MATH 2551 Syllabus

Multivariable Calculus, Section R, 4 credit hours

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Instructor Information

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General Course Information

Description

Math 2551 is an introduction to multivariable calculus. Topics include:

- Vectors and the geometry of space, vector calculus, parametric curves and motion
- Functions of several variables, visualization and partial differentiation, gradients, linear approximation, tangent planes, differentials, optimization, Lagrange multipliers
- Double and triple integrals, geometric and spatial applications, change of variables
- Vector analysis including the theorems of Green, Gauss, and Stokes

Course Learning Outcomes

The primary goal of Math 2551 is to prepare students to succeed in upper level courses that require this course as a pre-requisite. Upon successful completion of the course, students will be able to:

- Describe three-dimensional vectors, surfaces, and multivariable functions geometrically.
- Analyze vector-valued functions using calculus to characterize motion and paths in two and three dimensions.
- Calculate and interpret derivatives of multivariable functions to describe and estimate how such functions change.
- Analyze and solve multivariable optimization problems.
- Construct and evaluate integrals of multivariable functions using Cartesian and other coordinate systems.
- Construct and evaluate integrals of scalar and vector functions over curves and surfaces using the theorems of Green, Gauss, and Stokes
- Apply these integrals and theorems to model physical quantities such as flux and circulation.
- Contextualize mathematical quantities involving multivariable functions to interpret their meaning within problems that arise in everyday life or to give a geometric interpretation of them.

Prerequisites

- Calculus II: At least one of MATH 1552 or MATH 1X52
- Linear Algebra: At least one of MATH 1553, MATH 1554, MATH 1564, MATH 1X53, MATH 1X54

Required Course Materials

Textbook Thomas, Calculus: Early Transcendentals 15th edition by Addison-Wesley (Pearson). The textbook is not required for the class; many good references for the material of MATH 2551 can be found online or at the campus library.

A few online resources are listed below in no particular order:

- OpenStax Multivariable Calculus
- APEX Calculus
- Active Calculus - Vector Calculus
- Diana Davis' Multivariable Calculus
- Paul's Online Notes
- Khan Academy Multivariable Calculus

Grading Policy

Your final grade in the class will be computed according to the table below. Canvas will not accurately reflect your grade during the semester!

Grading scheme:
10% Homework
15% Quizzes
25% Max(Midterm 1, Final Part 1)
25% Max(Midterm 2, Final Part 2)
25% Max(Midterm 3, Final Part 3)

Grade Assignment After *all* grades are in and all overall percentage scores for students have been computed using the weights described above, grades are assigned. The standard cutoffs are as follows.

A: [90%, 100%] B: [80%, 90%) C: [70%, 80%) D: [60%, 70%) F: [0%, 60%)

Grades will not be rounded, but grade cutoffs may be adjusted at the end of the semester. So, to guarantee an A, get 90% or better overall. To guarantee at least a B grade, get 80% or better overall, etc.

Description of Graded Components

Homework Homework will be due through WeBWorK. There are a total of 245 homework points available in the course. The homework component of your grade will be **the fraction of points you earn out of 173**, capped at 100%. If you complete all of the weekly homework sets, you will meet the point cap. The practice problem sets and review problem sets are there to give you some leeway with the weekly assignments and to provide extra practice should you desire it for exams. All homework due dates are posted in WeBWorK and the course calendar.

Quizzes, Exams, & Regrades

- **Quizzes:** We will have quizzes in studio on some days. They will sum to a total of 40 points. The quiz component of your grade will be **the fraction of points you earn out of 36**, capped at 100%. No books, notes, calculators, cell phones, or other electronic devices are allowed during quizzes and exams.
- **Midterm Exams:** We will have three midterm exams, which will take place **during lecture** on the following dates listed in the course calendar.

- **Regrades:** Quizzes and exams will be graded through Gradescope. Once an assessment is graded, you will have one week to submit a regrade request. You can do this by accessing Gradescope from Canvas, clicking the option for a regrade request, and following the instructions. Regrade requests will not be considered unless they are made in this manner through Gradescope.
  - Regrade requests must reference a specific rubric item and specific part of the solution key that were not applied correctly.
  - Regrade requests may result in your grade being decreased if I observe that your solution was originally graded too generously
  - Regrade requests that do not reference a specific rubric item or part of the solution key will be ignored.
- **Final exam:** The final exam in this class serves as an opportunity for you to demonstrate increased mastery of the concepts of the course. It will consist of three parts, corresponding to the three midterm exams. Each part is optional; you may choose to take anywhere from none to all three parts.

  By taking any part of the final, you can only increase your grade in the course: the corresponding midterm grade will be replaced by the final grade, if this is higher. If the final exam part grade is lower, your grade will remain unchanged.

  Our final will be on TBD from TBD to TBD in TBD (most likely our usual lecture hall). For the full final exam schedule, see the registrar's schedule. **Only under extreme extenuating circumstances** will you be able to take the final exam at a different time or date. Early travel plans (including already-purchased tickets) are **not** an acceptable reason for this.

Course Policies

Attendance and Participation

You are expected to come prepared and actively participate in every lecture and studio session.

Class disruptions of any kind will not be tolerated and may result in your removal from the classroom. Please show courtesy to your fellow classmates and instructor by adhering to the following class rules: keep use of electronic devices focused on class-related activities, come to class on time and stay for the entire class period, refrain from conversing with your fellow students about non-mathematical topics during class, and put away any reading materials unrelated to the course.

In the event of an absence, you are responsible for all missed materials, assignments, and any additional announcements or schedule changes given in class.

Missed work policy

If you have to miss class on a day when a quiz or exam is scheduled for any of the following reasons or any other personal emergency, I will work with you to make up the assessment, as long as you are in communication with me in a timely manner.

- **University-approved absences**: Please give me notice by the second Wednesday of the semester, or as soon as possible once your absence has been approved.
- **Religious holiday**: By the second Wednesday of the semester, you should notify me of any classes (including studio) you will miss due to religious holidays.

- **Illness**: Except under extenuating circumstances, you should notify me *in advance* and for cases where you are ill enough to need medical care, provide the Office of Student Life with appropriate documentation, so that they can confirm it with me. Illnesses such as COVID, colds, flu, or other such illnesses where you feel unwell and don't want to infect others but do not feel ill enough to visit a doctor do not need documentation.
- **Family or personal emergency**: Notify me as soon as possible and when applicable (for extended absences) provide the Office of Student Life with appropriate documentation, so that they can confirm it with me.

If you do not communicate with me about your absence to set up a make-up opportunity within a week, missed quizzes and missed exams result in a 0.

In the case of an excused absence for a quiz, you will be able to take a make-up quiz if this make-up occurs within a week of the quiz itself. Otherwise, your grade for the excused quiz will be your median grade on the other quizzes.

If you have an excused absence for an exam, then you may take a make-up exam at 11:00 am on the Tuesday or Thursday listed on the course calendar; typically a week after the exam. If this is not possible, then your corresponding unit exam grade will come solely from that section of the final exam.

Any assignment for which no paper is received will be given a 0.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.