments	Readings Homework from May 13 th Assignments Homework for May 26 th	

Session 5		May 21 st 2026, 15:00 – 17:15
Topics	11.3 & 11.4 & 11.5 The Dot Product of Two Vectors The Cross Product of Two Vectors in Space Lines and Planes in Space	
Activity	Lecture & Sample Problems	
Readings & Assignments	Readings Read 7.5, 7.6, 11.3 – 11.5 In class exercises 11.3 no. 3-10, 13, 19, 31, 37 11.4 no. 9, 17, 25, 33, 37 11.5 no 9, 15, 39, 47, 65, 79, 87, 91, 95 Recommended exercises from class 5 11.3 p. 777 no. 11, 18, 20, 25, 30, 35, 44, 51, 57 11.4 p. 785 no. 3, 13, 41, 42, 47-50 11.5 p. 794 no. 1, 5, 11, 25, 43, 51, 55, 77, 89	

Session 6		May 25 th 2026, 15:00 – 17:15
Topics	11.6 & 11.7 Surfaces in Space Cylindrical and Spherical Coordinates	
Activity	Lecture & Sample Problems	
Readings & Assignments	Readings Read 7.2, 7.3, 11.6 – 11.7 In class exercises 11.6 no. 11, 17, 31, 37 11.7 no. 5, 9, 19, 25, 45, 55 Recommended exercises from class 6 11.6 p. 806 no. 1-6, 13, 18, 19, 21, 39, 43 11.7 p. 813 no. 3, 7, 13, 21, 23, 29, 41, 49, 51, 57-62, 65, 71-76, 87, 93, 95, 103	

Session 7		May 26 th 2026, 15:00 – 17:15
Topics	Problem Solving	
Activity	Collective problem-solving & Presenting solutions to the given set of exercises	
Readings & Assignments	Readings Homework from May 20 th Assignments Homework for June 1 st	

Session 8		May 27 th 2026
Topics	12.1 & 12.2 & 12.3 Vector-Valued Functions Differentiation and Integration of Vector-Valued Functions Velocity and Acceleration	
Activity	Lecture & Sample Problems	
Readings & Assignments	Readings Read 1.3, 3.1, 3.2, 5.1, 5.4, 11.1, 12.1 – 12.3 In class exercises 12.1 no. 3, 11, 25, 31, 51, 67 12.2 no. 5, 23, 27, 35, 41, 47, 53 Recommended exercises from class 8 12.1 p. 825 no. 10, 13, 19-22, 23, 37, 57, 71 12.2 p. 834 no. 3, 7, 13, 25, 31, 49, 55, 61	

Session 9		May 28 th 2026, 15:00 – 17:15
Topics	12.3 & 12.4 & 12.5 Tangent Vectors and Normal Vectors Arc Length and Curvature	
Activity	Lecture & Sample Problems	
Readings & Assignments	Readings Read 3.1, 7.4, 10.5, 11.1, 12.4, 12.5 In class exercises 12.3 no. 3, 17, 23 12.4 no. 5, 9, 27, 35 12.5 no. 13, 33, 43 Recommended exercises from class 9 12.3 p. 842 no. 27, 39 12.4 p. 852 no. 7, 13, 21, 33, 49 12.5 p. 864 no. 3, 7, 17, 37	

Session 10		June 1 st 2026, 15:00 – 17:15
Topics	Problem Solving	
Activity	Collective problem-solving & Presenting solutions to the given set of exercises	
Readings & Assignments	Readings Homework from May 26 th Assignments Homework for June 10 th	

Session 11		June 2 nd 2026
Review for Midterm Exam		

Session 12		June 3 rd 2026
MIDTERM EXAM		

Session 13		June 4 th 2026, 15:00 – 17:15
Topics	13.1 & 13.2 & 13.3 Introduction to Functions of Several Variables Limits and Continuity Partial Derivatives	
Activity	Lecture & Sample Problems	

Readings & Assignments	Readings Read 2.1 – 2.4, 3.2, 13.1 – 13.3 In class exercises 13.1 no. 9, 23, 37, 51, 71, 81 13.2 no. 5, 15, 27, 61 13.3 no. 11-40, 41, 45, 53, 57, 79, 93 Recommended exercises from class 13 13.1 p. 880 no. 7, 25, 29, 33, 47-50, 51, 53 13.2 p. 891 no. 5-8, 9, 13, 23, 25, 27, 29, 31, 33, 43, 45, 47, 55, 68-72 13.3 p. 900 no. 47, 67, 97
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Session 14	June 8 th 2026, 15:00 – 17:15
Topics	13.4 & 13.5 & 13.6 Differentials Chain Rules for Functions of Several Variables Directional Derivatives and Gradients
Activity	Lecture & Sample Problems
Readings & Assignments	Readings Read 3.1 – 3.4, 4.1 – 4.4, 13.4 – 13.6 In class exercises 13.4 no. 3, 11, 39 13.5 no. 3, 9, 15, 19, 23, 31 13.6 no. 3, 7, 17, 25, 31, 41, 57, 59 Recommended exercises from class 14 13.4 p. 909 no. 7, 9, 21, 38, 41 13.5 p. 917 no. 7, 13, 17, 21, 29 13.6 p. 928 no. 1, 5, 13, 21, 27, 50

Session 15	June 9 th 2026, 15:00 – 17:15
Topics	13.7 & 13.8 & 13.9 & 13.10 Tangent Planes and Normal Lines Extrema of Functions of Two Variables Applications of Extrema of Functions of Two Variables Lagrange Multipliers
Activity	Lecture & Sample Problems
Readings & Assignments	Readings Read 4.3, 4.7, 11.6, 12.4, 13.7 – 13.9 In class exercises 13.7 no. 5, 9, 21, 29, 35 13.8 no. 7, 9, 39

	13.9 no. 3, 9, 21 13.10 no. 5, 11, 17, 19, 49 Recommended exercises from class 15 13.7 p. 937 no. 17, 23, 31, 37, 49 13.8 p. 946 no. 5, 15, 27, 47, 53, 55-58 13.9 p. 953 no. 5, 13, 18 13.10 p. 962 no. 7, 15, 21, 33
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Session 16		June 10 th 2026, 15:00 – 17:15
Topics	Problem Solving	
Activity	Collective problem-solving & Presenting solutions to the given set of exercises	
Readings & Assignments	Readings Homework from June 1 st	
	Assignments Homework for June 16 th	

Session 17		June 11 th 2026, 15:00 – 17:15
Topics	14.1 & 14.2 14.3 & 14.4 Iterated Integrals and Area in the Plane Double Integrals and Volume Change of Variables: Polar Coordinates Center of Mass and Moments of Inertia	
Activity	Lecture & Sample Problems	
Readings & Assignments	Readings Read 4.7, 5.2, 7.2, 7.3, 13.10, 14.1, 14.2	
	In class exercises 14.1 no. 3, 15, 33, 37, 53 14.2 no. 3, 13, 23, 35, 51 14.3 no. 5, 9, 17, 33 14.4 no. 3, 13, 35 Recommended exercises from class 17 14.1 p. 976 no. 9, 11, 19, 25, 41, 45 14.2 p. 987 no. 9, 15, 19, 21, 25, 37 14.3 p. 995 no. 5-8, 11, 29, 39, 45, 49 14.4 p. 1004 no. 1-10, 14-16, 25, 29, 31, 33, 43, 45	

Session 18		June 15 th 2026, 15:00 – 17:15
Topics	14.5 & 14.6 & 14.7 & 14.8 Surface Area Triple Integrals and Applications	

	Triple Integrals in Other Coordinates Change of Variables: Jacobians
Activity	Lecture & Sample Problems
Readings & Assignments	Readings Read 7.2 – 7.3, 8.1, 10.3, 10.4, 11.5, 14.5 – 14.8 In class exercises 14.5 no. 5, 17 14.6 no. 3, 19, 25, 37 14.7 no. 15, 21, 29, 31, 37 14.8 no. 3, 11, 17 Recommended exercises from class 18 14.5 p. 1011 no. 1, 7, 11, 13, 15, 25, 27 14.6 p. 1021 no. 1, 5, 13, 17, 21, 33, 59, 63 14.7 p. 1029 no. 5, 11, 17, 39 14.8 p. 1036 no. 5, 7, 19, 23, 35

Session 19	June 16 th 2026, 15:00 – 17:15
Topics	Problem Solving
Activity	Collective problem-solving & Presenting solutions to the given set of exercises
Readings & Assignments	Readings Homework from June 10th Assignments Homework for June 20th

Session 20	June 17 th 2026, 15:00 – 17:15
Topics	15.1. & 15.2 & 15.3 & 15.4 Vector Fields Line Integrals Conservative Vector Fields and Independence of Path Green's Theorem
Activity	Lecture & Sample Problems
Readings & Assignments	Readings Read 12.1, 13.1, 15.1 – 15.3 In class exercises 15.1 no. 11, 21, 33, 37, 51, 57, 61 15.2 no. 3, 9, 15, 19, 23, 29, 39, 37, 59 15.3 no. 3, 11, 19, 23 Recommended exercises from class 21 15.1 p. 1053 no. 1-4, 7, 17, 25, 29, 39, 43, 51, 57, 69, 73, 75 15.2 p. 1065 no. 1, 2, 7, 23, 27, 35, 45, 59, 63 15.3 p. 1076 no. 1, 5, 11, 15, 29

Session 21		June 18 th 2026, 15:00 – 17:15
Topics	15.4 & 15.5 & 15.6 & 15.7 & 15.8 Green's Theorem Parametric Surfaces Surface Integrals Divergence Theorem Stokes Theorem	
Activity	Lecture & Sample Problems	
Readings & Assignments	Readings Read 10.2, 12.4, 13.7, 15.5 – 15.8 In class exercises 15.4 no. 7, 11, 15, 25 15.5 no. 9, 23, 33, 35, 39 15.6 no. 5, 13, 15, 25 15.7 no. 3, 9 15.8 no. 3, 7, 17 Recommended exercises from class 21 15.4 p. 1085 no. 1, 19, 21 15.5 p. 1095 no. 1-8, 21, 31 15.6 p. 1108 no. 1, 11, 17, 21, 23, 29 15.7 p. 1116 no. 1, 7, 17, 23 15.8 p. 1123 no. 1, 5, 9, 15, 19	

Session 22		June 22 nd 2026, 15:00 – 16:00
Topics	Problem Solving & Review for Final	
Activity	Collective problem-solving & Presenting solutions to the given set of exercises	
Readings & Assignments	Readings : Homework from 16 th June	

Session 23		June 23 rd 2026, 15:00 – 17:15
FINAL EXAM		

Section III: Academic Policies and Standards

Academic Policies

Students are expected to review and understand all CEA CAPA student policies, including our [Academic Policies](#) and [Engagement Policy](#). CEA CAPA reserves the right to change, update, revise, or amend existing policies and/or procedures at any time. Additional requirements that may be associated with a specific course or program are addressed in the term syllabus.

Student Learning & Development Objectives

CEA CAPA has identified [Student Learning and Development Objectives \(SLDOs\)](#) for all programs in all locations: content in context, navigating differences, power and equity, critical thinking and intellectual curiosity, career and professional development, and sustainability and migration. These are meta-level learning objectives that transcend coursework and are infused across all elements of program delivery, beyond specifics of course offerings, addressing student learning holistically and framing it a larger learning context.