MAC 2234
Section: 22C1 and 22C2
Survey of Calculus II
Fall 2024

I. General Information

Class Meetings

- This is an asynchronous online course; there are no scheduled meetings.

Instructor(s)

- Avi Mukhopadhyay
- Office: 417 Little Hall
- Office Hours: T 11:00-12:00, R 1:00-2:00 in Zoom
- Email: mukhopadhyay.avi@ufl.edu

Instructor(s)

- Himanshu Yadav
- Office: 475 Little Hall
- Office Hours: M 13:55-14:45, W 13:55-14:45, in Zoom
- Email: Yadav.himanshu@ufl.edu

Course Description

MAC 2234 is the second course in the sequence MAC 2233-34. Course topics are integration (exact and numerical); Taylor series; basic probability; first-order separable differential equations; systems of linear equations, Gaussian elimination, matrices; partial differentiation, multiple integrals, Lagrange multipliers; linear programming and simplex method. (M)

Prerequisites

Minimum grade of C in MAC2233. Students should have a solid working knowledge of the concepts of first semester calculus, including the definition of the derivative, calculations of derivatives of elementary functions, applications of the derivative, exponential and logarithmic functions. A thorough grasp of

algebra is assumed. Any course grades, AP, or IB scores used to meet this prerequisite must be on file at UF by registration.

General Education Credit

- Mathematics

This course accomplishes the General Education objectives of the subject area listed above. A minimum grade of C is required for General Education credit. Courses intended to satisfy General Education requirements cannot be taken S-U.

Required Readings and Works

None. Recommended reading assignments are linked on the pages for each week of the course. Also, in this course we will use the online platform Xronos which has been developed at UF and is supported by the Office of the Provost and the College of Liberal Arts and Sciences. Xronos is accessible through the Canvas site. More details will be provided in Canvas and in class.

Materials and Supplies Fees: n/a

II. Graded Work

Assignment	Assignment Description	General Education Mathematics SLOs Met	% of Grade
Lecture Quizzes	*After each lecture, you will take a short canvas quiz on the material covered. The five lowest lecture quiz grades will be dropped at the end of the semester.*	*Communication, Content, Critical Thinking.*	**10%**
Weekly Quizzes	*There will be weekly quizzes on Canvas, based on the homework and lectures. Your three lowest discussion quizzes will be dropped at the end of the semester.*	*Communication, Content, Critical Thinking.*	**10%**
Xronos Online Homework	*Each week, practice problems associated to each lecture will be assigned. These will be completed in the online homework system accessed via links in Canvas. You have unlimited attempts at these assignments. The three lowest scores will be dropped at the end of the semester.*	*Communication, Content, Critical Thinking.*	**20%**
Exams	*There will be four exams during the semester. They will be administered in Canvas with Honorlock proctoring. The lowest exam score will be dropped at the end of the semester, provided student takes all 4 exams and scores at least 40% on exam 4.*	*Communication, Content, Critical Thinking*	60%

Description of Graded Work

Grading Scale

Your final grade will be rounded to the nearest hundredth and a letter grade will be given using the following grading scale. For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

A	90-100%		C	67-73.99%
A-	87-89.99%		C-	64-66.99%
B+	84-86.99%		D+	60-63.99%
B	80–83.99%		D	57-59.99%
B-	77-79.99%		D-	54-56.99%
C+	74-76.99%		E	0-53.99%

A minimum grade of C is required for General Education credit. Courses intended to satisfy General Education requirements cannot be taken S-U.

Exam Dates

Exams will be online in Canvas with Honorlock proctoring. The dates are February 6, March 5, April 2, and April 18. You will have two hours for each exam and you may take them anytime between 6:00am and 11:59pm, Eastern Time.

Attendance and Participation

Attendance: Students are expected to keep up with the schedule of lectures, homework, and quizzes provided on the course calendar. Should a student need to withdraw from the course, the last day to do so is April 12, 2024. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Participation: Students are encouraged to engage with the discussion boards in the Canvas site when they have questions or comments that their classmates may be able to help answer. There is no grade associated with these activities.

III. Annotated Weekly Schedule

Week	Topic	Summary	Required Readings/Works	Assigned Work Due
Week 1	Integral calculus and its applications	Identify the properties of antiderivatives Identify the relationship between derivatives and antiderivatives Determine whether the substitution method would be appropriate to solve given equations. Recall the properties and applications of definite integrals. Use the definition of the definite integral to evaluate them. Apply the Fundamental Theorem of Calculus to evaluate definite integrals.	Watch lectures 1 and 2 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	August 31, 2024, 11:59pm

Week 2	Integral calculus and its applications	Apply the Trapezoidal Rule and Simpson's Rule to estimate definite integrals. Evaluate integrals via the substitution method. Evaluate integrals via integration by parts. Apply ideas of geometry (area of a shape) to definite integration. Distinguish how Simpson's rule relates to Riemann approximation. Recognize when Simpson's Rule can be applied. Determine when and why integration by parts is appropriate.	Watch lectures 3-5 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	September 7, 2024, 11:59pm

Week 3	Integral calculus and its applications	Evaluate improper integrals. Identify improper bounds. Utilize limits with integrals. Compute the probability of an event with an associated probability density function. Compute the expected value and variance associated to a probability density function. Recall the properties and limitations of probability density functions and be able to determine whether a given function is a probability density on a particular interval. Distinguish the relationship between expected value, variation, and standard deviation. Predict the geometric (graph) impact of expected value, variation, and standard deviation.	Watch lectures 6-8 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	September 14, 2024, 11:59pm

Week 4	Integral calculus and its applications	Compute expected waiting times, median product life, and analogous average quantities of the probability density function associated to various applications. Recall the geometric properties of uniform and exponential distributions. Estimate the value of a function at a specific point using Taylor polynomials. Recognize the properties of and the relationship between Taylor approximation and linearization.	Watch lectures 9-10 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	September 21, 2024

Week 5	Multivariable calculus	Define and evaluate a function of several variables. Visualize and sketch the graphs of functions of two variables. Recognize the definition of level curves. Find, recognize limitations of, and utilize level curves. Distinguish between the characteristics of partial and full derivatives. Compute partial derivatives of functions of several variables. Distinguish when and how extrema of a function can be determined and categorized. Locate and identify maximum, minimums, and saddle points of functions using partial derivatives.	Watch lectures 11-13 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	September 28, 2024, 11:59pm

Week 6	Multivariable calculus	Recall the role and restrictions of a constraining function. Apply the method of Lagrange multipliers to locate constrained maxima/minima of functions of several variables. Recall the properties and uses of total differentials. Utilize the total differential to approximate changes in functions of several variables. Recall the rules of correct notation of multiple integrals. Define and evaluate of the double integral of a function of two variables. Compute volumes using double integrals Recall the properties of total differentials and use them to estimate the change in a function of several variables.	Watch lectures 14-16 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	October 5, 2024, 11:59pm

Week 7	Differential equations	Determine whether equations are differential equations based on their characteristics. Recognize typical uses of differential equations. Recognize the purpose of, and be able to create and utilize slope fields to find solutions to a differential equation. Recognize and compute separable differential equations. Utilize the definition of the differential to separate variables. Compute solutions to elementary and separable differential equations. Compute solutions to linear first-order differential equations. Recognize and compute differential equations for real scenarios.	Watch lectures 17-18 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	October 12, 2024, 11:59pm

Week 8	Differential equations	Identify whether a real-world example can be solved with a differential equation based on its given characteristics. Apply separable differential equations to solve problems related to business. Recall the characteristics of Euler's method and how varying these characteristics affects the estimate made. Apply Euler's method to estimate solutions to differential equations.	Watch lectures 19-20 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	October 19, 2024, 11:59pm

Week 9	Systems of linear equations and matrices	Recall the properties of a system of equations and be able to determine whether there will be a solution and which method should be used to solve it. Apply the echelon method to solve systems of linear equations. Apply the substitution method to solve systems of linear equations. Explain how and when to use an augmented matrix to represent a given system of equations. Create an augmented matrix to represent a given system of equations. Determine whether a given matrix is overdetermined, underdetermined, or uniquely determined and be able to explain why. Apply the Gauss-Jordan method to solve systems of linear equations using matrices.	Watch lectures 21-23 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	October 26, 2024, 11:59pm

Week 10	Systems of linear equations and matrices	Determine when it is valid to add and subtract matrices. Add and subtract matrices and apply these concepts to solve problems. Determine when two matrices are equal. Determine when it is valid to multiply matrices and use this to solve problems. Multiply matrices and apply this operation to problems in business.	Watch lectures 24-25 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	November 2, 2024, 11:59pm
Week 11	Systems of linear equations and matrices	Invert matrices and use this to solve systems of equations. Analyze the idea of invertibility of matrices and its consequences. Analyze input-output models using matrix algebra. Relate the input-output matrix, internal production matrix, and total output matrix. Relate invertibility to the input-output model.	Watch lectures 26-27 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	November 9, 2024, 11:59pm
Week 12	Linear programming	Graph systems of linear inequalities in two variables. Correctly identify the feasible region of a system of inequalities. Solve linear programming problems graphically.	Watch lectures 28-29 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	November 16, 2024, 11:59pm

Week 13	Linear programming	Solve linear programming problems using the simplex method. Identify the role of pivot columns and rows. Analyze business applications via linear programming and the graphical or simplex methods.	Watch lecture 30 in Canvas. Complete lecture quizzes and weekly quiz along with Xronos homework.	November 23, 2024, 11:59pm

IV. Student Learning Outcomes (SLOs)

At the end of this course, students will be expected to have achieved the General Education learning outcomes as follows:

- **Content:** Students demonstrate competence in the terminology, concepts, theories, and methodologies used within the discipline. After completing this course students will be able to employ strategies in solving problems in integration, basic probability, multivariable calculus, optimization, first-order differential equations, linear algebra and systems of linear equations, and optimization using the simplex method. (Critical Thinking for Gen Ed Math, assessed through homework, lecture and discussion quizzes, exams)

- **Communication**: Students communicate knowledge, ideas, and reasoning clearly and effectively in written and oral forms appropriate to the discipline. Throughout this course students will formulate and solve mathematical models using algebraic, exponential, logarithmic, and multivariate functions, differentiation and integration, and will communicate mathematical solutions clearly and effectively. (Communication for Gen Ed Math, assessed through homework, lecture and discussion quizzes, exams)

- **Critical Thinking**: Students analyze information carefully and logically from multiple perspectives, using discipline-specific methods, and develop reasoned solutions to problems. In this course, students will reason in abstract mathematical systems, and they will apply mathematical models using algebraic, exponential, and logarithmic functions, differentiation techniques (single and multi-variable), optimization using the method of Lagrange multipliers, basic linear algebra and Gaussian elimination for solving systems of linear equations, and the simplex method for optimization, to solve problems. They will also develop and solve mathematical models of real-world word problems related to applications in business. (Critical Thinking for Gen Ed Math, assessed through homework, lecture and discussion quizzes, exams).

VI. Policies

Attendance Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email, they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructors in this class.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/ , 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Free Help-The Little Hall Math Lab

In addition to attending your discussion section regularly and visiting the office hours of your instructor and teaching assistant, for help, the Little Hall Math Lab located in Little Hall 215 offers free drop-in assistance with math homework Monday through Friday from 9:30 to 4:00, as well as test reviews before each math exam and other resources. It is staffed by mathematics graduate students and undergraduate tutors. Please note that this space is not designed for intense one-on-one tutoring, but rather as a resource

for quick questions and explanations. You should not expect the staff to help you if you have not at least begun your homework and have specific questions. Moreover, they absolutely will not assist you with quizzes or any other such work. More details are available here: https://oas.aa.ufl.edu/students/tutoring/

In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.