

Information Sheet: M 273 Multivariable Calculus, Autumn 2015

Catalog Description: Offered autumn and spring. Prereq., M 172 or 182. Calculus of functions of several variables; differentiation and elementary integration. Vectors in the plane and space.

Learning Goals: Upon completion of this course, a student will be able to:

1. Explain three-dimensional coordinate systems, dot and cross products, equations of lines and planes, cylinders and quadric surfaces;
2. Explain vector-valued functions and space curves, their derivatives, arc length and curvature, and motion in space;
3. Explain limits, continuity and partial derivatives of functions of several variables;
4. Explain tangent planes to surfaces and linear approximations;
5. Explain the chain rule, directional derivative and gradient vector, extreme values and Lagrange Multipliers;
6. Explain double and triple integrals over general regions, and their applications;
7. Explain triple integrals in cylindrical and spherical coordinates;
8. Explain vector fields, line integrals and the Fundamental Theorem of Line Integrals;
9. Define Green's Theorem;
10. Explain curl and divergence of vector fields;
11. Explain surface integrals, Stokes Theorem, and the Divergence Theorem.

Instructor: Greg St. George

Office: Math 313 Phone: 243-4146 e-mail: gregory.stgeorge@umontana.edu

Website: The moodle system will be used to list homework assignments and as a document repository. This will be up sometime in the first couple of weeks. There are *worked out solutions* to the odd problems as well as videos of presentations of many of the topics in the class linked to the book's website, larsoncalculus.com.

Text: Ron Larson & Bruce Edwards, *Multivariable Calculus* edition 10e. Cengage; or the large Calculus 10e which includes the above (this is what the instructor has and what is on reserve.

Office hours: To be announced

Schedule: We will do the material in chapters 11–15 (these are the chapter numbers in the complete version of the book. I don't know the numbers in the shorter book which just includes Multivariable Calculus but the first of these is "Vectors and the Geometry of Space" and the last is "Vector Analysis"). These will be done pretty much in order. The instructor will add additional material which is not available in the text.

Grading: The course consists of not only the material in the assigned sections of the text, and the homework problems, but also any material added in class. We will have three tests, and these will be announced at least three class periods in advance. All quizzes will be announced at least a day

in advance, and there will be a comprehensive final at the end. The final will be given according to the final schedule. Extraordinary performance on the final may, at the instructor's discretion, be the basis for raising a grade.

The score of the lowest test will be dropped, if this helps your average. If illness or other exigency requires the a student to miss a test; then that test will be the one dropped. If a second test is missed, a note from a doctor, the health service or other authority must be offered before a makeup will be prepared.

Accommodation. The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors and Disability Services for Students (DSS). If you think that you may have a disability adversely affecting you academic performance, and you have not already registered with DSS, please contact DSS in Lommassen 154. I will work with you and DSS to provide an appropriate accommodation.

Some Relevant Dates

1. 9 Sept.: Last day to add using Cyberbear.
2. 21 Sept.: Last day to drop or change grading option using Cyberbear.
3. 2 Nov.: Last day for drop/add, change of grading option without a Petition
4. 11 Dec.: Final deadline for any of the above sorts of changes
5. The final will be given according the University's Final Schedule, which is usually to be found on the Provost's website. If I read it correctly, I believe our final is on Tuesday of finals week.

Software and Calculators: No calculators will be allowed on tests.

Grading Scale: The cutoffs for A is 0.9, for B: 0.8, for C 0.65, for D: 0.55. Plusses and minuses will be used, the increment is usually about 3 points. (e.g. to get a B+ the cutoff will be around 0.87.)

Academic Honesty: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.

Student Conduct Code: All students need to be familiar with the Student Conduct Code. You can find it on the "A to Z Index" link on the UM home page.

Other Resources &c. There are obviously many places that lectures on this material can be found on the web. You are encouraged to use them. There is a copy of the text on reserve on the library; this can be used to cross-check problem numbers if you have an earlier edition of our text, or simply as a source of problems if you have another, equivalent text, of which there are many. A text that the instructor considers to be mathematically superior to our text is: *Vector Calculus* by Marsden and Tromba. This opinion is not shared by most students. The classic text used by the generation before the instructor was *Advanced Calculus* by R. Creighton Buck. This is still an excellent book. A very good book, but more oriented toward physics is David Bressoud's *Second Year Calculus: From Celestial Mechanics to Special Relativity*. Another book, which the instructor is only now reading, informal but apparently oriented to electromagnetic theory is *div grad curl & all that* by H. M. Shey. I am not far enough along in it to offer an opinion, but it seems it might provide a good followup book for physics majors in our class.