UMass Boston
Department of Mathematics
Math 240/242 - Multivariable and Vector Calculus
Summer (Jul 14 - Aug 21) 2014

Course Name: Math 242 - Multivariable and Vector Calculus (4 credits)
Math 240 - Multivariable Calculus (3 credits)
Math 242R - Multivariable and Vector Calculus - reduced credit (1 credit)

Section Number: Section 01B (combined section)

Which version: (UMB degrees) Mathematics and Engineering majors: Math 242 is required.
Physics majors: Both Math 240 and 242 are accepted, but 242 is recommended.
Mathematics minor: Both Math 240 and 242 are accepted.
Students with credit for Math 240 should enroll in Math 242R (1 credit).

Description: This course is an introduction to the calculus of functions of several variables. It begins with the study of the basic objects of multidimensional geometry: vectors and vector operations, various coordinate systems, and the elementary differential geometry of vector functions and space curves. After that we extend the tools of differential and integral calculus to multidimensional problems. Math 240 topics end here. Math 242 and 242R continue with line and surface integrals, including various extensions of the Fundamental Theorem of Calculus to multidimensional integrals and applications to vector fields.

Pre-requisites: MATH 141 or an equivalent course on differential and integral calculus of single variable functions (including trigonometric, exponential, and logarithmic).

Schedule: MTuWTh 10:00am - 11:45am in W-02-200.
For every hour in class, you should dedicate at least three additional hours studying for this course. Students should not make any travel plans that would require them to leave before August 21, 2014.

Textbook: Lecture notes provided by the instructor.
Recommended supplemental textbook: Multivariable Calculus: Concepts and Contexts, 4th edition, by James Stewart.

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Office hours: By appointment, MTuWTh 7:40am - 8:10am and 12:00pm - 12:30pm in S-03-091. Please use the online form available at `http://catazara.youcanbook.me/` to schedule a 10 or 20 minute appointment, at least 3 hours in advance. You can stop by without a confirmed appointment, but I may be unavailable.

Assignments: *Exams*: There will be two in-class exams on August 4 and August 21. Make-up exams will be allowed only with an official excuse. In all other situations, a missed exam will get a score of zero. Calculators will not be allowed on exams.

Quizzes: Almost daily there will be a brief quiz on the topics covered the previous day. There will be no make-up quizzes, but the lowest two scores will not be counted.

Homework: For each section you will have an online problem set, using WeBWorK: `https://webwork2.umb.edu/webwork2/m242-cz/`. Homework will normally be due each Monday evening, except the last assignments, which will be due Thursday evening. Late homework will be penalized.

Grading:

Exam 1: 100 points	A : 90%
Exam 2: 100 points	B : 80%
Quizzes: 100 points	C : 70%
Homework: 100 points	D : 60%

Attendance: Regular class attendance is required and active class participation is expected. Students are responsible for material and announcements missed due to an absence. Please come to class on time and turn off your cell phone before the class begins.

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 University Catalog and Student Handbook. The Code is available online:
`http://www.umb.edu/life_on_campus/policies/code/`

Special accommodations: 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, Campus Center, UL Room 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 Drop/Add period.

Expectations: Students enroolled in this course are expected to be:

- Motivated and disciplined;
- Adequately familiar with background material;
- Committed and actively involved in their own learning;
- Able to work in groups;
- Secure enough to ask for help.

Goals: By fully participating in all course activities, students should be able to:

- Understand the fundamental concepts of multivariable and vector calculus;
- Use multivariable and vector calculus to solve problems;
- Build and improve portable skills;
- Apreciate the beauty and power of mathematics.

Additional help: Academic Support Programs offers a variety of tutoring and tutorial formats to support students in their undergraduate and graduate coursework. The Math Resource Center offers tutoring in mathematics, computer science, and information technology, either in one-on-one or in group format. More information is available at `http://www.umb.edu/academics/vpass/academic_support/tutoring/`

Changes: Any changes or class cancellations will be announced in class or by e-mail or will be posted online. Course materials and announcements are posted on the piazza account: `https://piazza.com/umb/summer2014/math240242`

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Recommended Practice Problems

From Stewart: Calculus: Concepts and Contexts, 4th Edition, Brooks/Cole Publishing Co.
ISBN13: 978-0495560548, ISBN10: 0495560545

9.1 Three-Dimensional Coordinate Systems.	# 5, 9, 11, 13, 19, 31, 35, 39;
9.2 Vectors.	# 3, 9, 11, 17, 21, 23, 29, 31, 35, 37;
9.3 The Dot Product.	# 1, 3, 7, 9, 11, 17, 21, 25, 27, 31, 35, 37, 39, 43, 45;
9.4 The Cross Product.	# 1, 3, 5, 7, 9, 13, 17, 21, 23, 27, 31, 33, 39;
9.5 Equations of Lines and Planes.	# 1, 3, 5, 9, 15, 17, 21, 25, 29, 39, 43, 49, 53, 55, 57;
9.6 Functions and Surfaces.	# 5, 7, 15, 17, 19, 21, 33;
9.7 Cylindrical and Spherical Coordinates.	# 3, 5, 7, 9, 13, 17, 21, 25, 27, 31;
10.1 Vector Functions and Space Curves.	# 1, 3, 9, 11, 17, 19, 27, 35, 39, 43;
10.2 Derivatives and Integrals of Vector Functions.	# 3, 5, 11, 17, 23, 31, 33, 35;
10.3 Arc Length and Curvature.	# 3, 7, 13, 15, 17, 23, 25, 43, 45;
10.4 Motion in Space: Velocity and Acceleration.	# 5, 9, 13, 23, 35, 39;
10.5 Parametric Surfaces.	# 1, 3, 5, 13, 23, 25;
11.1 Functions of Several Variables.	# 3, 5, 7, 9, 11, 13, 17, 23, 35, 43, 45;
11.2 Limits and Continuity.	# 7, 11, 15, 29, 33, 37;
11.3 Partial Derivatives.	# 3, 5, 9, 21, 25, 27, 39, 45, 49, 55, 59, 65, 69, 71, 79, 85, 89;
11.4 Tangent Planes and Linear Approximations.	# 1, 11, 15, 19, 25, 29, 31, 33, 39;
11.5 The Chain Rule.	# 5, 11, 13, 15, 17, 23, 29, 37, 43, 47;
11.6 Directional Derivatives and the Gradient Vector.	# 1, 5, 7, 11, 19, 23, 27, 31, 37, 41, 43, 47, 51, 57;
11.7 Maximum and Minimum Values.	# 3, 5, 7, 11, 23, 35, 37, 41, 47, 51;
11.8 Lagrange Multipliers.	# 1, 3, 11, 19, 23, 35, 41;
12.1 Double Integrals over Rectangles.	# 1, 5, 9, 13;
12.2 Iterated Integrals.	# 3, 9, 13, 17, 21, 23, 27, 31, 35, 37;
12.3 Double Integrals over General Regions.	# 3, 5, 13, 15, 17, 25, 37, 45, 51, 53, 59;
12.4 Double Integrals in Polar Coordinates.	# 1, 5, 11, 13, 21, 27, 31;
12.5 Applications of Double Integrals.	# 1, 5, 11, 17, 23;
12.6 Surface Area.	# 3, 7, 9, 11, 25;
12.7 Triple Integrals.	# 3, 7, 11, 15, 19, 23, 25, 27, 33, 39, 43, 51;
12.8 Triple Integrals in Cylindrical and Spherical Coordinates.	# 3, 5, 7, 11, 17, 21, 29, 31;
12.9 Change of Variables in Multiple Integrals.	# 1, 5, 7, 11, 15, 17, 25;
13.1 Vector Fields.	# 5, 11, 17, 23, 25, 35;
13.2 Line Integrals.	# 3, 7, 11, 17, 21, 33, 39, 43, 47;
13.3 The Fundamental Theorem for Line Integrals.	# 1, 7, 11, 15, 25, 31, 35;
13.4 Green's Theorem.	# 1, 3, 7, 9, 13, 17, 23;
13.5 Curl and Divergence.	# 1, 5, 11, 15, 19, 27, 31;
13.6 Surface Integrals.	# 5, 9, 17, 21, 27, 37, 41;
13.7 Stokes' Theorem.	# 5, 7, 9, 13, 15, 17;
13.8 The Divergence Theorem.	# 1, 3, 7, 11, 19, 31;