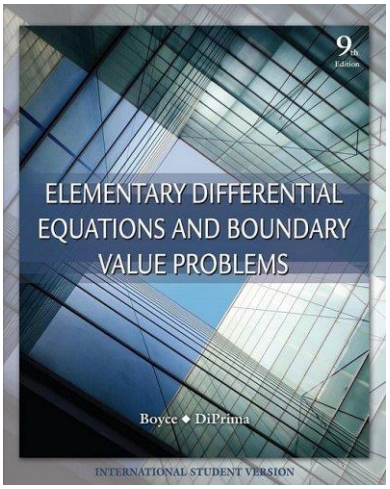
MATH 219 Introduction to Differential Equations (Fall 2014)



Frequency: Fall/Spring Terms **Credit:** 4

Course Coordinator: Benjamin Walter
(**office**: T-124, **phone**: x3001, **email**: benjamin@metu.edu.tr)

Course Website: http://math.ncc.metu.edu.tr/math219
Contains the full course information. Check it!
We will also be using the new **METU-Class** system.

Textbook: *Elementary Differential Equations and Boundary Value Problems*, Boyce, W. E., DiPrima, R. C., 9th ed.

Exams and Grading: Course grades are determined by two (non-cumulative) midterm exams, and a cumulative final exam.

- **Midterm Exams:** 2x 30% = **60 %** (dates to be announced)
- **Final Exam:** **40 %**
- **Bonus:** **5 %** (determined by math help room attendance)

Suggested Problems: A list of suggested problems is announced on the course website and METU-Class. Students are encouraged to attempt to solve all of these problems in a timely manner, and ask the instructors about the ones that they cannot solve. **At least 25% of the exam problems will be chosen among these problems.**

Exams: Dates for all exams are set by the university administration. We will announce the dates as soon as they are known. Students are assigned random seating for each exam – sit according to the posted seating charts. **Calculators and cell phones are not allowed during exams** – all cell phones should be left on the desk at the front of the exam room during the exam time.

Bonus: Bonus points will be awarded for attending the math help room. To count for math 219 bonus, you must ask a question, or remain for at least 15 minutes while a course instructor (Aker, Unal, Walter) or a TA (Celik, Ozer, Dosieva) is present. Please make sure that we write down your name during your visit.

Math Help Room: The mathematics help room in T-103 is a room staffed by mathematics faculty and teaching assistants where students may gather to ask questions, work on homework, and view exams. **Bonus points will be awarded to students who attend the math help room regularly.**

Make-up Policy: In order to be eligible to enter the make-up examination, a student should have a documented or verifiable and officially acceptable excuse. **It is not possible to make up multiple missed exams.** The make-up examination will be after the final exam, **and will include all topics.**

Cheating Policy: Cheating on any midterm or short exam will result in any of the following: (1) immediate score of ZERO on that exam, (2) immediate grade of FF in the course, (3) forwarding the case to the university disciplinary committee.

Lectures		
S1 - K. Aker	Mon 10:40-12:30 Wed 10:40-12:30	TZ-20
S2 - K. Aker	Mon 15:40-17:30 Thu 10:40-12:30	TZ-07
S3 - I. Ünal	Tue 10:40-12:30 Thu 8:40-10:30	TZ-20
S4 - B. Walter	Mon 10:40-15:30 Wed 10:40-10:30	TZ-21
S5 - B. Walter	Wed 13:40-15:30 Fri 13:40-15:30	TZ-19

	Office	Phone	Email
Kürşat Aker	TZ-42	3433	kaker
İbrahim Ünal	R-134	2916	uibrahim
Benjamin Walter	T-124	3001	benjamin

Office hours are held in the Math Help Room.

Week 1: Sept.22-26	1	Introduction, Directional Fields **Chapter 2. First Order Differential Equations** **§2.2:** Separable equations (also homogeneous equations - see p49 #30).
	2	**§2.1:** Linear equations; Method of integrating factors. **§2.3:** Modeling with first order equations (tank problems).
Week 2: Sept.29-Oct.3	3	**§2.4:** Differences between linear and nonlinear equations (existence and uniqueness theorems).
	4	**§2.6:** Exact equations and integrating factors.
Week 3: Oct.6-10	5	**Chapter 7. Systems of First Order Linear Equations** **§7.1:** Introduction. **§7.2:** Review of matrices.
	6	**§7.3:** Systems of linear algebraic equations; Linear independence, eigenvalues, eigenvectors.
Week 4: Oct.13-17	7	**§7.4:** Basic theory of systems of first order linear equations. **§7.5:** Homogeneous linear systems with constant coefficients.
	8	**§7.5:** Homogeneous linear systems with constant coefficients. **§7.6:** Complex eigenvalues.
Week 5: Oct.20-24	9	**§7.7:** Fundamental matrices.
	10	**§7.8:** Repeated eigenvalues. **§7.9:** Nonhomogeneous linear systems (variation of parameters only).
Week 6: Oct.27-31	11	**Chapter 4. Higher Order Linear Equations** **§4.1:** General theory of n^{th} order linear equations.
	Holiday: Wed., Oct. 29	
Week 7: Nov.3-7	12	**§4.2:** Homogeneous equations with constant coefficients.
	13	**Chapter 3. Second Order Linear Equations** **§3.2:** Fundamental solutions of linear homogeneous equations.
Week 8: Nov.10-14	14	**§3.3:** Linear independence and the Wronskian. **§3.4:** Complex roots of the characteristic equation.
	15	**§3.5:** Repeated roots; Reduction of order.
Week 9: Nov.17-21	16	**§3.6:** Nonhomogeneous equations; Method of undetermined coefficients.
	17	**§4.3:** The method of undetermined coefficients.
Week 10: Nov.24-28	18	**§3.7:** Variation of parameters.
	19	**§3.8:** Mechanical and electrical vibrations.
Week 11: Dec.1-5	20	**§3.9:** Forced Vibrations.
	21	**Chapter 6. The Laplace Transform** **§6.1:** Definition of the Laplace transform. **§6.2:** Solution of initial value problems.
Week 12: Dec.8-12	22	**§6.3:** Step functions.
	23	**§6.4:** Differential equations with discontinuous forcing functions.
Week 13: Dec.15-19	24	**§6.5:** Impulse functions. **§6.6:** The convolution integral.
	25	**Chapter 10. Partial Differential Equations and Fourier Series** **§10.A:** Derivation of the Heat Conduction Equation. **§10.1:** Two-point boundary value problems.
Week 14: Dec.20-26	26	**§10.2:** Fourier series. *§10.3: The Fourier convergence theorem (briefly).*
	27	**§10.4:** Even and odd functions.
Week 15: Dec.29-30	28	**§10.5:** Separation of variables, heat conduction in a rod.
FINAL EXAM		