COURSE DESCRIPTION
CALCULUS III
MA 227–DW
FALL 2022

DEPARTMENT OF MATHEMATICS
UNIVERSITY OF ALABAMA AT BIRMINGHAM

Course Instructor: Rudi Weikard
Office: UH 4032
Zoom: `https://uab.zoom.us/my/rudi.weikard`
E-mail: weikard@uab.edu
Office Hours: TT 1:15 pm – 2:15 pm and by appointment

Meeting times: MTWT 2:30 pm — 3:20 pm
Meeting location: HHB 221
Prerequisite: Grade of C or better in MA 126 or equivalent
Credits: 4 semester hours
Textbook: James Stewart, Essential Calculus, 2nd ed., Brooks/Cole, 2012.
Canvas: `https://www.uab.edu/elearning/canvas/`
UAB United: `https://www.uab.edu/uabunited/students`

Important dates:

First day of classes: August 22
Labor Day Holiday: September 5
Test I: September 19
Test II: October 18
Test III: November 17
Fall/Thanksgiving Break: November 21 – November 27
Last day of classes: December 1 (for this class)
Final Exam: December 7, 1:30 pm — 4:00 pm
Grades available online: December 14

Course content:

- Vectors in two and three dimensions, their geometric and algebraic representation, dot product and cross product (Sections 10.1 – 10.4, review)
- Parametrizations of curves, surfaces and solids (Sections 10.5 – 10.6, review)
- Vector functions: continuity, derivatives, and integrals; Velocity, acceleration (Section 10.7 & 10.9, review)
- Functions of several variables: limits, continuity and partial derivatives (Sections 11.1 – 11.3)
- Linear approximation (Section 11.4)

Date: August 15, 2022.

- The chain rule (Section 11.5)
- Gradient, directional derivatives (Section 11.6)
- Optimization (Sections 11.7 – 11.8)
- Double and triple integrals (Sections 12.1 – 12.2 and 12.4 – 12.5)
- Integration using polar, cylindrical, and spherical coordinates (Sections 12.3 and 12.6 – 12.7)
- Change of variables (Section 12.8)
- Vector fields and line integrals (Sections 13.1 – 13.3)
- Green's theorem (Sections 13.4)
- Curl and divergence(Sections 13.5)
- Surfaces and surface integrals (Sections 13.6 – 13.7)
- The integral theorems of Stokes and Gauss (Sections 13.8 – 13.9)

Aims of the course:
The course aims for students to attain *conceptual understanding* and *procedural fluency* with regard to the Calculus of Differentiation and Integration for several variables. *Conceptual understanding* is demonstrated by the ability to explain in detail the solutions of assigned problems. *Procedural fluency* is demonstrated by exercising routine tasks in an assured and timely fashion. The course also emphasizes *critical thinking* and *communication skills*, both written and verbal.

Methods of teaching and learning:

- 55 class meetings of 50 minutes with presentations by the instructor as well as by students.
- A significant time commitment (certainly more than class time) is to be expected.
- Working in groups is encouraged but not required.
- Students may seek outside help (books, internet, class mates) as they see fit as long as any help is acknowledged.

How this class works

Tell me and I forget, teach me and I may remember, involve me and I learn.
(Chinese proverb)

In this course we will approach learning in a different way from what you are likely used to. The best way to learn mathematics is to do mathematics and while (or rather because) that may often mean struggle and sometimes failure, the benefit of actively engaging with the subject are profound. Last year I was watching my grandson learning how to walk. Frequently he lost balance and fell only to get up again and start over. Getting up again is exactly what I hope you will do after one of your inevitable mistakes.

It is in our genes to learn walking and talking. It is also in our genes to be able to learn reading, writing, and thinking logically. Therefore I urge you to approach the tasks at hand without fear. You can do it, but you will fall once in a while (as do I).

Assessment procedures: There are three tests during the term and a Final Exam. The midterm tests will each weigh 10% in your final score while the Final

Exam will weigh 30%. The remaining 40% may be earned through presentations of homework problems according to the following rules:

(1) The correct presentation of a problem (or sometimes two) will earn 10 points. It is advised to write out a solution on paper beforehand. Then a document camera can be used to present your work.
(2) The audience (including the instructor) may challenge a statement made in the course of a presentation at any point.
(3) If the presenter is able to defend the challenged statement, he or she proceeds; if not, the presenter must sit down earning no points for this problem and losing the right to present again that day. The challenger may then present his or her solution to the topic at hand.
(4) The successor of a presenter will be chosen as the student with the smallest number of points among the volunteers taking into account the modification by rules (3) and (5). A random choice is made, if necessary.
(5) You may volunteer for a particular topic by an e-mail to me. This (in the order received) establishes priority among volunteers with the same number of points.
(6) You must give credit where credit is due, i.e., during your presentation you must declare the points at which you had help and by whom.
(7) It is also possible to report joint work with one or two collaborators. In such a case 4 points will be earned for the presentation while the other 6 points are evenly distributed among the collaborative.

If we reach 200 presentations, the student (or the students) with the highest score, then called H, will receive 100 points (the presentation score). A student with S points will receive the presentation score $100S/H$. If 200 presentations are not reached the number H will be scaled accordingly. The course performance is the weighted sum of presentation score, test scores, and final exam score (with weights as mentioned above). This is a number between 0 and 100. Your final grade is then determined according to the following table:

Course performance:	90-100	75-90	60-75	50-60	below 50
Final Grade:	A	B	C	D	F

Course policies:

- Please make sure that you are able to receive e-mails through your Blazer-ID account. Official course announcements may be sent to that address.
- If a test is missed due to a serious verifiable circumstance or official university business, the test grade will be replaced with the properly rescaled final exam score. You have to advise the instructor of such circumstances at the earliest possibility.
- No books or phones will be allowed during the tests.
- Calculators which do not have access to the internet will be allowed during the tests.
- A 5" × 8" Quick Reference Card prepared by the student (no copies!) will also be allowed during the tests.

Tips:

- Help is available in the Math Learning Lab (HHB 202). For specific information on opening hours click on Math Learning Lab under the Resources tab of the department's homepage at `www.uab.edu/cas/mathematics`.
- By working steadily and regularly, you will increase your chances to succeed in this course.
- If your are contacted via the Early Alert Program, you should consider taking advantage of the services it offers. Various services to assist you are also listed at `https://www.uab.edu/students/home/services`.
- Remember, being a full-time student is a full-time job.
- Seek help when you need it.

Disability Support Services

UAB is committed to providing an accessible learning experience for all students. If you are a student with a disability that qualifies under the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act, and you require accommodations, please contact Disability Support Services for information on accommodations, registration and procedures. Requests for reasonable accommodations involve an interactive process and consist of a collaborative effort among the student, DSS, faculty and staff. If you are registered with Disability Support Services, please contact me to discuss accommodations that may be necessary in this course. If you have a disability but have not contacted Disability Support Services, please call (205)934-4205 or visit `http://www.uab.edu/dss`.

Title IX Statement The University of Alabama at Birmingham is committed to providing an environment that is free from sexual misconduct, which includes gender-based assault, harassment, exploitation, dating and domestic violence, stalking, as well as discrimination based on sex, sexual orientation, gender identity, and gender expression. If you have experienced any of the aforementioned conduct, we encourage you to report the incident. UAB provides several avenues for reporting. For more information about Title IX, policy, reporting, protections, resources and supports, please visit the UAB Title IX webpage for UABs Title IX Sex Discrimination, Sexual Harassment, and Sexual Violence Policy; UABs Equal Opportunity and Discriminatory Harassment Policy; and the Duty to Report and Non-Retaliation Policy.