Math 245 (39609D) – Mathematics of Physics and Engineering, Spring 2018

Lecture: MWF 11:00–11:50am THH 114
Discussion: TuTh 10:00-10:50am THH B10
Instructor: Dr. S.S. Sadhal <sadhal@usc.edu>
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Contact Info: sadhal@usc.edu ; (213) 740-0492
Office Hours: MWF 09:00–10:30 am
Textbook: **Differential Equations** by J.R. Brannan & W.E. Boyce   (Wiley)
Teaching Assistant: Kyle Stratton < kstratto@usc.edu>

Topics:

Ch. 1	Introduction	Sections: 1.2 & 1.3
Ch. 2	First Order Diff. Eqns.	Sections: 2.1, 2.2 & 2.6
Ch. 4	Second Order Linear Eqns.	Sections: 4.1 – 4.7
Ch. 5	The Laplace Transform	Sections: 5.1 – 5.8
Ch. 3	Systems of Two First Order Eqns.	Sections: 3.1 – 3.6
Ch. 6	Systems of First Order Eqns.	Sections: 6.1 – 6.6
Ch. 7	Nonlinear Diff. Eqns. and Stability	Sections: 7.1 – 7.2

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 Wednesday during the discussion section. Late submission is not accepted (exceptions for documented medical/family emergencies will be made on a case-by-case basis). At the end of semester your lowest-scoring HW grade will be dropped.

Homework, although it weighs 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. At the end of semester your lowes-scoring quiz grade will be dropped.

Midterm Exams: There will be two midterm exams scheduled on **Friday, February 9 (Exam 1)** and **Friday, March 23 (Exam 2)** in regular class room. 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 – **Wednesday, May 2, 11am – 1 p.m.** No make-up exam.

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*.

Joint Educational Program (JEP): If you participate in and complete JEP successfully, you will receive 2% extra credit for this course. JEP is a math mentoring service program at a K-12 school. For detail information please contact JEP house (https://dornsife.usc.edu/joint-educational-project/). Sign-up period is usually during the first couple of weeks of the semester. (There may be some other, similar math tutoring programs, but they are not accepted for the extra credit.)

Tentative weekly schedule

2018	Monday	Wednesday	Friday
Week 1 Jan 8-12	Introduction: Sec.1.3	Sec.2.2 Linear equations: Method of Integrating Factors	Sec.2.1 Separable Equations
Week 2 Jan 15-19	**January 15, 2018 Martin Luther King Day**	Sec.2.6 Exact Equations	Sec.1.2 Autonomous Equations and Population Dynamics
Week 3 Jan 22-26	Sec.4.1 Definitions and Examples	Sec.4.2 Theory of Second Order Linear Homogeneous Equations	Sec.4.3 Linear Homogenous Equations with Constant Coefficients
Week 4 Jan 29-Feb 2	Sec.4.3 (Linear Homogenous Equations with Constant Coefficients - Complex Characteristic Roots)	Sec. 4.4 Mechanical Vibrations	Sec.4.5 Nonhomogeneous Equations
Week 5 Feb 5-9	Sec.4.6 Forced Vibrations	Sec.4.7 Variation of Parameters	**Midterm Exam 1, February 9, 2018**
Week 6 Feb 12-16	Sec.5.1 Definition of the Laplace Transform	Sec.5.2 Properties of the Laplace Transform	Catch up
Week 7 Feb 19-23	**February 19, 2018 Presidents' Day**	Sec.5.3 The Inverse Laplace Transform	Sec.5.4 Solving Differential Equations with Laplace Transforms **Last day to drop without a 'W'**
Week 8 Feb 26-Mar 2	Sec.5.5 Discontinuous Functions	Sec.5.6 Differential Equations with Discontinuous Forcing Functions	Sec.5.7 Impulse Functions
Week 9 Mar 5-9	Sec.5.8 Convolution Integrals and Their Applications	Matrices – Review (Ref. Appendix A.1 Matrices)	Matrices – Review (Cont.) Sec.3.1 Systems of Two Linear Algebraic Equations
Mar 12-18,		**Spring Break**	
Week 10 Mar 19-23	Sec.3.1 Systems of Two Linear Algebraic Equations (Cont.)	Sec.3.2 Systems of Two First Order Linear Differential Equations	**Midterm Exam 2 March 23, 2018**
Week 11 Mar 26-30	Sec.3.3 Homogeneous Linear Systems with Constant Coefficients Sec.3.4 Complex Eigenvalues	Sec.3.5 Repeated Eigenvalues	Solved Problems (Sec.3.3-3.5)
Week 12 Apr 2-6	Appendix A.2 Systems of Linear Algebraic Equations	Appendix A.3 Determinants and Inverses	Appendix A.3 Determinants and Inverses (Cont.) **Last day to drop with 'W'**
Week 13 Apr 9-13	Sec.6.3 Homogeneous Linear Systems with Constant Coefficients	Sec.6.4 Nondefective Matrices with Complex Eigenvalues	Sec.6.5 Fundamental Matrices Sec.6.6 Nonhomogeneous Linear Systems.
Week 13 Apr 16-20	Sec.6.5 & 6.6 (Cont.)	Sec. 3.6 Introduction to Nonlinear systems	Sec.7.1 Autonomous Equations and Stability
Week 15 Apr 23-27	Sec.7.2 Almost Linear Systems	Sec.7.3 Competing Species	Final Exam Review

Important Dates

Friday, February 23:	Last day to drop a class without a 'W'
Friday, February 9:	Midterm 1
Friday, March 23:	Midterm 2
Friday, April 6:	Last day to drop a class with a 'W'
Wednesday, May 2, 2018:	Final Examination 11:00 am-1:00pm
Quizzes on Thursdays:	January 18, 25, February 1, 15, 22, March 1, 8, 29, April 5, 12, 19

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.