COURSE RECORD

Code	AMN 558
Name	Advanced Engineering Mathematics
Hour per week	3+0
Credit	3
ECTS	7.5
Level/Year	Graduate
Semester	Fall, Spring
Type	Elective
Prerequisites	None
Description	This course provides fundamental knowledge and skills for advanced engineering mathematics; including mathematical model, differential equations, existence and uniqueness of solutions for IVPs, power series method, Frobenius method, Laplace transform method, matrices, vectors, determinants, linear systems, partial differential equations. Fourier series. wave, heat, Laplace equations, Dirichlet problems, Polar, cylindrical and spherical coordinates
Objectives	• Providing basic concepts and properties of mathematical models, differential equations and partial differential equations • Defining separable ordinary differential equations (ODEs), exact ODEs, integrating factors, Bernoulli equation, power series method, Frobenius method, Legendre and Bessel equation, Laplace Transform of derivatives and integrals, convolution and integral equations • Explaining linear systems, Gauss elimination, eigenvalues, and eigenvectors, orthogonal matrices, linear systems, Gauss elimination, eigenvalues and eigenvectors, orthogonal matrices • Using solution by separating variables, Fourier series, wave, heat, Laplace equations, solution by separating variables, Fourier series, wave, heat, Laplace equations, polar, cylindrical, and spherical coordinates
Learning Outcomes	LO1 : Identify different types of differential equations LO2: Solve ordinary differential equations using various methods. LO3: Define matrices, vectors, determinants linear systems of linear algebra. LO4: Recognize linear independence, the rank of a matrix and vector space and inverse of a matrix LO5: Use Laplace transforms, eigenvalues, and eigenvectors for solving differential equations. LO6: Apply separating variables and Fourier series to solve some basic partial differential equations.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
LO1	5	5	3	2	0	1	3	1	4	1
LO2	5	3	3	2	0	1	3	1	5	1
LO3	5	3	3	2	0	1	3	1	5	1
LO4	5	3	3	2	0	1	3	1	5	1
LO5	5	3	3	2	0	1	3	1	5	1
LO6	5	3	3	2	0	1	3	1	5	1

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

	Topics	Outcomes
1	First-Order ordinary differential equations (ODEs), Linear ODEs, and the existence and uniqueness of solutions	LO1
2	Solutions of ODEs	LO1,LO2,LO3
3	Convolution and integral equations	LO4

4	ODEs with variable coefficients, systems of ODEs	LO4
5	Linear system definition, Gauss elimination and the solutions of linear systems	LO5
6	Basic concepts of partial differential equations (PDE), wave, heat and Laplace equations	LO5
7	Solutions of ODEs and PDEs by Fourier series, polar, cylindrical and spherical coordinates	LO1-LO6

DERS BİLGİLERİ

Kodu	AMN 558
İsmi	İleri Mühendislik Matematiği
Haftalık Saati	3+0
Kredi	3
AKTS	7,5
Seviye/Yıl	Lisansüstü
Dönem	Güz, Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	yok
İçerik	Bu ders; matematik model, diferansiyel denklemler,başlangıç değer problemlerinin varlık ve teklik çözümleri,,kuvvet serisi methodu,Frobenius metodu,, Laplace donüşüm metodu,, matrisler, vektörler, determinantlar, doğrusal sistemler,kısmi diferansiyel denklemler, Fourier serisi,,dalga, ısı,Laplace denklemleri,diriklet problemleri,kutupsal,silindirik ve küresel kordinatlar dahil olmak üzere ileri mühendislik matematiği için temel bilgi ve becerileri sağlar.