GEORGE MASON UNIVERSITY
DEPARTMENT OF MATHEMATICAL SCIENCES
MATH 213-001 - Analytic Geometry and Calculus III - Spring 2020

Contact Information:

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Office Hours: Mondays 12:45 - 2:45 PM

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Office Hours: Tuesdays 12:40 - 1:20 PM, Thursdays 2:55 - 4:15 PM

Course Information:

Lectures: TR 9:00 - 10:15 AM, Enterprise Hall 178
Recitation: R 10:30 - 11:20 AM, or 11:30 AM - 12:20 PM, or 12:30 - 1:30 PM Aquia Building 213
Quiz Dates: Quiz 1, Tuesday February 4th
Quiz 2, Tuesday March 17th
Quiz 3, Tuesday April 21st
Midterm Dates: Midterm 1, Tuesday February 25th
Midterm 2, Tuesday April 7th
Final Exam: Tentatively Scheduled for Thursday May 7th at 7:00 AM

Prerequisite: Grade of C or better in MATH 114 or MATH 116.

Textbook Information: "*Thomas' Calculus, Early Transcendentals*", 14th edition by Hass, Heil, and Weir, ISBN 9780134439020, or "*Thomas' Calculus, Multivariable*", 14th edition by Hass, Heil, and Weir, ISBN 9780134606088.

Course Description: This course will cover most of the material contained in chapters 12, 13, 14, 15, and 16 of the textbook (see a detailed list below). Concepts will be introduced and explained during lectures. In recitation, students will see more examples and get extra practice with concepts. At any time questions are welcome and encouraged. Students will be evaluated on understanding by Quizzes, Midterms and a Final Exam. All evaluations will be timed. Quizzes will last 25 minutes, Midterms 75 minutes, and the Final Exam will be 2 hours.

Recitations: There are three recitation sections and students must be enrolled in one of them. Due to space constraints in the recitation classroom, each student must attend the recitation session in which they are registered. In recitation, students will see and work on more examples of problems that reflect what has been covered in lecture. Participation in recitation comprises 5% of the final grade for this course. The two lowest recitation participation grades will be dropped at the end of the semester.

Homework: While lectures are a vital and important part of the learning process, students learn math best by doing math. To this end, a list of problems is listed subsequently in the syllabus. These problems will not be collected or graded, but it is highly encouraged that students work on these problems in order to master the concepts. Students are encouraged to work together, but cautioned that problems and concepts must be understood individually.

Calculator Use: At no point will calculator use be permitted in class. This includes lecture and recitation examples, quizzes, midterms and the final exam. It is highly advised that work done outside of class also be done without a calculator unless a problem specifically requires it.

Attendance Policy: Attendance at every lecture and recitation is mandatory. The attendance guidelines set forth by the University will be followed. These policies can be found at the following website: `https://catalog.gmu.edu/policies/academic/registration-attendance/#text`. Make-up work will not be permitted for unexcused absences. In the case of an excused absence, students should communicate with the instructor or TA in advance if possible and obtain documentation excusing the absence. Additionally, students will still be responsible for material covered in class and will have one week to make-up any missed assignments or evaluations. It is encouraged that students make up missed assignments as soon as possible (if allowed) due to the fast-paced nature of the course.

Academic Honesty: Academic Dishonesty and/or cheating will not be tolerated! Please see `https://oai.gmu.edu/mason-honor-code/` for more information on the Mason Honor Code.

Accommodations for Students with Disabilities: Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit `http://ds.gmu.edu/` for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu, Phone: (703) 993-2474

Sexual Harassment and Misconduct: As a faculty member and designated "Responsible Employee," I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per university policy 1412. If you wish to speak with someone confidentially, please contact the Student Support and Advocacy Center (703-380-1434) or Counseling and Psychological Services (703-993-2380). You may also seek assistance from Mason's Title IX Coordinator (703-993-8730; titleix@gmu.edu).

Communication: Students must use their MasonLive email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.

Academic Help: Tutoring for this course is available. More information can be found at `http://math.gmu.edu/tutor-center.php`.

Grades:

The grade for this class will be computed in the following way:
Recitation Participation: 5 %
Quizzes: 15 %
Midterm 1: 20%
Midterm 2: 20%
Final Exam: 40%

Grades will be categorized as follows:

$$90 \leq A- < 92 \leq A < 98 \leq A+ \leq 100$$
$$80 \leq B- < 82 \leq B < 87 \leq B+ < 90$$
$$70 \leq C- < 72 \leq C < 77 \leq C+ < 80$$
$$0 \leq F < 60 \leq D < 70$$

Topics to be Covered by Chapter and Section:

Chapter 12: Vectors and the Geometry of Space
12.1 Three-Dimensional Coordinate Systems
12.2 Vectors
12.3 The Dot Product
12.4 The Cross Product
12.5 Lines and Planes in Space
12.6 Cylinders and Quadric Surfaces

Chapter 13: Vector-Valued Functions and Motion in Space
13.1 Curves in Space and Their Tangents
13.2 Integrals of Vector Functions; Projectile Motion
13.3 Arc Length in Space
13.4 Curvature and Normal Vectors of a Curve
13.5 Tangential and Normal Components of Acceleration

Chapter 14: Partial Derivatives
14.1 Functions of Several Variables
14.2 Limits and Continuity in Higher Dimensions
14.3 Partial Derivatives
14.4 The Chain Rule
14.5 Directional Derivatives and Gradient Vectors
14.6 Tangent Planes and Differentials
14.7 Extreme Values and Saddle Points
14.8 Lagrange Multipliers

Chapter 15: Multiple Integrals
15.1 Double and Iterated Integrals over Rectangles
15.2 Double Integrals over General Regions
15.3 Area by Double Integration
15.4 Double Integrals in Polar Form
15.5 Triple Integrals in Rectangular Coordinates
15.6 Applications
15.7 Triple Integrals in Cylindrical and Spherical Coordinates
15.8 Substitutions in Multiple Integrals

Chapter 16: Integrals and Vector Calculus
16.1 Line Integrals of Scalar Functions
16.2 Vector Fields and Line Integrals: Work, Circulation, and Flux
16.3 Path Independence, Conservative Fields, and Potential Functions
16.4 Green's Theorem in the Plane
16.5 Surfaces and Area
16.6 Surface Integrals
16.7 Stokes' Theorem
16.8 The Divergence Theorem and a Unified Theory

Suggested List of Textbook Problems from "Thomas' Calculus, Early Transcendentals" by Hass, Heil, and Weir, 14th edition.

The following list of problems includes problems that address students' needs for both mastering the calculus material and solving a variety of applied problems to real world situations. The student aiming for an A grade in the course should master problems from all clusters in a homework set.

Section 12.1: Problems 1-44, 51-76.
Section 12.2: 1-34, 41-51 odd, 59.
Section 12.3: 1-9, 11, 13, 19, 21, 25, 29, 31, 43, 45.
Section 12.4: 1-8, 15-25 odd, 27-31, 33-35, 37, 39.
Section 12.5: 1-35, 39-41, 45-47, 49, 57, 59, 61, 63, 65-69, 72.
Section 12.6: 1-38.

Section 13.1: 1, 2, 7-11, 13-16, 19, 23-29 odd, 31-37.
Section 13.2: 1-15, 21-23.
Section 13.3: 1-8, 11, 13, 15, 18.
Section 13.4: 1, 3, 5, 9, 11, 13, 27.
Section 13.5: 1-6.

Section 14.1: 1, 3, 5-8, 17, 23, 29, 31-36.
Section 14.2: 1-6, 13-16, 25-32, 35, 37, 39, 41-56, 59-62.
Section 14.3: 1-47, 55-61 odd, 75.
Section 14.4: 1-12, 25-28, 31-35, 37-47 odd.
Section 14.5: 1-21, 25-31 odd.
Section 14.6: 1-16, 21, 23, 27-31, 35, 37, 41, 43.
Section 14.7: 1-29 odd, 31, 35, 37, 43, 50-56, 63.
Section 14.8: 1-29 odd, 37, 41, 43.

Section 15.1: 1-32, 35, 37.
Section 15.2: 1,4-6, 9-26, 29, 31, 33-42, 47-51, 57, 59.
Section 15.3: 1-22.
Section 15.4: 1-26, 29, 31, 33.
Section 15.5: 3, 5, 7-28, 37, 41, 43, 45.
Section 15.6: 1-29 odd.
Section 15.7: 1-7 odd, 13, 15, 17, 20, 23-63, 65-73, 77-87 odd, 107, 108.
Section 15.8: 1-23 odd.

Section 16.1: 1-16, 19-30, 33, 35, 37.
Section 16.2: 1-29 odd, 39, 41, 47-61 odd.
Section 16.3: 1-10, 13-33 odd.
Section 16.4: 1-19 odd, 25-39 odd, 45.
Section 16.5: 1-25 odd, 31, 33, 37-43 odd, 49-53 odd.
Section 16.6: 1-29 odd.
Section 16.7: 1-27 odd.
Section 16.8: 1-31 odd.

Tentative Semester Schedule

Date	Topics	Sections
Tuesday 1/21	Introduction/Three-Dimensional Coordinate Systems	12.1 pp. 714-717
Thursday 1/23	Vectors	12.2 pp. 719-726
Tuesday 1/28	The Dot Product	12.3 pp. 728-734
	The Cross Product	12.4 pp. 736-741
Thursday 1/30	Lines and Planes in Space	12.5 pp. 742-749
Tuesday 2/4	Lines and Planes in Space	12.5 pp. 742-749
	Quiz 1	
Thursday 2/6	Cylinders and Quadric Surfaces	12.6 pp. 751-755
	Curves in Space and Their Tangents	13.1 pp. 763-769
Tuesday 2/11	Integrals of Vector Functions	13.2 pp. 772-777
	Curvature and Normal Vectors of a Curve	13.4 pp. 785-790
Thursday 2/13	Tangential and Normal Components of Acceleration	13.5 pp. 862 - 869
	Functions of Several Variables	14.1 pp. 806-811
Tuesday 2/18	Arc Length in Space	13.4 pp. 781-784
	Line Integrals of Scalar Functions	16.1 pp. 969-974
Thursday 2/20	Line Integrals of Scalar Functions	16.1 pp. 969-974
Tuesday 2/25	**First Midterm Exam**	
Thursday 2/27	Limits and Continuity	14.2 pp. 814-820
Tuesday 3/3	Partial Derivatives	14.3 pp. 823-832
	The Chain Rule	14.4 pp. 835 - 842
Thursday 3/5	Directional Derivatives and Gradient Vectors	14.5 pp. 845-852
	Tangent Planes and Linear Approximations	14.6 pp. 853-860
Tuesday 3/10	**Spring Break**	
Thursday 3/12	**Spring Break**	
Tuesday 3/17	Vector Fields and Line Integrals	16.2 pp. 976-985
	Quiz 2	
Thursday 3/19	Path Independence, Conservative Fields, and Potential Functions	16.3 pp. 989-998
Tuesday 3/24	Extreme Values and Saddle Points	14.7 pp. 863-869
	Lagrange Multipliers	14.8 pp. 872-879
Thursday 3/26	Lagrange Multipliers	14.8 pp. 872-879
	Double and Iterated Integrals over Rectangles	15.1 pp. 897-901
Tuesday 3/31	Double Integrals over General Regions	15.2 pp. 902-908
Thursday 4/2	Area by Double Integration	15.3 pp. 911-913
	Double Integrals in Polar Form	15.4 pp. 914-919
Tuesday 4/7	**Second Midterm Exam**	
Thursday 4/9	Green's Theorem	16.4 pp. 1000-1009
Tuesday 4/14	Surfaces and Area	16.5 pp. 1012-1020
Thursday 4/16	Surface Integrals	16.6 pp. 1022-1030
Tuesday 4/21	Stokes' Theorem	16.8 pp. 1032-1043
	Quiz 3	
Thursday 4/23	Triple Integrals in Rectangular Coordinates	15.5 pp. 921-929
	Applications	15.6 pp. 931-938
Tuesday 4/28	Triple Integrals in Cylindrical and Spherical Coordinates	15.7 pp. 941-949
Thursday 4/30	The Divergence Theorem	16.8 pp. 1045-1055
	Substitutions in Multiple Integrals	15.8 pp. 953-961

This Syllabus is Subject to Change.