Calculus III

SECTION I: Course Overview

Course Code: MATH245CDG
Subject Areas: Mathematics
Prerequisites: See Below
Language of Instruction: English
Contact Hours: 60
Recommended Credits: 4

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, you will be 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.

PREREQUISITES

Prior to enrollment, this course requires you to have completed Calculus I or Calculus II.

SECTION II: Instructor & Course Details

INSTRUCTOR DETAILS

Name:	TBA
Contact Information:	TBA
Term:	SUMMER

INSTRUCTIONAL FORMAT & ATTENDANCE POLICY

This course will meet four times per week for 125 minutes per session. This course is comprised of 24 total class sessions. All students are expected to arrive on time and prepared for the day's class session.

CEA enforces a mandatory attendance policy. You are therefore expected to attend all regularly scheduled class sessions, including any field trips, site visits, guest lectures, etc. that are assigned by the instructor. The table below shows the number of class sessions you may miss before receiving a grade penalty.

ALLOWED ABSENCES – SUMMER		
Courses Meeting X day(s) Per Week	**Allowed Absence(s)**	**Automatic Failing Grade at Xth Absence**
Courses meeting **4** day(s) per week	**1** Absence	**4th** Absence

For every additional absence beyond the allowed number, your final course grade will drop down to the subsequent letter grade (ex: A+ to A). As a student, you should understand that the grade penalties will apply if you are marked absent due to tardiness or leaving class early. In the table below, you will find the grade penalty associated with each excessive absence up to and including automatic course failure.

ATTENDANCE DOCKING PENALTIES				
Absence	**1st**	**2nd**	**3rd**	**4th**
Penalty	**No Penalty**	**0.5 Grade Docked**	**1 Grade Docked**	**Automatic Failure**
HIGHEST POSSIBLE GRADE AFTER ATTENDANCE PENALTIES				
Grade	**A+**	**A**	**A-**	**F**

CEA does not distinguish between excused and unexcused absences. As such, no documentation is required for missing class. Similarly, excessive absences, and the grade penalty associated with each, will not be excused even if you are able to provide documentation that shows the absence was beyond your control. You should therefore only miss class when truly needed as illness or other unavoidable factors may force you to miss a class session later on in the term.

GRADING & ASSESSMENT

The instructor will assess your progress towards the above-listed learning objectives by using the forms of assessment below. Each of these assessments is weighted and will count towards your final grade. The following section (Assessment Overview) will provide further details for each.

Class Participation	**10%**
Homework	**20%**
Quizzes (5)	**50%**

The instructor reserves the right to make changes or modifications to this syllabus as needed

Final Examination   20%

The instructor will calculate your course grades using the CEA Grading Scale shown below. As a CEA student, you should understand that credit transfer decisions–including earned grades for courses taken abroad–are ultimately made by your home institution

CEA GRADING SCALE			
Letter Grade	Numerical Grade	Percentage Range	Quality Points
A+	9.70 – 10.0	97.0 – 100%	4.00
A	9.40 – 9.69	94.0 – 96.9%	4.00
A-	9.00 – 9.39	90.0 – 93.9%	3.70
B+	8.70 – 8.99	87.0 – 89.9%	3.30
B	8.40 – 8.69	84.0 – 86.9%	3.00
B-	8.00 – 8.39	80.0 – 83.9%	2.70
C+	7.70 – 7.99	77.0 – 79.9%	2.30
C	7.40 – 7.69	74.0 – 76.9%	2.00
C-	7.00 – 7.39	70.0 – 73.9%	1.70
D	6.00 – 6.99	60.0 – 69.9%	1.00
F	0.00 – 5.99	0.00 – 59.9%	0.00
W	Withdrawal	N/A	0.00
INC	Incomplete	N/A	0.00

ASSESSMENT OVERVIEW

This section provides a brief description of each form of assessment listed above. Your course instructor will provide further details and instructions during class time.

Class Participation (10%): Student participation is mandatory for all courses taken at a CEA Study Center. The instructor will use the rubric below when determining your participation grade. All students should understand that attendance and punctuality are expected and will not count positively toward the participation grade.

CLASS PARTICIPATION GRADING RUBRIC	
Student Participation Level	Grade
You make major & original contributions that spark discussion, offering critical comments clearly based on readings, research, & theoretical course topics.	**A+** (10.0 – 9.70)
You make significant contributions that demonstrate insight as well as knowledge of required readings & independent research.	**A/A-** (9.69 – 9.00)
You participate voluntarily and make useful contributions that are usually based upon some reflection and familiarity with required readings.	**B+/B** (8.99 – 8.40)
You make voluntary but infrequent comments that generally reiterate the basic points of the required readings.	**B-/C+** (8.39 – 7.70)
	C/C-

You make limited comments only when prompted and do not initiate debate or show a clear awareness of the importance of the readings.	(7.69 – 7.00)
You very rarely make comments and resist engagement with the subject. You are not prepared for class and/or discussion of course readings.	**D** (6.99 – 6.00)
You make irrelevant and tangential comments disruptive to class discussion. You are consistently unprepared for class and/or discussion of the course readings.	**F** (5.99 – 0.00)

Homework (20%): Homework is assigned at every class to be handed in at the beginning of the following class. You must show all of your work.

Quizzes (50%): Students will take a quiz approximately 5 times in the term.

Final Examination (20%): A comprehensive final examination will be administered at the conclusion of the term.

REQUIRED READINGS

Listed below are the required course textbooks and additional readings. Whether you buy your books from our locally affiliated merchants or whether you acquire these before arrival, you must have constant access to these resources for reading, highlighting and marginal note-taking. It is required that you have unrestricted access to each. Additional copies will be placed on reserve in the Academic Affairs office for short-term loans. Access to additional sources required for certain class sessions will be provided in paper or electronic format consistent with applicable copyright legislation.

I. **REQUIRED TEXT(S):** You may purchase the required text(s) prior to departure or upon program arrival. The required text(s) are listed below:

J. Bradley, M. Strauss, and K. Smith. *Calculus*. 6th edition. Kendall Hunt. 2013. 1275p.

ADDITIONAL RESOURCES

In order to ensure your success abroad, CEA has provided the academic resources listed below. In addition to these resources, each CEA Study Center provides students with a physical library and study areas for group work. The Academic Affairs Office at each CEA Study Center also compiles a bank of detailed information regarding libraries, documentation centers, research institutes, and archival materials located in the host city.

- **UNH Online Library**: As a CEA student, you will be given access to the online library of CEA's School of Record, the University of New Haven (UNH). You can use this online library to access databases and additional resources while performing research abroad. You may access the UNH online library here or through your MyCEA Account. You must comply with UNH Policies regarding library usage.

- **CEAClassroom – Moodle**: CEA instructors use Moodle, an interactive virtual learning environment. This web-based platform provides you with constant and direct access to the course syllabus, daily schedule of class lectures and assignments, non-textbook required readings, and additional resources. Moodle includes the normal array of forums, up-loadable and downloadable databases, wikis, and related academic support designed for helping you achieve the learning objectives listed in this syllabus.

  During the first week of class, CEA academic staff and/or faculty will help you navigate through the many functions and resources Moodle provides. While you may print a hard copy version of the syllabus, you should always check Moodle for the most up-to-date information regarding this course. The instructor will use Moodle to make announcements and updates to the course and/or syllabus. It is your responsibility to ensure that you have access to all Moodle materials and that you

monitor Moodle on a daily basis in case there are any changes made to course assignments or scheduling.

To access Moodle: Please log-in to your MyCEA account using your normal username and password. Click on the "While You're Abroad Tab" and make sure you are under the "Academics" sub-menu. There you will see a link above your schedule that says "View Online Courses" select this link to be taken to your Moodle environment.

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<table>
<tr><td colspan="4">COURSE CALENDAR
Calculus III</td></tr>
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SESSION	TOPIC	ACTIVITY	STUDENT ASSIGNMENTS
1	Introduction to course Review of syllabus & Classroom Policies **9.1 & 9.2** Points and vectors in R^2 and R^3	Lecture In-class problem solving from among: p. 684 no. 26, 28, 37, 48, 52 p. 694 no. 13, 32, 51	Homework 1 p. 684 no. 9, 13, 14, 18, 23, 29, 36, 41, 50, 60 p. 694 no. 11, 15, 40, 47, 57
2	**9.3 & 9.4** The scalar product and the vector product	Lecture In-class problem solving from among: p. 703 no. 4, 5, 13, 24, 31, 48 p. 714 no. 3, 12, 16, 28	Homework 2 p. 703 no. 19, 26, 34, 46, 47 p. 714 no. 7, 17, 19, 23, 30, 45, 46
3	**9.5 & 9.6** Lines and planes in R^3	Lecture In-class problem solving from among: p. 724 no. 5, 7, 13, 17, 28, 31, 36 p. 733 no. 4, 8, 14, 24, 27, 44, 54	Homework 3 p. 724 no. 4, 7, 11, 18, 21, 29, 32, 41, 50 p. 733 no. 9, 17, 23, 34, 42, 43, 55
4	**10.1 & 10.2** Vector functions Their differentiation and integration	**Quiz no. 1 on chapter 9** Lecture In-class problem solving from among: p. 758 no. 10, 16, 20, 25, 26, 38, 44, 46 p. 769 no. 5, 12, 24, 30, 39, 51	Homework 4 p. 758 no. 7, 8, 11, 17, 28, 42, 45, 55, 56 p. 769 no. 4, 8, 13, 19, 21, 29, 38, 49, 56
5	**10.3** Modeling ballistics and Planetary motion	Lecture In-class problem solving from among: p. 779 no. 1, 16, 28, 41	Homework 5 p. 779 no. 19 to24, 29, 38, 52
6	**10.4** Unit tangent and unit normal vectors Curvature	Lecture In-class problem solving from among: p. 794 no. 3, 9, 19, 31, 52	Homework 6 p. 794 no. 7, 13, 21, 37, 46, 48, 53
7	**10.5** Tangential and normal components of acceleration	Lecture In-class problem solving from among: p. 801 no. 9, 14, 20, 27, 40	Homework 7 p. 801 no. 7, 13, 25, 30, 41, 47

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8	**11.1 & 11.2** Functions of several variables; limits and continuity	**Quiz no. 2 on chapter 10** Lecture In-class problem solving from among: p. 826 no. 3a, 4a, 7, 9, 11, 18, 20, 54 p. 836 no. 4, 6, 19, 20, 28, 34, 49, 54	Homework 8 p. 826 no. 8, 19, 33, 49, 53, 59 p. 836 no. 15, 17, 29, 40, 48, 53
9	**11.3** Partial derivatives	Lecture In-class problem solving from among: p. 846 no. 4, 5, 12, 22, 34, 36, 42, 46, 50	Homework 9 p. 846 no. 3, 6, 7, 8, 9, 14, 21, 22, 27, 37, 43, 49, 59
10	**11.4 & 11.5** Tangent planes; the chain rules	Lecture In-class problem solving from among: p. 857 no. 4, 6, 20, 28, 32, 46 p. 866 no. 4, 8, 12, 16, 22, 28, 44, 52	Homework 10 p. 857 no. 19, 25, 39, 40, 42,47, 53 p. 866 no. 11, 13, 25, 29, 30, 38, 39, 43, 53, 56
11	**11.6** Directional derivatives and the gradient	Lecture In-class problem solving from among: p. 881 no. 2, 12, 16, 18, 32, 44	Homework 11 p. 881 no. 7, 10, 19, 43, 45, 52, 53
12	**11.7** Extrema of functions of two variables	Lecture In-class problem solving from among: p. 893 no. 4, 10, 14, 42	Homework 12 p. 893 no. 5, 6, 9, 13, 36, 39, 41
13	**11.8** Lagrange multipliers	Lecture In-class problem solving from among: p. 904 no. 1, 12	Homework 13 p. 904 no. 14, 15, 27, 29, 35, 43, 57
14	**12.1 & 12.2** Double integrals	**Quiz no. 3 on chapter 11** Lecture In-class problem solving from among: p. 928 no. 4, 12, 28 p. 938 no. 3, 6, 9, 21, 31, 50	Homework 14 p. 928 no. 11, 21, 24, 32, 37, 45 p. 938 no. 5, 7, 10, 22, 27, 31, 32, 36 47, 55
15	**12.3** Double integrals in polar coordinates	Lecture In-class problem solving from among p. 948 no. 3, 8, 11, 17, 31, 51	Homework 15 p. 948 no. 5, 6, 18, 19, 35, 40, 49
16	**12.4 & 12.5** Surface area as double integrals; triple integrals	Lecture In-class problem solving from among:	Homework 16 p. 958 no. 5, 13, 26, 33, 35, 55

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		p. 958 no. 6, 10, 23, 28 p. 970 no. 12, 20, 32, 40, 46	p. 970 no. 9, 17, 21, 25, 37, 40, 47
17	**12.6** Mass, moments, probability density functions	Lecture In-class problem solving from among: p. 982 no. 6, 12, 18, 26, 38	Homework 17 p. 982 no. 9, 19, 25, 27, 37, 45
18	**12.7 & 12.8** Cylindrical and spherical coordinates; change of variables	Lecture In-class problem solving from among: p. 995 no. 3, 6, 7, 10, 12, 29, 30, 39, 49 p. 1005 no. 6, 12, 30, 44	Homework 18 p. 995 no. 33, 40, 41, 43, 50 p. 1005 no. 7, 8, 12, 19, 29, 37, 45
19	**13.1 & 13.2** Vector fields, divergence, and curl Line integrals	**Quiz no. 4 on chapter 12** Lecture In-class problem solving from among: p. 1026 no. 4, 23, 28	Homework 19 p. 1026 no. 3, 6, 9, 24, 25, 29, 32, 41, 42, 43
20	**13.2 & 13.3** Line integrals and independence of path	Lecture In-class problem solving from among: p. 1036 no. 4, 5, 11, 22	Homework 20 p. 1036 no. 7, 16, 19, 25, 27, 47
21	**13.3, 13.4, & 13.5** Independence of path; Green's theorem Surface integrals	Lecture In-class problem solving from among: p. 1036 no. 46, 50, 53 p. 1060 no. 2, 12, 37, 40 p. 1072 no. 4, 10, 26	Homework 21 p. 1036 no. 51, 55, 59, p. 1060 no. 3, 6, 17, 31, 42, 51 p. 1072 no. 3, 11, 17, 27, 31, 37, 45, 51
22	**13.5, 13.6, & 13.7** Surface integrals, Stokes' theorem, and the divergence theorem	Lecture In-class problem solving from among p. 1081 no. 4, 14, 36, 42 p. 1093 no. 6, 12, 28, 48	Homework 22 p. 1081 no. 7, 9, 17, 29, 35, 55 p. 1093 no. 7, 11 to 16, 25, 43, 48
23	**Quiz no. 5 on chapter 13** General review & questions for final exam		
24	**FINAL EXAM**		

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SECTION III: CEA Academic Policies

The policies listed in this section outline general expectations for CEA students. You should carefully review these policies to ensure success in your courses and during your time abroad. Furthermore, as a participant in the CEA program, you are expected to review and understand all CEA Student Policies, including the academic policies outlined on our website. CEA reserves the right to change, update, revise, or amend existing policies and/or procedures at any time. For the most up to date policies, please review the policies on our website.

     Class & Instructor Policies can be found here
     General Academic Policies can be found here