

MTH 243 CALCULUS FOR FUNCTIONS OF SEVERAL VARIABLES

UNIVERSITY OF RHODE ISLAND FALL 2019

Instructor: Jie Han

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Class Schedule: TuTh 12:30 – 1:45pm, Lippitt Hall 204

Office hours: TuTh 1:45 - 3:15pm or by appointment

Textbook: McCallum, Hughes-Hallet, et. al., Calculus: Multivariable (7th edition) with *WileyPlus*, Wiley.

Description: MTH 243 is the third calculus course at URI, with the focus on functions of 2,3, and more variables and the extensions of the ideas of elementary calculus to higher dimension.

General education areas and learning outcomes: MTH243 is a general education course. The general education areas satisfied by MTH243 are

- A1** Scientific, Technology, Engineering, and Mathematical Disciplines (STEM),
- B3** Mathematical, Statistical, or Computational Strategies (MSC).

At the conclusion of this semester you will be able to:

1. *Contour diagrams.* Read and interpret 3d plots and 2d/3d contour diagrams, read and interpret tables of functions of several variables, and plot by hand the graph of simple functions of 2 variables, and simple contour plots of 2 or 3 variables.
2. *Vectors.* Do calculations with vectors that involve the concepts of addition, scalar multiplication, dot product, cross product, magnitude, projection, and use these concepts in geometry and applications in physics.
3. *Gradients and directional derivatives.* Calculate partial and directional derivatives, gradients and differentials of function of several variables, use local linearization to approximate functions.
4. *Optimization problems.* Calculate critical points, use the second derivative test to determine local extrema and saddle points (for functions of two variables only), use these concepts to solve unconstrained optimization problems, and use Lagrange multipliers to solve constrained optimization problems.

5. *Double and triple integrals.* Calculate double and triple integrals algebraically, change variables in integrals from rectangular coordinates to polar, cylindrical, spherical coordinates and vice versa.
6. *Parametrization.* Use the concept of parametrization of curves and surfaces and apply it to solve physics problems involving motion in vector fields. Utilize parametrization in rectangular, spherical, and cylindrical coordinates.
7. *Vector fields.* Represent and interpret plots of vector fields (including flow lines). Compute the flow of a vector field.
8. *Vector fields and Green's theorem.* Use vector valued functions to evaluate line integrals in conservative vector fields. Apply Green's theorem for path-dependent vector fields.
9. *Modeling, approximation, technology.* Select calculus methods and use technology to analyze mathematical models and determine their applicability. Use technology to analyze accuracy of approximations, perform numerical and symbolic calculations, and produce graphical representation of functions to investigate their properties.
10. *Written mathematical communication.* Communicate effectively in written form mathematical ideas and conclusions, by stating in a complete, clear, concise, and organized manner steps, calculations, solution strategy, conclusions, and when appropriate, interpreting results in practical or applied terms.

Prerequisites: MTH 142

Calculators: Calculators will be allowed for homework, but not allowed for quizzes and exams. Instead, the calculations in quizzes and exams will be minimized.

Exams: There will be two in-class exams tentatively scheduled for **Tuesdays October 8th** and **November 19th**. A comprehensive final exam will be scheduled by the Enrollment Services. Please plan your end-of-semester travel accordingly since you will not be able to take the final exam at any other time.

The exams will reflect the variety of the homework and suggested problems. Do not expect to be asked merely to solve these problems with the numbers changed. The best way to prepare for the exams, and to develop confidence in your ability to solve problems, is to work on the suggested problems.

There will be no partial credit of any kind on the multiple choice questions. There will be no extra review material provided for the exams. The exams are closed books and no notes. You cannot use any calculators during exams.

Quizzes: We will have weekly an in-class quiz every Tuesday (except the exam days). Quiz problems will be similar to suggested problems and examples given in class. No make-up quizzes will be given; instead, I will drop the lowest quiz score for you at the end of the semester.

WileyPlus assignments: We will use WileyPlus online system for our graded homework assignments this semester. We will have ten assignments in total, each worth 10 points. Please follow WileyPlus for details and exact deadlines.

You are responsible for getting WileyPLUS set up and enrolling in the online section of your course in a timely fashion. This includes obtaining a WileyPLUS code, whether bundled with your textbook, or from Wiley if you purchased the textbook used. You will notice that the due dates in WileyPLUS are many days after the material is scheduled to be covered in class. You should be working on the WileyPlus assignments as we cover material in class. The extra time is a buffer for any technical difficulties you may encounter. You should not be in the habit of working on these assignments the day before the listed due date, as they should have been done days in advance. For this reason, there will be absolutely no extensions of WileyPLUS due dates for **any reason**.

To register for your section on WileyPlus, visit www.WileyPlus.com → Students → Register and enter your course ID **726452**. Alternatively, you can type the web address for our class directly into your browser: www.wileyplus.com/class/726452

Our section is MTH243 Multivariable calculus, Section 0006, Jie Han, Fall 2019.

Evaluation: Your *grade* will be determined based on your quizzes, WileyPlus assignments, the two in-class midterm exam, and the final exam in the following way: Quizzes 20%, Wiley Plus homework 15%, each midterm exam 20%, the final 25% . There will be no additional extra credits.

A rough guideline for grading is as follows: A (93.00% - 100%), A- (90.00% - 92.99%), B+ (87.00% - 89.99%), B (83.00% - 86.99%), B- (80.00% - 82.99%), C+ (77.00% - 79.99%), C (73.00% - 76.99%), C- (70.00% - 72.99%), D+ (67.00% - 69.99%), D (60.00% - 66.99%), F (59.99% and below).

Missed exams: Makeup exams will be given only in the case of severe illness, other extreme emergency, or an approved scheduling conflict on the day of the exam. You must notify your instructor before, not after, the exam, and emergencies require you to contact your instructor within 24 hours. If you do not take an exam and I have not heard from you before or on the exam day or within 24 hours of the exam in case of an emergency, you will receive a zero for the exam.

Incompletes: University policy on “incomplete” grades will be strictly applied. As per University policy, grades of I (incomplete) are given at the discretion of the instructor for documented, University-approved reasons only. Note that incompletes may only be given if the work in the course up until the documented problem is passing (60% and higher) by University policy. See sections 8.53.20 and 8.53.21 of the university manual.

Course materials: All class materials (e.g. notes, slides, projects, exams, lectures, etc.) are property of URI and the instructor. Copying, video taping, taking pictures, or posting this material is not allowed without consent of the instructor and URI.

Standards of behavior: You are here to learn, so please give class your full attention, ask questions if you do not understand and be respectful and courteous to your fellow students and instructor.

Students are responsible for being familiar with and adhering to the published "Community Standards of Behavior: University Policies and Regulations" which can be accessed in the University Student Handbook. If you must come in late, please do not disrupt the class. Please *turn off* all cell phones, laptops, tablets, ...

Accommodations: Any student with a documented disability is welcome to contact me as early in the semester as possible so that we may arrange reasonable accommodations. As part of this process, please be in touch with Disability Services for Students Office in 330 Memorial Union, 401-874-2098.

Class attendance: Class attendance is *expected and strongly encouraged*. You are responsible for everything in class; anything announced in class, any material covered, any handouts or assignments etc., i.e., it is your responsibility to make sure you are aware of what takes place in the class.

Illness due to flu: If any of us develop flu-like symptoms, we are being advised to stay home until the fever has subsided for 24 hours. So, if you exhibit such symptoms, please do not come to class. Notify me at 874-4439 or jie.han@uri.edu of your status, and we will work together to ensure that course instruction and work is completed for the semester.

The Centers for Disease Control and Prevention have posted simple methods to avoid transmission of illness. These include: covering your mouth and nose with tissue when coughing or sneezing; frequent washing or sanitizing your hands; avoiding touching your eyes, nose, and mouth; and staying home when you are sick. For more information please view www.cdc.gov/flu or flu.gov. URI Health Services web page, www.health.uri.edu, will carry advice and local updates.

Suggested problems: Suggested problems are given for all sections that we cover in class. Do as many of these as possible and keep the solutions. You must be self-disciplined to do all of the suggested problems and to make sure each one is done correctly. It helps you to practice doing all of the problems so that you can do them quickly enough when the time comes to take a test.

Getting help: Regular study and practice with the course material is imperative for success in this class. In addition to your instructor's office hours, the Academic Enhancement Center's (www.uri.edu/aec, 874-2367) Walk-In Tutoring will help you with this.

The Walk-In Tutoring Center is a no-appointment-needed tutoring center where you can work with tutors and other students in this and other math courses. They provide free support in all math courses up to MTH 243. Bring your book, notes, and questions with you. Tutoring is a great place to practice with classmates and friends, prep for exams, and review what we are learning in class. Check <http://web.uri.edu/aec/> for an up-to-date

schedule of tutors hours. You are also encouraged to discuss the class material with other students in the class.

Important dates:

open add period: Sep 4-10.

open drop period: Sep 4-26. No mark on transcript

additional drop period through e-campus: Sep 27 - Oct 17. "W" on transcript

A course may be dropped by official procedures determined by the Office of Enrollment Services (e-campus) on or before the end of the third week of classes (Drop Period) with no mark on a student's transcript. Courses may be dropped through e-campus between the fourth and the end of the sixth week of classes (Withdrawal Period) and will be recognized on a student's transcript with a "W." After the end of the sixth week (Late Withdrawal Period), a student may drop a course only in exceptional circumstances and only with authorization of the dean of the college in which the student is enrolled. Such drops will also be recognized on a student's transcript with a "W." If the student has not dropped a course by the end of the withdrawal period the instructor must submit a grade.

Course schedule: The following table will be used as a guide. We might be slightly ahead or behind at any given time.