MA242 – Multivariable and Vector Calculus **Spring 2019**
MWF 12:30 p.m.–1:45 p.m. (W-1-57)

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Course Description

Math 242 is an introduction to multivariable and vector calculus. Topics include Euclidean, polar, cylindrical, and spherical coordinates; dot products, cross-products, equations of lines and planes; continuity, partial derivatives, directional derivatives, optimization in several variables; multiple integrals, iterated integrals, change of coordinates, Jacobians, and the general substitution rule; curves and surfaces, parametrizations, line integrals, surface integrals; gradient, circulation, flux divergence; conservative, solenoidal vector fields; scalar, vector potential; and Green's, Gauss', and Stokes' theorems.

Prerequisites

Admission to the course is contingent upon successful completion of MA141 or an equivalent college level calculus course.

Text

There is one required text for the course: *Calculus: Early Transcendentals*, Eighth Edition, by James Stewart.

Grading

Course grades are based on weekly quizzes (20%), two in-class tests (20% each), and a cumulative final exam (40%).

Reading and class preparation

There is a reading assignment associated with each class period. Although it is not generally possible to discuss every topic in class, students are responsible for the entire content of the reading assignment. *Test and exam questions may cover reading material not discussed explicitly in class.* Consequently it is very important to complete the reading assignments on time and to come to class prepared with questions.

Make-up tests

Tests may be rescheduled only in cases of serious illness, bereavement, or other circumstances of similar gravity. Whenever possible, arrangements for make-up tests must be made *in advance* of the regularly scheduled testing time.

Accomodations for students with disabilities

Section 504 of the Americans with Disabilities Act of 1990 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, CC-UL-211, (617-287-7430). The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of the Drop/Add period.

Student conduct

Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct. The Code is available online at the following web site:

`https://www.umb.edu/editor_uploads/images/life_on_campus/Code_of_Conduct_5-14-14.pdf`

Please pay particular attention to Section XII, paragraphs 1 and 5. In this course, you will be permitted to use a short note sheet during exams, provided that you have prepared the sheet yourself. Your exam responses may quote your lecture notes or the course textbook without attribution, but material taken from any other source must be properly attributed to its author. In addition, the use of electronic devices during exams is *expressly prohibited*. Violation of these policies will result in disciplinary action.

Web page

This syllabus and other course materials are available on-line at

`http://cartan.math.umb.edu/wiki/index.php/Math_242,_Spring_2019`

Schedule of topics

Week 1: Introduction. Three-dimensional coordinate systems.

Week 2: Vectors. The dot and cross products.

Week 3: Equations of lines and planes; cylinders and quadric surfaces; vector functions and space curves.

Week 4: Derivatives and integrals of vector functions; arc length and curvature; velocity and acceleration.

Week 5: Functions of several variables; limits and continuity; partial derivatives.

Week 6: First midterm (Tuesday, March 6; covers assignments 1–4). Tangent planes and linear approximations.

Week 7: The chain rule; directional derivatives and the gradient vector; maximum and minimum values.

Week 8: Lagrange multipliers; double integrals over rectangles; double integrals over general regions.

Week 9: Double integrals in polar coordinates; applications of double integrals; surface area.

Week 10: Triple integrals; triple integrals in cylindrical and spherical coordinates.

Week 11: Second midterm (Tuesday, April 16; covers assignments 5–9). Change of variables in multiple integrals.

Week 12: Vector fields; line integrals; fundamental theorem for line integrals.

Week 13: Green's Theorem; curl and divergence; parametric surfaces.

Week 14: Surface integrals; Stokes' Theorem; the Divergence Theorem.

Week 15: Summary.