TED University

MATH 203 - Linear Algebra and Differential Equations - Syllabus

2021-2022 Fall

Credit Hours: (3+0+0) **3 TEDU Credits, 5 ECTS Credits Pre-requisites:** Math 101

Course Description

First-order ODEs and their IVPs: Separable, Exact, Linear and Homogeneous equations. Linear second-order ODEs and their IVPs: Homogeneous, Non-homogeneous, Constant coefficient equations. Solution methods of ODEs and their IVPs: Integrating Factors, Variation of Parameters, Undetermined coefficients, Laplace Transforms, Convolution, Power Series Solutions, Euler's Method. Vectors and Matrices. Algebra of Matrices. Systems of linear equations. Row Reduction. Matrix Inverses. Determinants of square matrices. Eigenvalues and Eigenvectors. Diagonalization. Systems of linear ODEs and their solutions.

Time Schedule and Instructors

Section #	Instructors	Time Schedule	Classroom
Section 1	Engin Özkan	Tuesday 09-11 and Thursday 13-14	G113&G203
Section 2	Engin ÖzkanTuesday 16-17 and Wednesday 9-11		G113
Section 3	Engin Özkan	Wednesday 16-17 and Thursday 9-11	G003&G010
Section 4	Öznur Mut	Tuesday 15-16 and Thursday 14-16	G112 &G103
Section 5	Öznur Mut	Tuesday 13-15 and Thursday 12-13	G112&G103

Instructors	e-mail	Office
Öznur Mut	oznurmut@gmail.com	
Engin Özkan	engin.ozkan@tedu.edu.tr	A421

Text Book

• Peter V. O'Neil, "Advanced Engineering Mathematics", Cengage Learning, 2012

Supplementary Books

- Erwin Kreyszig, "Advanced Engineering Mathematics," 10th edition, Wiley, 2011.
- D.G. Zill, "Advanced Engineering Mathematics," 5th ed., Jones & Bartlett Learning, 2014.
- A. Croft, "Engineering Mathematics", 4th ed., Pearson, 2013.
- W.E. Boyce, "Elementary differential equations and boundary value problems", Wiley, 2010.

Attendance

Attendance is recommended but not mandatory in this course. Classes start on the hour. Please be respectful of your classmates by being on time. Cell phones should be turned off and kept out of sight. Please do not use your computers during class time.

Grading

Assessment Methods	Percentage
Midterm Exam 1	25%
Midterm Exam 2	25%
Final Exam	40%
Active Learning Exercises	10%
Extra Credit Works	10%

Learning Outcomes

Upon successful completion of this course, a student will be able to:

- 1. Solve linear, exact and homogeneous first-order ODEs and their initial value problems and, homogeneous or non-homogeneous second-order ODEs and their initial value problems with appropriate methods.
- 2. Perform basic vector and matrix operations such as addition, scalar multiplication, dot and cross product of vectors, and understand subspaces and basis in the vector space Rⁿ, orthogonalization (Gram-Schmidt), orthogonal complement and projection.
- 3. Perform basic matrix operations, elementary row operations and row reduced echelon form, bases for row, column or null spaces, and solve homogeneous and nonhomogeneous systems, and find matrix inverses, calculate determinants, find eigenvalues and eigenvectors, diagonalization.
- 4. Calculate eigenvalues and eigenvectors, and able to use them in the context of solving system of differential equations.

Student Workload (140 hours)

Activities	Number	Duration (hour)	Total Work
			Load
Lectures	14	3	42
Course Readings	14	2	28
Extra Credit Works (Study duration)	4	5	20
ALEs (Study duration)	10	1	10
Midterm Exams (Study duration)	2	12	24
Final Exam (Study duration)	1	16	16

Make-up Policy

Only one make-up exam will be given at the end of the semester. The make-up exam will be given only for medical excuses documented by medical reports that are approved by the Student Health Center or other documented excuses approved by the university's executive branches. <u>No make-ups</u> will be given for extra credit works. There will not be make-up for a make-up exam.

Course Outline

The course outline is given below. This outline is <u>tentative</u> and it will be adapted to the pace of the class in agreement with the students. Any changes will be announced either in the classroom or via e-mail.

TENTATIVE COURSE OUTLINE				
Week	Topics	Assessments Exams		
Oct 4-8	Introduction, Separable Equations, Linear Equations			
Oct 11-15	Exact Equations, Homogeneous Equations, Bernoulli Equations, and Riccati Equations	ALE-1		
Oct 18-22	-The Linear Second-Order Equation -The Constant Coefficient Case	ALE-2		
Oct 25-29	 The Nonhomogeneous Equation Method of Variation of Parameters Method of Undetermined Coefficients 	ALE-3		
Nov 1-5	-Euler's Differential Equation -The Laplace Transform: Definition and Notation	ALE-4, ECW-1		
Nov 8-12	-Solution of Initial Value Problems -Shifting and the Heaviside Function -Convolution	MDT-1 Nov 11, 18.30		
Nov 15-19	Solution of SystemsPower Series Solutions	ALE-5		
Nov 22-26	-The Vector Space <i>R</i> ⁿ -Orthogonalization -Orthogonal Complements and Projections	ALE-6		
Nov 29- Dec 3	-Matrices, Elementary Row Operations -Reduced Row Echelon Form, Row and Column Spaces	ALE-7		
Dec 6-10	Homogeneous Systems, Nonhomogeneous Systems	ALE-8, ECW-2		
Dec 13 -17	-Matrix Inverses, -Linear Transformations (Optional)	ALE-9		
Dec 20-24	-Definition of the Determinant -Calculation of Determinants -A Determinant Formula for A ⁻¹ -Cramer's Rule (optional)	MDT-2, Dec 22, 18:30		
Dec 27-31	- Eigenvalues and Eigenvectors - Diagonalization	ALE-10		
Jan 3-7	Solution of X'=AX for constant A	ECW-3		

Active Learning Exercises

Throughout the semester you will have ten active learning exercises in-class. These exercises will help you learn the course material in an active and collaborative manner. These exercises will be good at digesting the topic. Only the highest eight of them will be regarded.

Extra Credit Work

Students will be assigned at least three assignments from WeBWork. The ECW's will help you to be ready for exams.

Calculator Policy

You may use a graphing calculator or software that does symbolic calculations. But you will NOT be allowed to use a calculator during active learning exercises and exams.

Cheating

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following: copying answers on exams, homework and lab works, using prohibited material on exams, lying to gain any type of advantage in class, providing false, modified or forged data in a report, plagiarizing, modifying graded material to be regraded, causing harm to colleagues by distributing false information about an exam, homework or lab. Cheating is a very serious offense and will be penalized accordingly by the university disciplinary committee.

Plagiarism

All of the following are considered plagiarism:

- Turning in someone else's work as your own
- Copying words or ideas from someone else without giving credit
- Failing to put a quotation in quotation marks
- Giving incorrect information about the source of a quotation
- Changing words but copying the sentence structure of a source without giving credit

- Copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not

Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources