UMass Boston 2017-01-23 16:28
Department of Mathematics
Math 240/242/242R - Multivariable and Vector Calculus
Spring 2017

Course Name:	Math 242 - Multivariable and Vector Calculus (4 credits) Math 240 - Multivariable Calculus (3 credits) Math 242R - Multivariable and Vector Calculus (1 credit)
Section:	Section 02
Which version: (UMB degrees)	Mathematics and Engineering majors: Math 242 is required. Physics majors: Both 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. The course continues 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:	Tu 11:00am - 1:20pm and Th 11:00am - 12:15pm in M-01-0428. 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 Saturday, May 20, 2017.
Textbook:	Primary: Lecture Notes provided by the instructor, to be posted on Piazza (see below) Recommended problems from: Multivariable Calculus: Concepts and Contexts, 4th edition, by James Stewart. ISBN-10: 0495560545 Copies of the book will be placed on reserve at the library.
Instructor:	Catalin Zara, Associate Professor of Mathematics. Email: catalin.zara@umb.edu Office: Science 3-091 Website: `czara.aczsite.net` Phone: 617 287-6463

Office hours: **By appointment**. Times: TuTh 8:50am-9:20am, Tu 1:20pm - 1:50pm, and Th 12:30pm - 1:50pm in S-03-091. Please use the online form at
`http://catazara.youcanbook.me/`
to schedule a 10 or 20 minute appointment, at least 2 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 (February 28th and April 11th), plus a cumulative final during the final exam period. 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 needed/allowed on exams.

Quizzes: Almost every Tuesday, at the end of class, there will be a 10-minute quiz on the topics covered the previous week. 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 Tuesday evening. Late homework will be penalized.

Grading:

Exam 1: 100 points	A : 90%
Exam 2: 100 points	B : 80%
Final exam: 200 points	C : 70%
Quizzes: 100 points	D : 60%
Homework: 100 points	

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/community/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 enrolled 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;
- Appreciate 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/`

We will be using Piazza for class discussion. Rather than emailing questions to me, I strongly encourage you to post your questions on Piazza. If you have any problems accessing the site or you have feedback for the developers, email team@piazza.com. Find our class page at:
`https://piazza.com/umb/spring2017/math242240/home`

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/spring2017/math242240`

A Brief Introduction to WeBWorK

WeBWorK (Online Homework System):
`https://webwork2.umb.edu/webwork2/m242-cz/`
`http://webwork.maa.org/wiki/Category:Students`

(1) Go to `https://webwork2.umb.edu/webwork2/m242-cz/` [Ignore the security warnings: the site is safe!]

(2) Login using your UMB email username and your UMB student ID as password. For example, if your UMB email is John.Smith001@umb.edu and your UMB student ID is UMS087654321, then your username is john.smith001 and your initial password is ums087654321 (all **lowercase**).

(3) Click on the **Password/Email** button (top left corner). Change your password. Type your current email address. Click on **Change User Options**. After receiving the confirmation message(s) in green, click on the Sets button (top left corner).

(4) Select the first problem set and download a hardcopy (select PDF). You will need the Adobe Acrobat Reader to do this. Open the file and print it. At this point you no longer need to be connected.

(5) Work the problems, and when you have the answers (all, or just some of them), reconnect to WeBWorK, with your new password.

(6) Click on the first problem set link, then on **Problem 1**. Navigate through the problems, either by clicking on **Next** or directly on the problem numbers on the left. Type your answers in the spaces provided. Be very careful with brackets.

(7) Click on **Preview Answers**. If what you see is what you wanted your answer to look like, click **Submit Answers**. If not, correct your input, and preview again, until you get the desired form.

(8) After you submit the answer(s) for each problem, WeBWorK tells you which answers are correct / incorrect. You can fix the incorrect answer(s) now, or you can return to this problem later. Your answers are saved, and WeBWorK will remember them when you login later.

(9) Click on **Next** to go to the next problem, or on **Prob. List** to see the list of all problems in this problem set, if you want to jump to another problem.

(10) When you finish the session, click on **Logout**.

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;
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.	# 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;