

MTH 243: Calculus for Functions of Several Variables

Summer 2020 - Session I

Course Information

Instructor: Thomas Sharland, tsharland@uri.edu
Office: Lippitt 202F
Class Times: **This is an online, asynchronous course**
Virtual Office Hours: TBA or *by appointment*
Textbook: *Calculus: Multivariable (Seventh Edition)* by McCallum, Hughes-Hallet, et. al.
Required: WileyPLUS Online Homework Access Code (comes with on-line version of textbook)

Technology Requirements

To successfully complete this course, you will need access to a computer with reliable, high-speed Internet access and appropriate system and software to support the Brightspace learning platform. Typical technical requirements for users are:

Windows 7 (XP or Vista)	Mac OS X or higher
64 MB Ram	32 MB Ram
28.8 kbps modem (56k or higher recommended)	28.8 kbps modem (56k or higher recommended)
Sound Card & Speakers	Sound Card & Speakers
External headphones with built-in microphone	External headphones with built-in microphone
Mozilla Firefox 9.0 or higher	Mozilla Firefox 9.0 or higher; Safari 5.0 or higher

Also requires Adobe Flash and Adobe Acrobat Reader.

Brightspace Help

To access Brightspace go to <https://brightspace.uri.edu>. The Brightspace resource page can be found at <https://web.uri.edu/brightspace/>.

Classroom Protocol

For this online course, Brightspace is our classroom. Please refer to the Brightspace YouTube video tutorials before you get started and refer back to them as a resource as needed while you complete this course. In the online learning environment, attendance is measured by your PRESENCE in the site as well as your CONTRIBUTIONS to the site. The importance of regular log-ins and active participation cannot be overstated.

Course Description

Topics include coordinates for space, vector geometry, partial derivatives, directional derivatives, extrema, Lagrange multipliers, and multiple integrals. (Lec. 3) Pre: C- or better in MTH 142. (A1 - science, technology, engineering, and mathematical disciplines) (B3 - mathematical, statistical, or computational strategies)

Getting Started

This is a fully online course. We will use **Brightspace** as our virtual classroom. After you log into Brightspace, click on the link to our section. Then click on **Content**, followed by **Start Here**. In there you will find the introductory content for this course (including this syllabus!), and a video introducing you to the course and explaining how to navigate it in the weeks ahead.

Course Goals

The course goals consist of developing understanding and skills related to the basic concepts of multivariable and vector calculus: graphs and contour maps of functions of two variables, partial derivatives, the gradient vector and its applications, the dot and cross products, double and triple integration in rectangular, polar, spherical and cylindrical coordinates, the meaning, properties and applications of the line integral.

Learning Outcomes

At the end of the course the student should be able to:

- Identify functions in two and three variables.
- Compute with vectors, including the dot and cross products.

- Solve problems involving differentiation and integration of functions in two and three variables.
- Solve optimisation problems in two and three variables.
- Set up and compute path integrals.

Grading

Assessment

The assessed components of the course are the following.

- **WileyPLUS Homework:** A weekly homework assignment based on sections covered that week. This will appear on WileyPLUS on Monday at the start of the week and will be due by 11.59pm the following Sunday.
- **Online Discussions:** There will be Brightspace discussion forums devoted to WileyPLUS assignments, the material covered and general questions. The General Q&A forum is reserved for course administration issues, general mathematical chat and topics outside the course. The graded forums are as follows.
 - *WileyPLUS*: will focus on the homework.
 - *Lessons*: will be used to discuss the material for the current week.

You are expected to make at least three meaningful posts in these discussion forums each week. A post for which you will receive credit may be a well-formulated question or a relevant comment. It can also be an answer to a question asked by another class participant. In fact, such answers are most welcome as peer-tutoring is very important in an online course as is active participation in online discussions. Your instructor will be posting weekly questions in the Lessons discussion forum. Those questions are aligned with weekly objectives and learning outcomes. (See section Grading Policy below for an explanation of how forums participation will be graded.)

- **Quizzes:** There will be regular quizzes to check your understanding of the material and to make sure you are keeping up with the reading. These will appear on Monday, Wednesday and Friday in the *Quizzes* tab in Brightspace, and must be completed by Tuesday, Thursday and Saturday respectively.
- **Exams** (Midterms and final) There will be two types of question: answer only, which are very similar to the style of the WileyPLUS homework problems, and short written solutions, where you will be asked to show your working. More details can be found in Brightspace.

Discussion Rubric

Forums Grading Rubric			
Criteria	4-5pts	2-3pts	0-1pts
Responses to Questions	Student responds to the posted questions with thoughtful ideas, uses mathematical language and textbook concepts, and applies concepts to situations not covered in the textbook.	Student responds to the posted question in a way that does not clearly use the concepts. Uses some mathematical language, but does not apply concepts to other situations.	Student responds to the posted question but misses the main idea of the discussion topic. A student with an INCORRECT fact or shows a misunderstanding of the concepts in their posting can only receive a maximum of 1 pt for response to questions. Check your facts!
Participation	Post in a timely manner. Postings encourage and facilitate interaction among members of the online community. Student responds to other postings. Must post 3 or more times to get 5 pts.	Postings rarely interact with or respond to other members of the online community. Not actively engaged in the discussion.	Postings to questions posed by the instructor only. Students rarely post to the discussion boards. Posting of I agree is not consider a posting.

Grade Scheme

The final grade will be computed from six components, given the following weight.

- Introductory Activity 5%
- Discussion Forums: 15 %
- Wiley Homework 20 %
- Quizzes: 20 %
- Two Midterm Exams: 20 % (10 % each)
- Final exam: 20 %

There is no extra credit. Below is the grading scheme.

92 - 100	A	65 - 69.99	C
88 - 91.99	A-	60 - 64.99	C-
84 - 87.99	B+	55 - 59.99	D+
80 - 84.99	B	50 - 54.99	D
75 - 79.99	B-	0.0 - 44.99	F
70 - 74.99	C+		

Professional Conduct

Cheating and plagiarism are serious academic offenses, which are dealt with firmly by the College and University. Scholastic integrity presumes that students are honest in all academic work. Cheating is the failure to give credit for work not done independently (i.e., submitting a paper written by someone other than yourself), unauthorized communication during an examination, or the claiming of credit for work not done (i.e., falsifying information). Plagiarism is the failure to give credit for another person's written or oral statement, thereby falsely presuming that such work is originally and solely your own.

If you have any doubt about what constitutes plagiarism, visit the following website: <https://honorcouncil.georgetown.edu/whatisplagiarism>, the URI Student Handbook, and University Manual sections on plagiarism and cheating at <http://web.uri.edu/studentconduct/student-handbook/>.

Students are expected to be honest in all academic work. A student's name on any written work, quiz or exam shall be regarded as assurance that the work is the result of the student's own independent thought and study. Work should be stated in the student's own words, properly attributed to its source. Students have an obligation to know how to quote, paraphrase, summarize, cite and reference the work of others with integrity. The following are examples of academic dishonesty.

- Using material, directly or paraphrasing, from published sources (print or electronic) without appropriate citation;
- Claiming disproportionate credit for work not done independently;
- Unauthorized possession or access to exams;
- Unauthorized communication during exams;
- Unauthorized use of another's work or preparing work for another student;
- Taking an exam for another student;
- Altering or attempting to alter grades;
- The use of notes or electronic devices to gain an unauthorized advantage during exams;
- Fabricating or falsifying facts, data or references;
- Facilitating or aiding another's academic dishonesty;
- Submitting the same paper for more than one course without prior approval from the Instructor.

Please note the following section from the University Manual: 8.27.17. Instructors shall have the explicit duty to take action in known cases of cheating or plagiarism. The instructor shall have the right to fail a student on the assignment on which the instructor has determined that a student has cheated or plagiarized. The circumstances of this failure shall be reported to the student's academic dean, the instructors dean, and the Office of Student Life. The student may appeal the matter to the instructors dean, and

the decision by the dean shall be expeditious and final. Such action will be initiated by the instructor if it is determined that any written assignment is copied or falsified or inappropriately referenced.

Any good writers handbook as well as reputable online resources will offer help on matters of plagiarism and instruct you on how to acknowledge source material. If you need more help understanding when to cite something or how to indicate your references, PLEASE ASK. Please note: Students are responsible for being familiar with and adhering to the published Community Standards of Behavior: University Policies and Regulations which can be accessed in the University Student Handbook.

Academic Support Services

Office of Disability Services

Americans With Disabilities Act Statement Any personal learning accommodations that may be needed by a student covered by the Americans with Disabilities Act must be made known to the university as soon as possible. This is the student's responsibility. Information about services, academic modifications and documentation requirements can be obtained from the The Office of Affirmative Action, Equal Opportunity and Diversity (AAEOD). <https://web.uri.edu/affirmativeaction/>

Any student with a documented disability is welcome to contact me early in the semester so that we may work out reasonable accommodations to support your success in this course. Students should also contact Disability Services for Students, Office of StudentLife, 330 Memorial Union, 401-874-2098.

From the University Manual: 6.40.10 and 6.40.11 Accommodations for Qualified Students With Disabilities. Students are expected to notify faculty at the onset of the semester if any special considerations are required in the classroom. If any special considerations are required for examinations, it is expected the student will notify the faculty a week before the examination with the appropriate paperwork.

Uri Online Library Resources

<https://web.uri.edu/library/>

Course Schedule

Here is a tentative course schedule. Make sure to also check the weekly “to-do” page in Brightspace.

Week	Topic	Suggested Problems
May 18	12.1 - Functions of Two Variables	(12.1) 1,2,3,4,6,7,9,10,11,13,18,20,21,24,28,35
	12.2 - Graphs and Surfaces	(12.2) 2,3,4,5,7,8,11,12,13,15,16,17,23,24,26
	12.3 - Contour Diagrams	(12.3) 1,2,3,4,5,7,8,9,11,14,16,17,28
	12.4 - Linear Functions	(12.4) 1,2,3,5,7,8,9,10,13,21,22,23
	12.5 - Functions of Three Variables	(12.5) 1,2,3,4,5,6,12,15
	13.1 - Displacement Vectors	(13.1) 1,2,3,5,6,7,9,11,15,17,21,25,27,28,30,31,32
	13.2 - Vectors in General	(13.2) 6,7,9,10,11,13,15,17,25
May 25	13.3 - The Dot Product	(13.3) 1,3,5,6,7,11,13,15,17,19,21,22,23,25,27,33,39,43,47
	13.4 - The Cross Product	(13.4) 1,3,5,7,13,14,15,20,23,29,30
	14.1 - The Partial Derivative	(14.1) 1,3,4,5,6,7,8,10,11,13,14,15
	14.2 - Computing Partial Derivatives Algebraically	(14.2) 2,3,5,7,9,11,13,17,26,31,32,39,40,49
	14.3 - Local Linearity and the Differential	(14.3) 2,3,5,11,13,17,21,22,25
	14.4 - Directional Derivatives in the Plane	(14.4) 1,5,7,9,15,19,23,25,27,33,36,37,51,66,74
	14.5 - Directional Derivatives in Space	(14.5) 3,5,17,18,19,21,25,28,30,33,57,58,61
June 1	14.6 - The Chain Rule	(14.6) 3,7,11,16,19,21,25
	14.7 - Second-Order Partial Derivatives	(14.7) 1,3,23,27,41
	15.1 - Critical Points	(15.1) 1,3,4,5,9,12,15,17,21,25,32,33
	15.3 - Lagrange Multipliers (read only)	(15.3) 1-9, 28
	16.1 - Integrating Functions of Two Variables	(16.1) 1,7,9,11,17,19,21,25
	16.2 - Iterated Integrals	(16.2) 1,3,5,7,13,15,17,19,28,30,33,34,39,40,45,46
June 8	16.3 - Triple Integrals	(16.3) 1,2,5,7,9,11,13,31,32,37,39,50
	16.4 - Double Integrals in Polar Coordinates	(16.4) 1,2,3,4,9,11,12,19,21,29,31
	16.5 - Integrals in Cylindrical and Spherical Coordinates	(16.5) 1,3,5,9,11,19,21,22,23,73,74
	17.1 - Paramaterized Curves	(17.1) 1,2,3,4,5,6,7,9,11,19,21,23,25,27,33,35,39,40
	17.2 - Motion, Velocity, and Acceleration	(17.2) 1,3,5,7,9,11,13,14,26,28
	17.3 - Vector Fields	(17.3) 1,2,3,4,5,6,7,8,10,11,13,15,17,21,22,23,24
June 15	18.1 - The Idea of a Line Integral	(18.1) 1,2,3,4,5,7,8,9,11,27
	18.2 - Line Integrals over Paramaterized Curves	(18.2) 1,2,3,4,5,7,8,12,14,16,22,33
	18.3 - Gradient Fields and Path-Independent Fields	(18.3) 1,3,13,14,17,19,24,31,32
	18.4 - Path-Dependent Fields and Green's Theorem	(18.4) 1,2,3,5,6,11,12,13,14,15