

Prerequisites: MAT 137 with a grade greater than or equal to C

Description: MAT 238 Calculus III (4). Vector functions and multidimensional calculus; partial derivatives, gradients, optimization, multiple integrals, parametric curves and surfaces, vector calculus, line integrals, flux integrals, and vector fields.

Course web page: <http://jan.ucc.nau.edu/ns46/136/136.html>

Textbook: Calculus Early Transcendentals (third edition) by Jon Rogawski and Colin Adams. The relevant chapters are 12-17. This is the same book NAU used for Calculus II in the Fall semester.

Learning outcomes: Upon successful completion of the course, the student will be able to:

1. Perform vector arithmetic including dot and cross products and apply these products to geometric and simple physics situations.
2. Find equations of lines and the equation of a plane.
3. Find the parametric equations and vector-valued function that describe a curve or surface.
4. Calculate derivatives and integrals of vector-valued functions and apply the derivatives and integrals to motion problems.
5. Find the parametric equations and vector-valued function that describe the line tangent to a curve.
6. Demonstrate understanding of and calculate the arc length of a curve given by a vector valued function or parametric equations.
7. Graph basic surfaces and sketch contour diagrams for functions with two variables.
8. Compute partial derivatives for functions of two or more variables including the use of the chain rule.
9. Find the tangent plane of a surface at a point; and the linear approximation, directional derivative, and gradient of a function.
10. Find maximum and minimum values of functions of several
11. Evaluate a double integral over rectangles and over more general regions. Use double integrals to calculate volume.
12. Evaluate double integrals using polar coordinates.
13. Evaluate triple integrals using rectangular, cylindrical, or spherical coordinates.
14. Evaluate line integrals. Apply Greens theorem to evaluate a line integral.
15. Evaluate surface integrals. Apply the curl of a vector field to use Stokes theorem. Apply divergence of a vector field to use the Divergence theorem.

Attendance: Class attendance is mandatory. You are responsible for material covered in class whether or not it is in the text book. It is important to take notes, and review them after class.

Grading: A : 90.00%, B : 80.00%, C : 70.00%, D : 60.00%

Check the accuracy of your scores regularly on the grade sheet posted on the web. Grades are not negotiable based on personal reasons like scholarships, graduation time, job offers etc. Cutoff levels are firm.

- Weights: 20% homework, quizzes, attendance; 60% tests; 20% final
- Tests: There will be 4 in-class tests. The exact dates will be announced at least a week before the tests in class and on the course web page. Use of electronic devices (advanced calculators, ipods, cell phones, etc.) and cheat sheets will not be allowed on the tests. Simple calculators only capable of the 4 basic operations are allowed (but not required) on tests and quizzes. Borrowing calculators from other students on tests is forbidden. Coming to class in not sufficient preparation for taking the tests. The problems on the tests are not always routine calculations. You need to have a deep understanding of the material. You need to spend a considerable amount of time preparing for the tests. Review your notes, make sure you understand the theory and examples we do in class. Review the handouts, test each other with questions.

- Comprehensive final exam: A final exam is scheduled on finals week. Exact dates and times are available on the NAU academic calendar on the NAU web site.
- Quiz: A quiz may be given at any time without announcement. There may be group and individual quizzes.
- Homework: Homework will be assigned regularly on WeBWorK or on paper. Try to log in to WeBWorK as soon as possible to make sure you have an account. Let me know immediately if you experience difficulties logging in. Check WeBWorK regularly for new assignments. Make sure your email address on WeBWorK is current. I am going to send out announcements to this email address. I recommend that you collect your solutions to the WeBWorK problems in a notebook. Check the course web page regularly for announcements. Homework is the foundation of your learning. You cannot expect to solve the assigned problems easily. Some problems require a great deal of effort and time. Even if you are unable to solve a problem, the time spent on trying is not wasted. The only way to build mathematical skills is to think about problems. The more you think the more you know. Do not spend your time on memorization. Try to understand everything as deeply as possible. The emphasis in this class, like in any mathematics class, is on understanding. Your questions are always appreciated. No late homework is accepted. It is recommended to create study groups and discuss the assigned problems but you need to solve your homework sets on your own. The discussion forum is a convenient way to communicate with other students in the class. I encourage you to discuss the homework problems on the discussion forum.

Resources: Free tutoring is available in AMB 137 through the Math Achievement Program. Computers are available in AMB 137 and in AMB 222.

Portfolio: Please collect and save all handouts and graded material in a portfolio.

Activities: You can earn extra credit by submitting solutions to the problem of the week. Link is available on the course web page.

Make up tests will be given only in case of verified medical or other emergency which must be documented. You must make a reasonable effort to notify me as soon as you can. Let me know before a missed test is given if possible. The best way to contact me is by email. Tell me your name and class time if you send me an email.

Classroom Etiquette: Laptop and cell phone use (including texting) during classes is inappropriate.

Other policies: Please read the **Department Policies** and **Academic integrity policy** documents on the course web site.

All the information on this syllabus are subject to change and any class announcements regarding the syllabus are considered official amendments to it.