Math 251 - Multivariable Calculus, Spring 2022
Course Syllabus

Instructor: Brian Leary
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   Office: Learning Resource Center 323K
   Office hours: Mon: 1-2, Tues: 1-2, Wed: 1-2 & 6pm-7pm (online), Thurs: 12-1, Fri: 10-11
The Wednesday evening online office hour will be accessible through Google Meet with the meeting code TechMathLeary. Other office hours will be in person, and I may be available by appointment at additional times.

Class Room/Time: INN-B 314, MTWF 12:00-12:50 pm
Course website: community.wvu.edu/~bal0018/math251S22.html (as a backup website, I will also try to keep the eCampus site updated)

Course announcements and some course material may be posted on the website or sent via email. Please be sure to check the website regularly, and to regularly check the email address you have on record. You are responsible for any information posted on the course website.

Textbook: OpenStax *Calculus Volume 3*, available to download for free at
   https://openstax.org/details/books/calculus-volume-3.

Catalog Data: MATH 251 Multivariable Calculus (4-0) Credits 4. Introduction to solid analytic geometry, vector algebra, and calculus of several variables.
Prerequisite: MATH 156 with a grade of C- or better

Course Objective: This course is designed to continue the study of calculus, covering mainly three-dimensional analytic geometry, differentiation/integration of functions of several variables, and vector calculus. An important objective is also to develop a deeper insight and sophistication of learning mathematics.

Course Outcomes: Upon successful completion of the course, the student will be able to do the following:

1. Use equations to describe curves and surfaces in the space and find arc length and curvature of a curve.

2. Perform operations on vectors and use vector functions to describe and analyze motions in space.

3. Find domains, limits, and partial derivatives of multivariable functions and apply derivative analysis to geometric problems, approximation problems, and optimization problems.

4. Evaluate double and triple integrals and use them in applications, including finding volume, center of mass, moments, and surface area.

5. Evaluate line and surface integrals, and understand and use major theorems in vector calculus (Fundamental theorem of line integrals, Green's theorem, Stokes' theorem, and Divergence theorem).

Course material: This course is a study of multidimensional space. First, we gain an understanding of three dimensional space using both an analytical geometry approach and a vector approach. Once we understand 3D space and surfaces in 3D space, we begin to use calculus to analyze them, analogous to how we used calculus to analyze curves. We find that partial derivatives can be used to give a 3D analog of the tangent line considerations of Calc 1, and we study how to use multiple integrals to compute general volumes and surface areas of surfaces. Finally, we finish by studying vector calculus, which is the calculus of functions that map points to vectors.

Topics:

1. Vectors and Three Dimensional Analytical Geometry (8 days - Chapter 2)

2. Vector-Valued Functions (8 days - Chapter 3)

3. Partial Derivatives (14 days - Chapter 4)

4. Multiple Integrals (15 days - Chapter 5)

5. Vector Calculus (16 days - Chapter 6)

Grading: Your final grade will be based on homework, quizzes, four exams during the semester, and the final exam. Your final course score will be the maximum of the following two grading schemes:

- 15% Homework + 5% Quizzes + 15% Exam 1 + 15% Exam 2 + 15% Exam 3 + 15% Exam 4 + 20% Final Exam

- 15% Homework + 5% Quizzes + 20% (highest grade of the four exams) + 20% (2nd grade of the four exams) + 15% (3rd grade of the four exams) + 25% Final Exam

Letter Grade Cutoffs: A: 90%, B: 80%, C: 70%, D: 60%, F: below 60%

Homework: Homework will be completed online with MyOpenMath.com. When you sign-up, you will use the Course ID and Enrollment Key given in class and posted on the eCampus site. Homework assignments will be due most Fridays.

A note about the homework: the only real point of the homework is for you to do it. The time you spend thinking, trying things, getting wrong answers, and (hopefully) getting right answers is the purpose of the homework. The exams are where your course grade will really be decided, and the homework is your training for the exams. Don't skip your training!

Exams: There will be four exams, tentatively scheduled for Wednesday, January 26; Friday, February 11; Friday, March 11; and Friday, April 8. These will be 50 minute exams taken during the regular lecture time. The final exam time has been set by the university, and will be on Wednesday, May 4 from 10:00 am to 11:50 am. Make-up exams will only be given to students with excused absences, and such make-up exams must be scheduled within 24 hours of the missed exam.

Quizzes: There will be a quiz given most weeks in which there is no exam. This will be a very brief quiz given at the beginning of class, intended to test you with more immediacy than the exams and with less consequence. The problems that appear on the quiz will be taken from the homework problems I assign. Only your best 5 quizzes will count toward your grade, and there will be absolutely NO make-up quizzes.

Class policies:

- Graphing calculators will never be allowed during any exams. Scientific calculators will be considered on an exam by exam basis. You may use any calculator to help you do the homework if you wish, but you should keep in mind that you may be required to solve similar problems without a calculator on the quizzes and exams.

- While class attendance does not directly factor into your grade computation, attendance of each lecture is highly recommended. Regular attendance will tend to lead to better understanding of the course material, which tends to lead to better performance on exams.

- If you believe a problem on a homework assignment or midterm exam has been graded incorrectly, you must notify the instructor of your complaint within 7 days of the date the exam is handed back. If you are unable to retrieve your graded material at the time it is handed back, it is your responsibility to make arrangements with the instructor to retrieve the material at another time.

Getting Help: Always remember: asking for help when you need it is not a sign of weakness, but a sign of strength! Please feel free to attend my office hours or email me if you have questions about the course material. If you are unable to make it to my regularly scheduled office hours, I am willing to make an appointment to meet at another time if possible. Additionally, you can get help in the Math Tutoring Lab in LRC 323 from 8 AM to 4:30 PM. Free tutoring is also available through Student Support Services, located in Benedum 130, and the Student Success Center, located in the library on the second floor of LRC. Finally, I would also encourage the formation of study groups, to learn from each other and help each other learn.

Institutional Policies: Students are responsible for reviewing policies on inclusivity, academic integrity, incompletes, sale of course materials, sexual misconduct, adverse weather, as well as student evaluation of instruction, days of special concern/religious holiday statements, and the updated COVID-19 statement. For these detailed policies of West Virginia University, please review: https://tlcommons.wvu.edu/syllabus-policies-and-statements.