Math 245 (39601D and 39609D): Mathematics of Physics and Engineering, Spring 2020

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Office Hours: MWF 10:00-11:00 am, Room TBA

	39601D	39609D
Lecture	MWF 09:00-09:50 am, SOS B4	MWF 11:00-11:50, SOS B44
Discussion	TuTh 2:00-2:50pm, 3:00-3:50pm, GFS 213	TuTh 10:00-10:50am, 11:00-11:50am, GFS 213
Teaching Assistant	Amin Naghdloo <naghdloo@usc.edu>	Anahid Khoobyar <khoobyar@usc.edu>
Final Exam	Friday, May 8, 08:00-10:00 am	Wednesday, May 6, 11:00 am -1:00pm

Textbook: **Differential Equations** by Polking, Boggess and Arnold
Topics:

Ch. 1	Introduction	Sections: 1.2, 1.3
Ch. 2	First-Order Equations	Sections: 2.1 – 2.6, 2.9
Ch. 3	Modeling real systems	Sections: 3.1 – 3.4
Ch. 4	Second-Order Linear Eqns.	Sections: 4.1, 4.2 – 4.7
Ch. 5	The Laplace Transform	Sections: 5.1 – 5.7
Ch. 7	Matrices	Sections: 7.1, 7.2
Ch. 8	Systems of Differential Eqns.	Sections: 8.1, 8.4, 8.5
Ch. 9	Linear Systems	Sections: 9.1, 9.2, 9.3, 9.6, 9.9

Grading Scheme: Homework 15%; Quizzes 10%; Midterm exam 1, 20%; Midterm exam 2, 20%; Final exam 35%

Homework: Homework problems are selected from the textbook and assigned weekly on Blackboard (https://blackboard.usc.edu). Since many homework problems will be assigned during the semester, it is recommended that you do the problems as soon as the section is covered in class. Homework is due on following Thursday during the discussion section. Late submissions will not be accepted (exceptions for documented medical/family emergencies will be made on a case-by-case basis). At the end of semester one lowest-scoring HW grade will be dropped.

Homework, though only a small fraction of course grade, is considered to be a vital part of the learning experience in the class, and is of crucial importance to successful completion of the course. A respectable performance on quizzes and exams can be realized by all students if attention and energy are given to the timely completion of assigned homework problems.

Quiz: Weekly quizzes are conducted during discussion sessions on each Thursday, with a few problems similar to homework problems assigned in previous week. No 'make-up' of these quizzes will be permitted (exceptions as noted above for homework). At the end of semester your lowest-scoring quiz grade will be dropped.

Midterm Exams: There will be two midterm exams scheduled on **Friday, February 14 (Exam 1)** and **Friday, March 27 (Exam 2)** in regular classroom. No make-up exam.

Final Exam: The final exam is comprehensive and will be held at the time specified in the University Schedule of Classes. See dates above for the appropriate section.

Academic Integrity: The USC Department of Mathematics adheres to the University's policies concerning Academic Integrity as described in *SCampus*. All faculty, staff and students share the responsibility for maintaining an environment of integrity. Students are expected to be aware of, and to observe, the academic integrity standards set forth in *SCampus*.

Math 245: Tentative weekly schedule

2020	Monday	Wednesday	Friday
Week 1 Jan 13-17	Sec.1.2-1.3. Introduction. Definitions. Math modeling of physical phenomena.	Sec.2.1 Linear equations: Intergration.	Sec.2.2. Separable equations.
Week 2 Jan 20-24	**January 20, 2020** **Martin Luther King Day**	Sec.2.3 More on modeling	Sec.2.4. Linear equations
Week 3 Jan 27-31	Sec. 2.5 Mixing problems	Sec.2.6. Exact differential equations	Sec.2.9. Autonomous equations and stability.
Week 4 Feb 3-7	Sec.3.1-3.2. Modeling of population growth	Sec 3.3 Financial modeling	Sec. 3.4. Electric circuits.
Week 5 Feb 10-14	Sec. 4.1. Second-order equations.	Sec.4.1. Examples and definitions of second-order equations.	**Midterm Exam 1, February 14, 2018**
Week 6 Feb 17-21	**February 17, 2020** **Presidents' Day**	Sec 4.3. Linear homogeneous equations with constant coefficients.	Sec 4.5. Nonhomogeneous equations. Undetermined coefficients.
Week 7 Feb 24-28	Sec 4.6. Variation of parameters.	Sec.4.7 Forced harmonic systems.	Sec.5.1. Laplace Transforms**.** Definitions. **Last day to drop without a 'W'**
Week 8 Mar 2-6	Sec 5.2 Basic properties of Laplace transforms	Sec.5.3. Inverse Laplace transform.	Sec.5.4. Using Laplace transform to solve differential equations.
Week 9 Mar 9-13	Sec.5.5. Discontinuous forcing function terms.	Sec 5.6. Impulse input. Delta functions.	Sec 5.7. Convolutions
Mar 15-22		**Spring Break**	
Week 10 Mar 23-27	Sec 7.1 Vectors and matrices.	Sec 7.2. Systems of linear algebraic equations.	**Midterm Exam 2** **March 27, 2018**
Week 11 Mar 30- Apr 3	Sec 7.3. Solving systems of algebraic equations.	Sec.8.1, 8.4. Systems of differential equations. Linear systems	Sec 8.5. Properties of linear systems.
Week 12 Apr 6-10	Sec 9.1. Linear systems with constant coefficients	Sec 9.2. Plane systems	Sec 9.3. Plane systems portraits **Last day to drop with 'W'**
Week 13 Apr 13-17	Sec.9.4. Trace-determinant plane.	Sec.9.5. Higher-dimensional systems	Sec 9.5. Continuing with higher-dimensional systems
Week 14 Apr 20-24	Sec 9.6. Exponential of a matrix	Sec 9.9. Nonhomogeneous linear systems	Sec 10.1. Nonlinear systems. Linearization.
Week 15 Apr 27- May 1	Sec 10.2. Long-term behavior of solutions.	Sec 10.8. Competing Species. Predator-Prey systems	Final Exam Review

Important Dates

Friday, February 28:	Last day to drop a class without a 'W'
Friday, February 14:	Midterm 1
Friday, March 27:	Midterm 2
Friday, April 10:	Last day to drop a class with a 'W'
Wednesday, May 6, 2020:	Final Examination 11:00 am-1:00 pm (39609D: 11:00 am class)
Friday, May 8, 2020:	Final Examination 08:00 am-10:00 am (39601D: 09:00 am class)
Quizzes on Thursdays:	January 23, 30, February 6, 20, 27, March 5, 12, April 2, 9, 16, 23.

Math Center: The Math Center is located in KAP263 and is open Monday through Friday (see http://dornsife.usc.edu/mathcenter/welcome/ for detail schedule).

Disclaimer: The contents of this syllabus are subject to changes during the semester.