Howard University – Department of Mathematics

Calculus III

MATH 158 Sec. 01, Spring 2020

4 credits

Mon, Wed and Fri 1:10–2:00pm in Lindsay Hall, room 0103; Thu 1:10–2:00pm in Lindsay Hall, room 0107.

Instructor: Dr. Roberto De Leo

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Office Hours: Mon, Wed and Fri 2-3pm or by appointment

Course website: http://www.howard.edu/blackboard

Prerequisites: mastery of College Algebra and a "C" or better in MATH156 (Calculus I) and MATH 157 (Calculus II). *It is assumed that students are proficient in standard Calculus I and II topics including: continuity, limits, derivatives, definite integrals and integration techniques.*

Course description: MATH158 is the third and the final part of our standard three-semester calculus sequence. The distinct feature of this part of the course is its focus on the multi-dimensional analysis, as opposed to one-dimensional analysis that you learned in MATH 156 (Calculus I) and MATH 157 (Calculus II). This semester you will get familiar with such important concepts as a vector, a vector field, a function of several variables, partial derivative, a line-integral and multi-variable integrals. You will see that these concepts, as scary as they may sound, are actually a natural generalization of the things you already know from calc I and II. This is how the tree of mathematics is built: going slowly from elementary to more and more complex. The ideas of the vector calculus apply to numerous areas of human knowledge such as engineering, physics, pure mathematics, biology and so on.

Regardless of your background coming in this class, our goal is to provide instructorship and all the resources necessary for every one of you succeed, and enjoy yourselves as much as possible in the process! In spite of this, you may find vector calculus very challenging. Like in MATH 156 and 157, *your success in MATH 158 requires a lot of hard work, hours of study and problem solving and, last but not least, your active involvement in learning, both in and outside of the classroom.*

Textbook: *J. Marsden & A. Weinstein, "Calculus III", Springer*

The book pdf and a relative Student Guide are freely available from http://www.cds.caltech.edu/∼marsden/volume/Calculus/. The method of instruction for most classes will be a lecture/discussion. *You are encouraged to participate in class by asking questions, contributing to discussions, taking notes and working problems. Outside of class, all students are expected to read the text, complete all assignments, regularly access Blackboard, and come to my office hours and ask questions about the homework.* **Note that the material covered in class is not identical with that in the textbook and you are supposed to learn both of them. You are quite likely to fail if you only attend classes without studying from the book or if you skip classes and rely only on the textbook.**

Grading: The weights in determining your final grade are as follows:

- Homework: 15%
- Quizzes: 15%
- Exam1: 15%
- Exam 2: 15%
- Exam 3: 15%
- Final Exam: 25%

Final grades will be assigned according to the following percentages: **A** 90-100; **B** 80-89; **C** 70-79; **D** 60-69; **F** 0-59.

Quizzes. Quizzes will be given usually on Fridays during the last 15 minutes of class. There are NO make-ups for quizzes. At the end of the semester, the two lowest quiz scores will be dropped.

Midterms. Midterms' make-ups will be given only in extreme circumstances that are documented, approved excused absences and only if I am aware of the circumstances prior to the exam. Students may be excused for reasons of illness or injury that are certified by a physician, death in the immediate family, court summons or religious holiday. In particular, make-ups will never be given to accommodate travel plans.

Homework. Homework will be assigned weekly on HU's WebWork server. I will also assign weekly homeworks from the book, they will be usually ungraded but trying to solve them will increase your chances to get a good grade in quizzes and midterms.

Calculators. The use of any electronic devices with computing capabilities is prohibited during exams and quizzes. Use of a cell phone or other means of communication during an exam or quiz could result in a score of 0.

Academic Integrity Policy. As an academic community, HU is committed to providing an environment in which research, learning, and scholarship can flourish and in which all endeavors are guided by academic and professional integrity. All members of the campus community - students, staff, faculty, and administrators - share the responsibility of insuring that these standards are upheld so that such an environment exists. Instances of academic misconduct by students will be handled pursuant to the Academic Code of Student Conduct: https://www.howard.edu/policy/academic/student-conduct.htm

Disability Policy. HU is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities. Students with disabilities who require accommodations for access to and/or participation in this course are welcome, but must be registered with the Special Students Service: https://www.howard.edu/specialstudentservices/DisabledStudents.htm

Tentative Schedule:

The schedule below WILL vary according to our progress in class and will be updated regularly on Blackboard. In case of test dates changes you will be notified at least a week in advance.

Week	Content	Topics
1	13.1,13.2,13.3	Vectors in plane and space, lines and distance.
2	13.4,13.5,13.6	Scalar and vector products, matrices and determinants.
3	14.3, 14.4,14.5	Functions in two variables, level sets, quadrics, cylindrical and spherical coordinates.
4	14.6, 14.7,15.1	Curves in space and their arc length. Partial Derivatives. **Midterm 1.**
5	15.2, 15.3,15.4	Tangent plane, chain rule and matrix multiplication.
6	16.1, 16.2	Gradients and directional derivatives, level surfaces and implicit differentiation.
7	16.3, 16.4	Maxima and minima, Lagrange multipliers.
8	17.1,17.2	Double integrals. **Midterm 2.**
9	Spring Break	
10	17.3, 17.4	Applications of double integrals. Triple integrals.
11	17.5, 17.6	Integrals in polar, cylindrical and spherical coords. Applications of triple integrals.
12	18.1, 18.2	Line integrals. Path independence.
13	18.3, 18,4	Exact Differentials, Green's Theorem.
14	18.5, 18,6	Circulation and Flux of a vector field.
15	Review	**Midterm 3.**
16	Review, Reading	