

MA242 – Multivariable Calculus

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Course Description

Math 242 is a four-credit course in Multivariable 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 calculus course.

Text

There is one required text for the course: *Multivariable Calculus: Concepts and Contexts*, Fourth 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.

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 as delineated in the catalog of Undergraduate Programs, pp. 44–45 and 48–52. The Code is available online at the following web site:

http://www.umb.edu/editor_uploads/images/life_on_campus/CSC.pdf

Web page

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

http://cartan.math.umb.edu/wiki/index.php/Math_242,_Fall_2013

Course Calendar

*Homework problems should be done prior to the due date but **are not to be handed in**. One problem from each assignment will appear on the weekly quiz.*

Wednesday, September 4: Introduction.

Friday, September 6: Three-dimensional coordinate systems.

Read before class: Section 9.1.

Monday, September 9: Vectors.

Read before class: Section 9.2.

Do before class: Assignment 1.

Wednesday, September 11: The dot product.

Read before class: Section 9.3.

Friday, September 13: The cross product.

Read before class: Section 9.4.

Monday, September 16: Equations of lines and planes.

Read before class: Section 9.5.

Do before class: Assignment 2.

Wednesday, September 18: Functions and surfaces.

Read before class: Section 9.6.

Friday, September 20: Cylindrical and spherical coordinates.

Read before class: Section 9.7.

Monday, September 23: Vector functions and space curves.

Read before class: Section 10.1.

Do before class: Assignment 3.

Wednesday, September 25: Derivatives and integrals of vector functions.

Read before class: Section 10.2.

Friday, September 27: Arc length and curvature.

Read before class: Section 10.3.

Monday, September 30: Motion in space: velocity and acceleration.

Read before class: Section 10.4.

Do before class: Assignment 4.

Wednesday, October 2: Parametric surfaces.

Read before class: Section 10.5.

Friday, October 4: Functions of several variables.

Read before class: Section 11.1.

Monday, October 7: Exam 1 (sections 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 10.1, 10.2, 10.3, 10.4, and 10.5).

Do before class: Assignment 5.

Wednesday, October 9: Limits and continuity.

Read before class: Section 11.2.

Friday, October 11: Partial derivatives.

Read before class: Section 11.3.

Wednesday, October 16: Tangent planes and linear approximations.

Read before class: Section 11.4.

Do before class: Assignment 6.

Friday, October 18: The Chain Rule.

Read before class: Section 11.5.

Monday, October 21: Directional derivatives and the gradient vector.

Read before class: Section 11.6.

Do before class: Assignment 7.

Wednesday, October 23: Maximum and minimum values.

Read before class: Section 11.7.

Friday, October 25: Lagrange multipliers.

Read before class: Section 11.8.

Monday, October 28: Double integrals over rectangles.

Read before class: Section 12.1.

Do before class: Assignment 8.

Wednesday, October 30: Iterated integrals.

Read before class: Section 12.2.

Friday, November 1: Double integrals over general regions.

Read before class: Section 12.3.

Monday, November 4: Double integrals in polar coordinates.

Read before class: Section 12.4.

Do before class: Assignment 9.

Wednesday, November 6: Applications of double integrals.

Read before class: Section 12.5.

Friday, November 8: Surface area.

Read before class: Section 12.6.

Wednesday, November 13: Triple integrals.

Read before class: Section 12.7.

Do before class: Assignment 10.

Friday, November 15: Triple integrals in cylindrical and spherical coordinates.

Read before class: Section 12.8.

Monday, November 18: Exam 2 (sections 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 12.1, 12.2, 12.3, 12.4, and 12.5).

Do before class: Assignment 11.

Wednesday, November 20: Change of variables in multiple integrals.

Read before class: Section 12.9.

Friday, November 22: Vector fields.

Read before class: Section 13.1.

Monday, November 25: Line integrals.

Read before class: Section 13.2.

Do before class: Assignment 12.

Wednesday, November 27: The Fundamental Theorem for line integrals.

Read before class: Section 13.3.

Monday, December 2: Green's Theorem.

Read before class: Section 13.4.

Do before class: Assignment 13.

Wednesday, December 4: Curl and divergence.

Read before class: Section 13.5.

Friday, December 6: Surface integrals.

Read before class: Section 13.6.

Monday, December 9: Stokes' Theorem.

Read before class: Section 13.7.

Do before class: Assignment 14.

Wednesday, December 11: The Divergence Theorem.

Read before class: Section 13.8.

Friday, December 13: Summary and review.

Do before class: Assignment 15.