

MATH 219 – Differential Equations

Fall 2026 Syllabus

Course Information

Credits	(4–0) 4
Coordinator	Yıldıray Ozan, Office 217, Mathematics Department ozan@metu.edu.tr (312) 210 5373
Course Assistant	Melis Aslan, Office Z-44, Mathematics Department melisa@metu.edu.tr (312) 210 5377
Course Website	http://ma219.math.metu.edu.tr/
Textbook	W. E. Boyce and R. C. DiPrima, <i>Elementary Differential Equations and Boundary Value Problems</i> , 10th ed.
Office Hours	To be announced.

Catalog Description. First order equations and various applications. Higher order linear differential equations. Power series solutions. The Laplace transform. Solutions of initial value problems. Systems of linear differential equations. Introduction to partial differential equations.

Course Objectives

By the end of this course, a student will be able to:

- classify and identify different types of differential equations;
- solve several important classes of ordinary differential equations and interpret their qualitative behavior;
- apply ideas from linear algebra to solve single linear ordinary differential equations and systems of such equations;
- model certain physical phenomena using differential equations and interpret their solutions physically;
- use power series methods to solve second-order linear differential equations;
- apply the Laplace transform for solving differential equations;
- use separation of variables to solve basic partial differential equations via Fourier series.

Exams and Grading

The course grade will be based on two midterm examinations and one final examination.

Examination	Weight	Date and Time
Midterm Examination I	30%	November 14, Saturday, 13:30
Midterm Examination II	30%	December 19, Saturday, 13:30
Final Examination	40%	January 7, Thursday, 13:30

Suggested Problems. A list of suggested problems will be announced on the course website. Students are encouraged to attempt all suggested problems in a timely manner and consult their instructors regarding problems they cannot solve.

Attendance. Attendance will not be recorded. However, students are strongly recommended to follow the lectures. In case of a scheduling conflict with another course, students may attend another section that fits their timetable.

NA Policy. A student who misses all examinations will receive an NA grade for the course.

Make-up Policy. To be eligible for a make-up examination for a missed examination, a student must have a documented or verifiable and officially acceptable excuse. A student cannot take make-up examinations for two missed exams. The make-up examination will be held after the final examination and will cover all course topics.

Instructors

Sec.	Instructor	Lecture Schedule	Contact
S1	Özcan Yazıcı	Tue 08:40–10:30, YP-A1 Thu 10:40–12:30, YP-A3	oyazici@metu.edu.tr Office 127; (312) 210 5387
S2	Haydar Alıcı	Tue 08:40–10:30, YP-A4 Thu 10:40–12:30, YP-A4	ahaydar@metu.edu.tr Office 225; (312) 210 2976
S3	Marat Akhmet	Tue 13:40–15:30, U3 Fri 08:40–10:30, U3	marat@metu.edu.tr Office 121; (312) 210 5355
S4	Ahmet İrfan Seven	Tue 13:40–15:30, P2 Fri 08:40–10:30, P2	aseven@metu.edu.tr Office 226; (312) 210 5391
S5	Haydar Alıcı	Tue 13:40–15:30, YP-A2 Fri 08:40–10:30, YP-A1	ahaydar@metu.edu.tr Office 225; (312) 210 2976
S6	Ahmet Beyaz	Tue 13:40–15:30, U1 Fri 08:40–10:30, U1	beyaz@metu.edu.tr Office 123; (312) 210 5381
S7	Ahmet Beyaz	Tue 15:40–17:30, U3 Thu 08:40–10:30, U3	beyaz@metu.edu.tr Office 123; (312) 210 5381
S9	Yıldıray Ozan	Wed 15:40–17:30, YP-A1 Fri 10:40–12:30, YP-A1	ozan@metu.edu.tr Office 217; (312) 210 5373

Important Dates

Date	Event
September 28	Classes begin
October 5–9	Add-drop and advisor approvals
October 28–29	Republic Day holiday
November 10	Commemoration of Atatürk
November 30 - December 6	Course withdrawal applications
December 31	Last day of classes
January 1	New Year's Day
January 4–16	Final examination period
January 25	Announcement of letter grades

Course Schedule

The following schedule is intended as a general guideline. Instructors may make minor adjustments when necessary. Section numbers refer to Boyce and DiPrima, *Elementary Differential Equations and Boundary Value Problems*, 10th ed.

Week	Dates	Sections	Topics
1	Sep. 28–Oct. 2	§1.1, §1.3, §2.1–2.2	Introduction and direction fields. Separable and homogeneous equations. Linear equations and the method of integrating factors.
2	Oct. 5–9	§2.3, §2.4, §2.6	Modeling with first-order equations. Linear and nonlinear equations. Exact equations and integrating factors.
3	Oct. 12–16	§7.1–7.2	Systems of First-Order Linear Equations. Introduction and review of matrices.
4	Oct. 19–23	§7.3	Systems of linear algebraic equations. Linear independence, eigenvalues, and eigenvectors.
5	Oct. 26–30	§7.4, §7.6	Basic theory of systems of first-order linear equations. Complex eigenvalues.
6	Nov. 2–6	§7.7–7.9	Fundamental matrices. Repeated eigenvalues. Nonhomogeneous linear systems; variation of parameters.
7	Nov. 9–13	§4.1–4.2	Higher-Order Linear Equations. General theory of n th-order linear equations. Homogeneous equations with constant coefficients.
8	Nov. 16–20	§4.3–4.4	Method of undetermined coefficients. Method of variation of parameters.
9	Nov. 23–27	§3.7–3.8, §5.1–5.2	Mechanical and electrical vibrations. Forced vibrations. Review of power series and series solutions near an ordinary point.

Week	Dates	Sections	Topics
10	Nov. 30 - Dec. 4	§5.3, §5.5	Series solutions near an ordinary point and near a regular singular point.
11	Dec. 7–11	§6.1–6.3	The Laplace Transform. Definition of the Laplace transform. Solution of initial value problems. Step functions.
12	Dec. 14–18	§6.4–6.6	Differential equations with discontinuous forcing functions. Impulse functions and the convolution integral.
13	Dec. 21–25	§10.1–10.2	Partial Differential Equations and Fourier Series. Two-point boundary value problems and Fourier series.
14	Dec. 28–31	§10.3–10.5	Fourier convergence theorem. Even and odd functions. Separation of variables and heat conduction in a rod.