

## MATH 20C: FUNDAMENTALS OF CALCULUS II

JOHN VOIGHT

### COURSE INFO

- **Lectures:** Monday, Wednesday, Friday, 12:20 p.m.–1:10 p.m.
- **Room:** Perkins 107
- **Instructor:** John Voight
- **Office:** 16 Colchester Ave, Room 207C
- **E-mail:** [jvoight@gmail.com](mailto:jvoight@gmail.com)
- **Instructor's Office Hours:** Mondays, 11:00 a.m.–12:00 noon and 2:30 p.m.–3:30 p.m.; Wednesdays, 11:00 a.m.–12:00 noon; or please make an appointment!
- **Course Web Page:** <http://www.cems.uvm.edu/~voight/295/>
- **Instructor's Web Page:** <http://www.cems.uvm.edu/~voight/>
  
- **Prerequisites:** Math 19 or permission.
- **Required Text:** Stefan Waner and Steven Costenoble, *Applied Calculus*, 4th edition.
- **Grading:** Weekly homework will count for 10% of the grade, weekly quizzes will count for 20%, three exams will count for 45%, and a comprehensive final exam will count for 25%.
- **Final exam:** Thursday, 18 December 2008, 3:30–6:30 p.m.

I am happy to provide appropriate and fair accommodations for students with documented special needs; early in the semester, please contact the ACCESS office (<http://www.uvm.edu/~access/>) directly. Students have the right to practice the religion of their choice. Each semester students should submit in writing by the end of the second full week of classes their documented religious holiday schedule for the semester.

### SYNOPSIS

Fundamentals of Calculus II is the second course in a two course sequence. The underlying applications of integral calculus will be investigated along with some methods for doing multivariable calculus (chapters 6–9 and P). The topics will include, but not be limited to, basic integration,  $u$ -substitution, integration by parts, improper integrals, probability, differential equations, and multivariable functions with multivariable calculus. This understanding will be discovered and shown via mathematical modeling of real world situations. An emphasis will be made to understand these new concepts graphically, numerically, verbally, and algebraically.

### CALCULATORS

The homework will often involve some fairly intense computations and mathematical modeling, and it is required that students purchase or obtain an appropriate calculator. A TI-83/84 Graphing calculator is highly recommended. Students will be allowed to use a calculator on all assignments, quizzes, and tests, but please be aware that the instructor will ask for all work to be shown in order to receive credit. However, if you do not buy this model, please get your calculator approved by the instructor by the end of the second week of class: you will not be allowed to use anything that “does calculus” on quizzes or exams, e.g. calculate derivatives—and the interpretation of this will be left to the discretion of the instructor. In any case, for the exams, be aware that a very fancy calculator will be almost no help to you and that a calculator with basic arithmetic and trigonometric functions will more than suffice.

## HOMWORK

Homework is due on Wednesdays. The homework will only be graded “for completeness”—I will rarely grade individual problems. It is *extremely* important that you attempt all of the problems listed and seek help for those which you are unable to finish: the only way to learn mathematics is to practice, make mistakes, and correct them! Cooperation on homework is permitted, but if you work together, do not take any paper away with you—in other words, you can share your thoughts (say on a blackboard), but you have to walk away with only your understanding. In particular, write the solution up on your own.

- **HW #1**, due 10 Sep:  
§6.1: 1–45 (odd), 49, 63
- **HW #2**, due 17 Sep:  
§6.2: 1–17 (odd), 21, 25, 29, 33, 37, 41, 45, 49, 53, 57, 69, 73  
§6.3: 1, 3, 5, 9, 13, 17
- **HW #3**, due 24 Sep:  
§6.3: 19, 25, 27, 29, 33, 35, 37, 63–69 (odd)  
§6.4: 1–17 (odd), 21, 25, 29, 33, 37, 39, 51, 53, 57
- **HW #4**, due 1 Oct:  
§7.1: 1, 5, 7, 13, 15, 17, 19, 23, 27, 35, 39, 45
- **HW #5**, due 8 Oct:  
§9.3: 1–23 (odd), 41, 43, 45, 51  
§7.2: 1, 5, 9, 13, 17, 21, 23, 25, 27
- **HW #6**, due 15 Oct:  
§7.3: 1, 3, 5, 6, 25, 27, 35  
§7.4: 25, 27, 29, 31, 33, 35, 49  
§7.5: 1, 3, 5, 7, 9
- **HW #7**, due 22 Oct:  
§7.5: 11, 27, 29, 31, 35  
§7.6: 1, 3, 5, 7, 9, 11, 13, 15, 19, 21, 23, 31, 34
- **HW #8**, due 29 Oct:  
§8.1: 1, 3, 9–21 (odd), 25, 31–41 (odd)
- **HW #9**, due 5 Nov:  
§8.2: 3–9 (odd), 11–19, 23, 27, 29, 31, 33, 39, 41, 45  
§8.3: 1–11 (odd)
- **HW #10**, due 12 Nov:  
§8.3: 19, 23, 25, 29, 31, 43, 45  
§8.4: 1–11, 13, 15, 21, 25, 33, 35, 39
- **HW #11**, due 19 Nov:  
§8.5: 1, 3, 5, 7, 9, 11, 19, 23, 29  
§8.6: 1, 3, 7, 11, 17, 19, 21, 23, 25, 27, 37
- **HW #12**, due 10 Dec:  
§P.2: 1, 3, 7, 9, 11, 13, 15, 17–27, 29–39 (odd)  
§P.3: 1, 3, 7, 9, 11, 15, 21–37 (odd), 38, 63, 65, 67, 69

## QUIZZES

Every Wednesday there will be a 15 minute quiz. The problem(s) on the quiz will be taken directly from the homework, possibly with a few numerical changes. Your lowest two scores will be dropped. No make-up quizzes will be permitted.

## EXAMS

There will be three exams, on these dates:

- Exam #1: Wednesday, September 24 (covering §§6.1–6.4)
- Exam #2: Wednesday, October 22 (covering §§7.1–7.6, 9.3)
- Exam #3: Friday, November 21 (covering §§8.1–8.5)

You are permitted to bring to each exam one  $8 \times 11$ -sheet of paper upon which you may write anything that you like on one side. Photocopies and word-processed text are forbidden.

The final exam is scheduled for Thursday, December 18, 3:30–6:30 p.m. in Perkins 107.

#### SYLLABUS

Although we may deviate from this by adding or skipping topics, the tentative plan for the course is as follows.

- **Chapter 6:** The Integral
  - 1, 3 Sep (W): §6.1: The Indefinite Integral
  - 2, 5 Sep (F): §6.1
  - 3, 8 Sep (M): §6.1
  - 4, 10 Sep (W): §6.2: Substitution
  - 5, 12 Sep (F): §6.2
  - 6, 15 Sep (M): §6.3: The Definite Integral: Numerical and Graphical Approach
  - 7, 17 Sep (W): §6.3
  - 8, 19 Sep (F): §6.4: The Definite Integral: Algebraic Approach and the FTC
  - 9, 22 Sep (M): §6.5: Numerical Integration (Online)
  - 10, 24 Sep (W): **Exam #1** (covering §§6.1–6.4)
- **Chapter 7:** Further Integration Techniques and Applications
  - 11, 26 Sep (F): §7.1: Integration by Parts
  - 12, 29 Sep (M): §7.1
  - 13, 1 Oct (W): §9.3: Integrals of Trigonometric Functions and Applications
  - 14, 3 Oct (F): §9.3
  - 15, 6 Oct (M): §7.2: Area Between Two Curves and Applications
  - 16, 8 Oct (W): §7.3: Averages and Moving Averages
  - 17, 10 Oct (F): §7.4: Continuous Income Streams
  - 18, 13 Oct (F): §7.5: Improper Integrals and Applications
  - 19, 15 Oct (W): §7.5
  - 20, 17 Oct (F): §7.6: Differential Equations and Applications
  - 21, 20 Oct (M): Review
  - 22, 22 Oct (W): **Exam #2** (covering §§7.1–7.6, 9.3)
- **Chapter 8:** Functions of Several Variables
  - 23, 24 Oct (F): §8.1: Functions of Several Variables
  - 24, 27 Oct (M): §8.1
  - 25, 29 Oct (W): §8.2: Three-Dimensional Space
  - 26, 31 Oct (F): §8.2
  - 27, 3 Nov (M): §8.3: Partial Derivatives
  - 28, 5 Nov (W): §8.3
  - 29, 7 Nov (F): §8.4: Maxima and Minima
  - 30, 10 Nov (M): §8.4
  - 31, 12 Nov (W): §8.5: Constrained Maxima and Minima and Applications
  - 32, 14 Nov (F): §8.5
  - 33, 17 Nov (M): §8.6: Double Integrals and Applications
  - 34, 19 Nov (W): Review
  - 35, 21 Nov (F): **Exam #3** (covering §§8.1–8.5)
  - 24–28 Nov (M–F): *No class, Thanksgiving Recess*
- **Chapter P:** Calculus Applied to Probability and Statistics (Online)
  - 36, 1 Dec (M): §P.1: Continuous Random Variables and Histograms
  - 37, 3 Dec (W): §P.1
  - 38, 5 Dec (F): §P.2: Probability Density Functions
  - 39, 8 Dec (M): §P.3: Mean, Median, Variance and Standard Deviation
  - 40, 10 Dec (W): §P.3