**Course Syllabus**

**MATH 2215 – Multivariate Calculus**

Fall semester, 2024

**Course:** MATH 2215 – Multivariate Calculus; **CRN**: ???????

**Textbook:** (Required) The primary text for this course is [Calculus III](https://courses.lumenlearning.com/calculus1/) by Lumen Learning, adapted from [Calculus Volume 3](https://openstax.org/details/books/calculus-volume-1) by OpenStax.

NOTE: This is a Pilot course and as part of your participation in the pilot, access to Lumen OHM will be at no cost.

**Prerequisites:** A grade of C or higher in MATH 2212, or an equivalent transfer credit.

**Class structure:** The class is taught in the lecture format, with two weekly lectures. Lectures are mandatory to attend and are integral for your success in the course.

**Class schedule:** ??????? and ???????? at ????pm-????pm in ?????.

**Instructor’s contact info:**

* Dr. ??????????: **Office:** 25 Park Place, room ????; **Email:** ?????????.

**Office hours:** Every ?????? and ??????? at ????? am–?????am; or by appointment.

**MATH 2215 is a Core IMPACTS course that is a part of the Mathematics area.**

Core IMPACTS refers to the core curriculum, which provides students with essential knowledge in foundational academic areas. This course will help students master course content, and support students’ broad academic and career goals.

This course should direct students toward a broad Orienting Question:

* How do I measure the world?

Completion of this course should enable students to meet the following Learning Outcome:

* Students will apply mathematical and computational knowledge to interpret, evaluate, and communicate quantitative information using verbal, numerical, graphical, or symbolic forms.

Course content, activities, and exercises in this course should help students develop the following Career-Ready Competencies:

* Information Literacy
* Inquiry and Analysis
* Problem-Solving

**Lumen OHM supplemental website:** Signing up for a LUMEN OHM account is a required component of this class, because it will be used for assigning graded online homework. Moreover, the entire textbook is available electronically on the website, as well as additional study and review resources. You will be able to register and access LUMEN OHM directly through icollege.

**iCollege:** Most course-related materials are available or will be posted throughout the semester on GSU’s iCollege website. You can log in to iCollege at <http://icollege.gsu.edu/>.

**Course content: Real-valued functions of several variables, limits, continuity, differentials, directional derivatives, partial derivatives, chain rule, multiple integrals, their applications.**

**Student Learning Outcomes:**

1. Define, calculate and apply the concepts of vectors, dot product and cross products.
2. Calculate arc length, unit tangent and normal vectors.
3. Perform computations with vector-valued functions.
4. Analyze and apply the concepts of limits and continuity to multivariable functions.
5. Use Lagrange multipliers to find extreme values of multivariate functions.
6. Calculate and apply partial derivatives and gradient fields.
7. Calculate double and triple integrals, understand the relationship of the integrals with geometric. regions in rectangular, polar and spherical coordinate systems.

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**Course evaluation:** Your course grade will be determined as follows:

1. **Tests (48%).** There will be three tests – closed-books, closed-notes, with basic calculators allowed (see the calculator policy below). Each test will contribute 16% to your course grade.
2. **Homeworks (13%).** Online homeworks will be made available in icollege via the LUMEN OHM platform throughout the semester. Both “Pre-Lecture” and “Homework” assignments will count towards the homework grade. The average of all homework grades will contribute 13% to your course grade.
3. **Quizzes (13%).** There will be several types of quizzes in this course in class, and/or on iCollege. In the end of the semester, two lowest quiz grades will be dropped, and the average of the remaining quizzes will contribute 13% to your course grade.
4. **Attendance (4%).** Attendance is taken during every class. Credit for attending class requires students to be present during the entire class period. Students will be allowed 2 lecture absences without penalty to the attendance grade. Each additional absence will affect the attendance grade.
5. **Final Exam (22%).** The comprehensive final exam is scheduled for **???????????** at ???pm-???pm. Except for its duration, the format and policies for the final exam are the same as for the tests. If your Final Exam score is higher than your lowest test score, it will be used to replace the lowest test score in the determination of your final grade.

**Letter grades** will be awarded as follows:

97%-100% → A+

93%-96% → A

90%-92% → A-

87%-89% → B+

83%-86% → B

80%-82% → B-

77%-79% → C+

70%-76% → C

60%-69% → D

Below 60% → F

**Example of final course grade computation**

Tests: T1 = 88, T2 = 73, T3 = 76; Homework average = 96.4; Quiz average = 81.7; Attendance = 100; Final exam = 79;

Final grade: (88+79+76)\*0.16 + 96.4\*0.13 + 81.7\*0.13 + 79\*0.22+100\*.04 = 83.413 which is a B. (Note the replaced grade for Test 2.)

\*\*\*Note:  The replacement of the lowest midterm grade with final exam grade (if it is higher) will be done during the calculation of final grades.  The grade replacement will not appear in icollege.  Grades in icollege will reflect the grades earned throughout the semester

**Writing in mathematics:** Your grades on all written assignments will be based on clear presentation as well as correct mathematics. It is often a good idea to model your writing on the examples worked in class or posted online. If you are unsure of whether or not written work is acceptable, you should ask about it. Please be aware that the process, and not merely the final answer, is critical to your understanding of the material and your success in the course. Precise, effective writing will be rewarded. Careless or incomplete work will be penalized, even if by chance it leads to a correct numerical answer. This means your final answer is worth less than the procedure you used to get your answer.

**Prerequisite policy:** During the first two weeks of the semester the Department of Mathematics and Statistics checks whether or not each student has met the prerequisites for this course. If you do not have the prerequisites, please inform me and change to another course right away. If our check finds that you do not have the prerequisites, you must drop this course or you will be dropped (or withdrawn) automatically.

**Withdrawal policy:**

1. **Undergraduates:** If you withdraw from this class on or before the Midpoint of the semester (**5:00pm on Tuesday, October 15th, 2024**), you will receive a WP regardless of your performance. The computer will then turn this into a W or a WF depending on how many cumulative withdrawals you have in the University. Voluntary withdrawals after the Midpoint are not allowed.
2. **Others:** If you withdraw from this class on or before the Midpoint of the semester (**5:00pm on Tuesday, October 15th, 2024**), you will receive a W or a WF depending on your performance. You must be passing (70 average or better at the time of withdrawal) to receive a W.

**Other faculty initiated withdrawals:** Attending the course implies consistent class attendance and active involvement both on iCollege and in Lumen OHM which is accessed directly through icollege. Failure to meet the following requirements will be considered as lack of attendance:

1. If you do not attend any of the class periods during the first two weeks of the semester, you will be administratively withdrawn from the class for non-attendance.
2. If you do not register and access Lumen through icollege during the first two weeks of the semester, you will be administratively withdrawn from the class for non-attendance.
3. If you stop attending the course and/or completing assignments you may be administratively withdrawn from the course as stopped attending.

**Excused absences and makeup policy:** Making up missed graded assignments is allowed **only** in case of a documented, verifiable excuse. In case of an extended emergency (7 days or more), students must promptly submit documentation to the Dean of Students Office (DOS) at <https://deanofstudents.gsu.edu/student-assistance/professor-absence-notification/>. Instructors will then be notified by the DOS of these excused absences without the need to manage medical or other pertinent information individually. For shorter excused absences, you must communicate with your instructor directly. Missing the final exam will result in a grade of F for the course unless arrangements are made **prior** (at least 2 weeks) to its administration.

**Calculator Policy:** For all graded assignments you are allowed to use a non-programmable, non-graphing, non-symbolic-solving scientific calculator. Examples of suitable calculators include: Casio fx-260 (but not Casio fx-300 or Casio fx-115ES), TI-30X IIS (but not TI-83 or more advanced models), HP-9S (but not HP-9G or HP-35), Sharp EL-501 and Sharp EL-531 (but not Sharp EL-W535). Your calculator cannot have buttons or functions involving integration or differentiation. Your calculator should have buttons for parentheses, exponent (raising to any power), reciprocal, trigonometric functions and their inverses, exponentials, logarithms, and memory for numbers (not programs or equations). Use of mobile phones is not permitted in place of a calculator under any circumstances. Breaking these rules will be treated as cheating according to the university guidelines below. Any questions regarding the allowance of a particular calculator should be submitted to the instructor by email.

**Academic integrity policy:** Cheating/plagiarism will not be tolerated on any work. A test score of “0” for academic dishonesty will NOT be replaced by the final exam.  Academic dishonesty on the final exam may result in an “F” for the course. A first occurrence will result in a grade of 0 on the assignment for all concerned parties as well as an Academic Dishonesty form being filed with the Dean’s Office. A second occurrence will result in a grade of F for the course for the concerned parties and a second Academic Dishonesty form being filed. (See also the University’s policy on Academic Honesty at <http://codeofconduct.gsu.edu/>.)

**Copyright and Honesty Clause. All content created in this course, including videos, handouts, etc., may be used only by students enrolled in the course for purposes relating to the course. The selling, sharing, publishing, presenting, or distributing of instructor-prepared course lecture notes, videos, audio recordings, or any other instructor-produced materials from any course for any commercial or non-commercial purpose is strictly prohibited, unless explicit written permission is granted in advance by the course instructor. This includes posting any materials on websites such as Chegg, Course Hero, OneClass, Stuvia, StuDocu, and other similar sites. Unauthorized sale or commercial or non-commercial distribution of such material is a violation of the instructor’s intellectual property and the privacy rights of students attending the class, and is prohibited. Failure to abide by these limitations constitutes a violation of the Policy on Academic Honesty and will be treated accordingly.**

**Electronic Technology Policies:** You should not use your cell phone or computer or another device for tasks that are not class related, i.e., you should not text, talk, or do anything that may be considered by your instructor to be disruptive. If you have an emergency, for which using your cell phone is absolutely necessary, quietly step out of the class to handle the emergency.

**Inclement weather policy:** If the University is closed due to inclement weather, any exam that may have been scheduled for that date will be administered on the next available class date. If an in-class assignment is due that day, it will be due the next class.

**Academic support:**

1. Form study groups with classmates.
2. Attend all Supplemental Instruction sessions (see above). You can also visit other classes’ SI sessions.
3. See your instructor during office hours. You can also see any other current Calculus-I instructor.
4. 4. Visit the Panther Tutoring - Stem center located in the GSU Sports Arena, room 102. ( <https://cas.gsu.edu/academics-admissions/undergraduate-learning/stem-education-programs/stem-tutoring/>  (404)413 - 5563.).
5. Visit the Counseling and Testing Center: learning assistance, test anxiety classes, student support services (<http://counselingcenter.gsu.edu/>, 404-413-1640).

**Additional notes:**

1. Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State University. Upon completing the course, please take time to fill out the online course evaluation.
2. Students who wish to request accommodation for a disability may do so by registering with the Access and Accommodations Center (<https://access.gsu.edu/>). Students may only be accommodated upon issuance by the Center of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.
3. GSU has a process for students seeking excused absences through the Dean of Students Office. Should a student test COVID positive, they have to submit documentation to <https://deanofstudents.gsu.edu/student-assistance/professor-absencenotification/>. Instructors will then be notified by the Dean of Students of any excused absence without the need to manage medical information individually.

This syllabus provides a general plan for the course; deviations may be necessary.

**Tentative course outline:** This day by day outline provides a general plan for the course; deviations may be necessary.

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| **Week** | **Start Date** | **Sections** |
| 1 | Aug. 26 | Intro, 2.1, 2.2 |
| 2 | Sep. 2 | 2.3, 2.4 |
| 3 | Sep. 9 | 2.5, 2.6, 2.7 |
| 4 | Sep. 16 | 3.1, 3.2, 3.3 |
| 5 | Sep. 23 | *Test 1 Review*  **Test 1** |
| 6 | Sept. 30 | 4.1, 4.2, 4.3 |
| 7 | Oct. 7 | 4.4, 4.5 |
| 8 | Oct. 14 | 4.6  *Test 2 Review* |
| 9 | Oct. 21 | **Test 2**  4.7 |
| 10 | Oct. 28 | 4.8, 5.1 |
| 11 | Nov. 4 | 5.2, 5.3  *Test 3 Review* |
| 12 | Nov. 11 | **Test 3**  5.4 |
| 13 | Nov. 18 | 5.5 |
| 14 | Nov. 25 | Thanksgiving break, no classes. |
| 15 | Dec. 2 | 5.7  *Final Exam Review* |
| 16-17 | Dec. 10 – Dec.17 | **Final Exam**  **(date and time: see above)** |

**MATH 2215 Curriculum**

**Chapter 2 Vectors in Space**

2.1 Vectors in the Plane

2.2 Vectors inf Three Dimensions

2.3 The Dot Product

2.4 The Cross Product

2.5 Equations of Lines and Planes in Space

2.6 Quadric Surfaces

2.7 Cylindrical and Spherical Coordinates

**Chapter 3 Vector Valued Functions**

3.1 Vector-Valued Functions and Space Curves

3.2 Calculus of Vector-Valued Functions

3.3 Arc Length and Curvature

3.4 Motion in Space

**Chapter 4 Differentiation of Functions of Several Variables**

4.1 Functions of Several Variables

4.2 Limits and Continuity

4.3 Partial Derivatives

4.4 Tangent Planes and Linear Approximations

4.5 The Chain Rule

4.6 Directional Derivatives and the Gradient

4.7 Maxima/Minima Problems

4.8 Lagrange Multipliers

**Chapter 5 Multiple Integration**

5.1 Double Integrals over Rectangular Regions

5.2 Double Integrals over General Regions

5.3 Double Integrals in Polar Coordinates

5.4 Triple Integrals

5.5 Triple Integrals in Cylindrical and Spherical Coordinates

5.7 Change of Variables in Multiple Integrals