EASTERN MEDITERRANEAN UNIVERSITY
FACULTY OF ARTS AND SCIENCES
DEPARTMENT OF MATHEMATICS

2015 – 2016 SPRINGSEMESTER

COURSE CODE	MATH241		
COURSE TITLE	Ordinary Differential Equations and Linear Algebra		
COURSE TYPE	University Core (UC)		
LECTURER(S)	Group 1	Mohammad MOMENZADEH	Office AS135 , Tel.: 1032 mohammad.momenzadeh@emu.edu.tr
	Group 2	Fatma B. RİZANER	Office AS118, Tel.: 2281 fatma.bayramoglu@emu.edu.tr
	Group 3	Sinem UNUL	Office AS135, Tel:1032 sinem.unul@emu.edu.tr
ASSISTANT(S)	Group 1	Kanda ABUASSBA	Office AS250, Tel: 2403 kanda.abuassba@cc.emu.edu.tr
	Group 2	Ceren USTAOĞLU	Office AS149, Tel: 2194 ceren.ustaoglu@emu.edu.tr
	Group 3	Muath AWADALLA	Office: AS250, Tel: 2403 muath.awadalla@emu.edu.tr
EMU CREDITS	(4,0,1) 4		
ECTS CREDITS	6		
PREREQUISITES	Math151 Calculus I		
COREQUISITES	None		
WEB LINK	http://brahms.emu.edu.tr/fbayramoglu		
TEXTBOOK	Stephen W. Goode & Scott A. Annin, *Differential Equations and Linear Algebra*, (3rd edition), Prentice Hall, 2007. Stephen W. Goode, *Differential Equations and Linear Algebra*, (2nd edition), Prentice Hall, 2002.		
REFERENCES	Steven J. Leon, *Linear Algebra with Application*, Pearson Education, 2006. S. Alpay & A. Erkip, *Ordinary Differential Equations*, METU, 1992. H. Anton & C. Rorres, *Elementary Linear Algebra* (Applications version), Wiley, 1994. Shepley L. Ross, *Introduction to Ordinary Differential Equations*, Wiley, 1989.		

AIM & OBJECTIVES

There are two objectives of this course: the first, to understand the basic concepts and skills of linear algebra which are required for simple applications in science and engineering problems, and the second, to learn some elementary methods for solving first and second-order differential equations, and apply linear algebra to solve first-order systems of linear differential equations.

CATALOGUE DESCRIPTION

Systems of linear equations, elementary row operations, echelon form, Gaussian elimination method; Matrices; Determinants, adjoint and inverse matrices, Cramer's rule; Vector spaces, linear independence, bases and dimension, eigenvalue problem. First-order differential equations, separable differential equations, change of variables, exact differential equations; Second-order differential equations, the method of undetermined coefficients, the variation of parameters method; General results of first-order linear systems, homogeneous constant coefficient vector differential equations, variations of parameters for linear systems; Laplace transform method.

GRADING CRITERIA

Midterm Exam 1	: 30%
Quiz	: 10%
Midterm Exam 2	: 25%
Final Exam	: 35%

RELATION TO OTHER COURSES

This course is based on Calculus I and plays an important role in courses which need concepts and skills in linear algebra and differential equations for solutions of certain engineering problems. Taking Calculus II at the same has advantage in understanding how to solve certain types of differential equations.

COURSE OUTLINE

Remarks: Section numbers and subsection topics are all from the textbook. Materials in the course outline which are not in the textbook will be given to students as hand-outs before the class. Any subsection topic not listed in this outline will not be taught in class, and will not be included in examinations

GENERAL LEARNING OUTCOMES

On succesful completion of the course, the students should be able to:

- Understand the applications of Matrices
- Gain basic skills to solve systems of linear equations
- Understand the concepts of vector space, subspace, linear independence
- Solve eigenvalue/eigenvector problems
- Solve the first and the second-order linear differential equations
- Understand the use of Laplace transforms in solving differential equations
- Solve systems of first-order linear differential equations
- Realize how to use matrices and differential equations in solving engineering problems

Week 1	2 hours	First meeting to understand the course description Chapter 2 Matrices and Systems of Linear Equations 2.1 Matrices: definitions and notations 2.2 Matrix algebra
Week 2	4 hours	2.3 Terminology and notation for systems of linear equations 2.4 Elementary row operations and row echelon matrices 2.5 Gaussian and Gauss-Jordan Elimination Method 2.6 The inverse of a square matrix
Week 3	4 hours	Chapter 3 Determinants 3.1 The definition of a determinant 3.2 Properties of determinants 3.3 Cofactor expansions 3.4 Evaluating Determinants using Elementary Row Operations 3.5 Cramer's Rule 3.6 Inverse Matrix using Adjoint Matrix Chapter 4 Vector Spaces 4.1 Vectors in R^n 4.2 Definition of a vector space
Week 4	4 hours	4.3 Subspaces 4.4 Spanning sets 4.5 Linear dependence and linear independence
Week 5	4 hours	4.6 Bases and dimension, Basis of the Rowspace and Columnspace 4.9 The rank-nullity theorem
Week 6	4 hours	Chapter 5 The Eigenvalue and Eigenvectors 5.6 The eigenvalue/eigenvector problem 5.7 General results for eigenvalues and eigenvectors 5.8 Diagonalization 5.9 Linear Transformation
Week 7	**31 March 2016**	**Quiz I**
Weeks 7,8 & 9	**8 April 2016 – 20 April 2016**	**MIDTERM EXAMINATION1 PERIOD**
Week 10	4 hours	Chapter 1 First-Order Differential Equations 1.2 Basic Ideas and Terminology 1.4 Separable differential equations 1.6 First-order linear differential equations
Week 11	4 hours	1.8 Change of Variables (Bernoulli) 1.9 Exact Differential equations Chapter 6 Linear Differential Equations of Order *n* 6.1 General theory for linear differential equations 6.2 Constant-coefficient homogeneous linear differential equations
Week 12	**17 May 2016 at 16.30**	**MIDTERM EXAMINATION2**
Week 12	4 hours	6.3 The method of undetermined coefficients 6.7 The Variation of Parameters Method
Week 13	4 hours	6.8 A differential equation with nonconstant coefficients 6.9 Reduction of order
Week 13	4 hours	Chapter 8 The Laplace transform method
Week 14	4 hours	The inverse transform Laplace transform solution of linear differential equations with constant coefficients
Weeks 15-16-17	(**May 31–June 15, 2016**)	**FINAL EXAMINATIONS PERIOD**
Week 18	(**June 22–24, 2016**)	**Online Application Period for RESIT Examinations**
Weeks 19-20	(**June 27–July 2, 2016**)	**RE-SIT EXAMINATIONS PERIOD**

ACADEMIC HONESTY

Copying from others or providing answers or information (written or oral) to others is cheating. Copying from another student's paper or from another text without written acknowledgement is plagiarism. According to University's bylaws **cheating and plagiarism** are serious offences resulting in a failure from exam or project and disciplinary action (which includes an official warning or/and suspension from the university for up to one semester).

IMPORTANT NOTES

- **Attendance** to the classes is **compulsory**. All students who receive **a failing final grade** and attend the classes **less than 50%** will receive the grade **NG**.
- It is compulsory to show student identification card to attend examinations. Those who cannot show identification card will not be allowed to attend the examination.
- Students are **obligated** to attend the examinations in the scheduled room. They will not be allowed to attend the examination in a room which is not scheduled for them.
- Students may check their examination papers within a pre-announced period of time. Information about this matter will be given in the instructions of each examination.
- A student missing an examination has to provide a valid excuse within three days following the examination he/she missed so as to have permission for the make-up for the missed exam.
- Final exam make-up will be consider as RE-SİT exam.