MAT-160: Calculus III

Spring 2019

> The general laws of nature are to be expressed by equations which hold good for all systems of coordinates, that are covariant with respect to any substitution whatever.
>
> *Albert Einstein*

Professor:	Thomas R. Cameron	**Time:**	M W F 8:30 – 9:20 pm
Email:	thcameron@davidson.edu	**Place:**	CHAM 3068

Course Page: https://www.thomasrcameron.com/courses/MAT-160/mat_160.html
Office Hours: M W F 2:30 – 4:00 pm, Th 10:30 am – 12:00 pm, and by appointment in CHAM 3044.

Textbook: H. Anton, I. Bivens, and S. Davis, Calculus, Early Transcendentals (11e), John Wiley and Sons, 2015.
Prerequisite: Mathematics 113.

Course Description: A study of the differential and integral calculus of functions of several variables together with an introduction to vector calculus. Topics include partial derivatives, directional derivatives, gradients, tangent planes to surfaces, double and triple integrals, change of variables in multiple integrals, vector fields, line integrals, Green's Theorem, and surface integrals.

Learning Outcomes: Students will be able to

- Vector Space
  - Work with different coordinate systems in two and three dimensions (cartesian, polar, cylindrical, and spherical).
  - Use parametric equations to model the motion of a particle in two and three dimensions.
  - Describe lines, planes, and quadric surfaces in three dimensions.
- Vector-Valued Functions
  - Do calculus (integrals and derivatives) on univariate vector-valued functions.
  - Define tangent, normal, and binormal vectors.
  - Define arc length and curvature.
- Partial Derivatives
  - Define the limit and continuity of multivariable functions.
  - Define differentiability and compute partial derivatives, directional derivatives, and gradients.
  - Explain derivatives rules such as the chain rule.
  - Use derivatives to compute maxima and minima.
- Multiple Integrals
  - Explain with examples how to compute double and triple integrals.

  - Compute integrals over non rectangular regions.
  - Use the Jacobian to apply change of variables in multiple integrals.

- Multivariable Fundamental Theorem of Calculus
  - Explain with examples the independence of path and the fundamental theorem of calculus for line integrals.
  - Explain with examples Green's theorem, the Divergence theorem, and Stokes' theorem.
  - Appreciate that all previously mentioned theorems are a special case the fundamental theorem of calculus for multivariable functions.

Grading Policy:
Your final grade is broken up as follows.

Category	Percentage
Daily Handouts	15%
Projects (5% each)	15%
Reviews (10% each)	30%
Homework	20%
Final Review	20%

Your final letter grade is based on the following scale.

Grade	Percentage Interval	Grade	Percentage Interval
A	$[93, 100]$	C+	$[76, 80)$
A-	$[90, 93)$	C	$[73, 76)$
B+	$[86, 90)$	C-	$[70, 73)$
B	$[83, 86)$	D+	$[66, 70)$
B-	$[80, 83)$	D	$[63, 66)$
		F	$[0, 63)$

Daily Handouts: During each class period, you will be given an opportunity to interact with the material in a way that is above and beyond the daily reading. This may be in the form of handouts, group exercises, pop quizzes, or discussions. These assignments will be graded based on attendance, participation, and your preparation for class (did you do the reading).

Projects: There will be three short projects throughout the semester. For each project, you will be expected to redo three different homework problems where your score was less than 100 percent. Your redo should include

an explanation of what you previously did wrong, and a complete and accurate solution of the problem. Finally, you will do three "Focus on Concepts" problems from the book that were not previously assigned, and provide a complete and accurate solution of those problems. These assignments will be graded based on the accuracy, clarity, and neatness of your writing.

Reviews: There will be three short reviews throughout the semester. These reviews will be taken in class and the dates can be found on the class calendar (see the course website). Each will review will test you on definitions, analysis of concepts, computation, and applications of topics from the course. These assignments will be graded based on accuracy.

Homework: Homework assignments are due bi-weekly. Each assignment will have many problems and is intended to give you the practice time necessary to master the material. These assignments will be graded based on accuracy.

Final Review: There will be a take home final review. You will be given from 5/9/2019 to 5/15/2019 to finish this review. All topics from the course may show up on the final review; however, there will be an emphasis on topics from Chapter 15 of the book. This assignment is graded based on accuracy.

Academic Honesty: Students are expected to complete all graded work in accordance with the Davidson College Honor Code, as it applies to each assignment in this class.

Special Accommodations: The college welcomes requests for accommodations related to disability and will grant those that are determined to be reasonable and maintain the integrity of a program or curriculum. To make such a request or to begin a conversation about a possible request, please contact the Office of Academic Access and Disability Resources, which is located in the Center for Teaching and Learning in the E.H. Little Library: Beth Bleil, Director, bebleil@davidson.edu, 704-894-2129; or Alysen Beaty, Assistant Director, albeaty@davidson.edu, 704-894-2939. It is best to submit accommodation requests within the drop/add period; however, requests can be made at any time in the semester. Please keep in mind that accommodations are not retroactive.

Disclaimer: I reserve the right to diverge from this syllabus in the best interest of the course. Any changes made will be announced in advance.