University of Massachusetts Global A private nonprofit affiliate

Course Number, Title and Credits

MATU 318 - Linear Algebra and Differential Equations - 3 credits

Course Description

This course provides an integrated introduction to linear algebra and differential equations, covering matrices, vector spaces, eigenvalues, and first/higher-order ODEs. Through five-week intensive study, students will master methods for solving linear systems and differential equations, building a solid foundation for engineering and science applications.

Prerequisites: MATU 116 Calculus II or equivalent

Course Learning Outcomes

By the end of this course, students should be able to:

1. Solve basic and higher-level differential equations and explain what the solutions mean in real-world contexts.
2. Use key linear algebra tools—like solving equations with matrices, finding determinants, and working with vector spaces and bases.
3. Work with eigenvalues and eigenvectors to simplify matrices and apply them to both algebra and differential equations.
4. Solve systems of differential equations using matrix methods and eigenvalue techniques.
5. Combine linear algebra and differential equations to solve real problems, and clearly explain your reasoning and solutions.

Required Textbooks

Differential Equations and Linear Algebra, 4ed, Edwards, Penney, Calvis.Pearson

You will need to purchase an access code for MyMathLab. This comes with an e-book, so it is

optional to purchase the physical textbook. The cost of the homework software is about $89.99 per semester.

Letter Grade/Percentage Equivalents

Grades are determined on a straight-scale basis using the following scales.					
A	94% to 100%	A-	90% to 93%	B+	87% to 89%
B	84% to 86%	B-	80% to 83%	C+	77% to 79%
C	74% to 76%	C-	70% to 73%	D+	67% to 69%
D	64% to 66%	D-	60% to 63%	F	59% and below

Methods of Evaluation for Determining Grades

Assignment Detail for Course:

Assignments	**Possible Points**
Quizzes	250
Homework	150
Midterm Exam	300
Final Exam	300
Total Points Possible in Course	**1000**

Week by Week Outline for Course (Tentative):

Week	**Topics&Assignments**
Week 1	● 1.1 Differential Equations and Mathematical Models ● 1.2 Integrals as General and Particular Solutions ● 1.3 Slope Fields and Solution Curves ● 1.4 Separable Equations and Applications ● 1.5 Linear First-Order Equations

	• 1.6 Substitution Methods and Exact Equations • 3.1 Introduction to Linear Systems • 3.2 Matrices and Gaussian Elimination • 3.3 Reduced Row-Echelon Matrices
Week 2	• 3.4 Matrix Operations • 3.5 Inverses of Matrices • 3.6 Determinants • 4.1 The Vector Space R3 • 4.2 The Vector Space Rn and Subspaces • 4.3 Linear Combinations and Independence of Vectors • 4.4 Bases and Dimension for Vector Spaces
Week 3	MIDTERM (1.1 - 1.6, 3.1 - 3.6, 4.1 - 4.4) • 6.1 Introduction to Eigenvalues • 6.2 Diagonalization of Matrices • Supplemental Material: Introduction to Linear Transformations • Supplemental Material: The Matrix of a Linear Transformation
Week 4	• 5.1 Introduction: Second-Order Linear Equations • 5.2 General Solutions of Linear Equations • 5.3 Homogenous Equations with Constant Coefficients • 5.5 Nonhomogeneous Equations and Undetermined Coefficients • 7. 1 First-Order Systems and Applications
Week 5	• 7.2 Matrices and Linear Systems • 7.3 The Eigenvalue Method for Linear Systems FINAL EXAM (6.1 - 6.2, Supplemental Material, 5.1 - 5.5, 7.1 - 7.3)

Attendance Policy

Requirements for student attendance and participation will be defined by each instructor based on the following policy:

- Monday of the first week of the session is the first day of class.

- Regular attendance/engagement is expected for student success. Online engagement is evident through posting to a discussion board, blog, completing assignments including journal entries, or taking quizzes and exams. If regular attendance/engagement are not evident, the student's grade may be adversely affected. If a student misses more than one week of engagement in an online class, the student may, at the discretion of the instructor, fail the course.
- Students in courses with required synchronous class sessions are expected to remain for the full duration. If a student misses more than one required synchronous online class, the student may, at the discretion of the instructor, fail the course.
- Students must submit an academically-related assignment through the Learning Management System (LMS) before the end of Week 2 (i.e., a quiz, test, course content-related Discussion Board post, or other course content-related assignment). Introduction posts do not count as an academically-related assignment. If a student does not submit an academically-related assignment, the student will be administratively dropped from the course. Students administratively dropped for non-attendance/participation will not be reinstated in the course. In infrequent cases, students in certain classes may be exempt from the requirement to submit an academically-related assignment before the end of Week 2; students may consult with their instructor for further information.
- Students should consider withdrawing from a course if they will be unable to participate each week. Instructors may, but are not obligated to, accommodate students under extraordinary circumstances, but the student must request accommodation and provide requested supporting documentation.
- Schools and programs may have different attendance policies. Refer to school and program specific information for additional attendance policies.

Academic Integrity

The University of Massachusetts Global is an academic community based on the principles of honesty, trust, fairness, respect and responsibility. Academic integrity is a core University value, which ensures respect for the academic reputation of the University, its students, faculty and staff, and the degrees it confers. The University expects that students will conduct themselves in an honest and ethical manner and respect the intellectual work of others.

Submitting to faculty work completed by the use of any artificial intelligence tool without permission and/or when prohibited by class policy. When faculty require the use of technology, including artificial intelligence, as a part of an assignment for the course, there is no violation. Students are reminded to consult syllabi, assignment sheets/rubrics, program documents and their faculty. Use of artificial intelligence, when permitted, must be correctly cited in the assignment.

The UMass Global online library provides resources to support research, proper citation styles, and the safe and responsible use of generative artificial intelligence or Gen AI.

- The Academic Integrity and Plagiarism Avoidance page provides guidance to help students

better understand academic integrity and includes tips on how to avoid plagiarism.

- The Citing Sources page offers guidance on how to properly cite using APA, MLA, and Chicago styles.
- The Artificial Intelligence Resource Guide for Students provides advice for understanding and appropriately using generative artificial intelligence tools such as ChatGPT and Bard.

UMass Global's Office of Accessible Education

Students who require disability-related services or accommodations to access their educational experience can register with the Office of Accessible Education (OAE). The Office of Accessible Education (OAE) is committed to ensuring equal educational access and opportunity for all members of our academic community. Students will be provided equitable and reasonable accommodations and services that are in compliance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 (ADA)/Americans with Disabilities Act Amendments Act of 2008 (ADAA). Registration with OAE is on a voluntary, self-identifying basis. Please visit the Office of Accessible Education (OAE) website for more information about how to register for services, eligibility requirements, and information about potential academic accommodations and services.

Our university is committed to ensuring equal access for all students. Let us know about any accessibility barriers you encounter using any of our online systems or websites by submitting a Feedback or Accessibility Concern Submission Form. We'll do our best to improve things and get you the information you need.

UMass Global’s CARES Team

The CARES team is a campus-wide team of appointed staff and faculty responsible for identifying, assessing, and responding to concerns and/or disruptive behaviors by students, faculty/staff, and community members who struggle academically, emotionally, or psychologically, or who present a risk to the health or safety of the university or its members.

Individuals may refer themselves or other community members of concern by emailing cares@umassglobal.edu or by filling out a referral form here. The CARES Team provides short term assessment, intervention, support, and recommendations of resources to those referred and engaged in the process.

UMass Global's Title IX Statement

The University of Massachusetts Global strives to maintain and foster a climate that promotes respect and human dignity. Sexual misconduct and relationship violence in any form is antithetical to the university’s mission and core values, violates university policies, and may also violate federal and state

law. The office of Title IX is primarily concerned for students' safety and well-being and is tasked with investigating all reports of sexual misconduct experienced by our community members. Title IX prohibits sex-based and gender-based discrimination and harassment, which includes discrimination based on pregnancy and/or pregnancy-related complications, parental status, and marital status. Students expecting or experiencing pregnancy-related complications, that may require educational accommodations, should contact the University's Title IX Coordinator and/or the Office of Accessible Education.

The University and Title IX's prohibition of sex discrimination also covers sexual harassment, sexual violence, and any other form of sexual misconduct. We offer options and resources to all students affected by these issues and are committed to providing a fair, thorough, and prompt investigation and adjudication process. If you or someone you know has been impacted by sexual assault, dating, and domestic violence, stalking, or sexual exploitation, please visit the University's Title IX Resource Page to access additional resources and information.

UMass Global's staff and faculty are tasked with reporting any possible sex or gender-based discrimination or Title IX violations to the University's Title IX Coordinator at civilrightscomplaints@umassglobal.edu.

Click on this Link to our University Title IX Policy