Math 245 (Section 39617)—Mathematics of Physics and Engineering, Spring 2021

Lecture: MWF 2:00-2:50 pm ONLINE (LA time)
Discussion: TuTh 12noon, 1pm ONLINE (LA time)
Instructor: Dr. Qingtang Su
Office: KAP 444C
Contact Info: qingtang@usc.edu
Office hours: MW 6:30-7:30pm (LA time); or by appointment
Textbook: Differential equations (Classic version), 2nd ed. by Polking (Pearson)
TA: TBD

Topics

Ch.1	Introduction	Section 1.2, 1.3
Ch.2	First-order Equations	Section 2.1, 2.2, 2.4, 2.6, 2.9
Ch.4	Second-order Equations	Section 4.1, 4.3, 4.4, 4.5, 4.7
Ch.5	Laplace Transform	Section 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7
Ch.7	Matrix Algebra	Section 7.1, 7.2, 7.3, 7.6, 7.8
Ch.8	An Introduction to Systems	Section 8.1, 8.4, 8.5
Ch.9	Linear Systems	Section 9.1, 9.2, 9.3, 9.5, 9.9
Ch.10	Nonlinear systems	Section 10.1, and 10.2, 10.5 if time permitted

Blackboard learning management system:
Homework assignments as well as announcements concerning the course will be posted to Blackboard http://blackboard.usc.edu. It is your responsibility to check Blackboard frequently. Your homework, quizzes, and exams are submitted and graded on gradescope (you can use the course entry code **KYKDWJ** to enroll in the course on gradescope). Your scores will also be recorded on gradescope. It is your responsibility to check that your scores are recorded correctly.

Math Center: The Math Center will be an extremely valuable resource for you. Its website is https://dornsife.usc.edu/mathcenter. Your TA holds (online) office hours there, as do all other TAs for core math classes – and they are all there to help you. It is highly recommended that you make a habit of going to the Math Center regularly, to work with other students and to get your questions answered as they arise.

Grading Plan: Homework 15%; Quiz 10%; Midterm 1 20%; Midterm 2 20%; Final 35%

Important Dates:

Friday, 2/5 Last day to add or drop classes without a mark "W" and receive a refund
Friday, 2/19 Midterm 1; Time: 2:00-2:50 pm; the same zoom as for the lectures.
Friday, 3/5 Last day to withdraw without a "W" on transcript or change pass/no pass to letter grade.
Friday, 3/26 Midterm 2; 2:00-2:50 pm; the same zoom as for the lectures
Friday, 4/30 Last day to drop a class with a mark of W.
Monday 5/10 Final exam Time: 2-4pm; Room: via zoom

Test Schedule for International Students: All the schedules including tests are established under the Los Angeles time. If you are residing outside the US domestic time regions, please provide the following information to the instructor during the 1st week of class: (1) country you are residing and (2) your local time that corresponds to 12pm (noon) LA time (PDT). Test schedule will be customized in group depending on geophysical location.

Homework: Homework problems are assigned weekly. Specific problems will be posted to the Blackboard every week (by Friday afternoon). Homework is due on the following Friday, by 5pm (LA time). Your scanned work in PDF format is to be submitted to the gradescope. PDF format is required for best compatibility to the gradescope grading system. Late submission is not accepted. At the end of semester your worst hw grade will be dropped. No homework will be due in the same week as an exam. Homework 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.

Quiz: Weekly quizzes are conducted during discussion sessions on each Thursday, with a few problems similar to homework problems assigned in previous week. The quiz will be strictly timed. You will have 20 minutes for work plus 10 minutes for scan and submission through the Blackboard (total 30 min). No late submission and No make-up quizzes will be permitted. At the end of semester your worst quiz grade will be dropped.

Midterm Exams: There will be two midterm exams scheduled on **Friday, Feb 19, 2-2:50pm, Online (Exam 1)** and **Friday, March 26, 2-2:50pm (Exam 2)**. The exam will be strictly timed. You will have 50 minutes for work plus 20 minutes for submission through the Blackboard (total 70 min). No make-up exam.

Final Exam: A departmental, comprehensive final exam will be held at the time specified in the University Schedule of Classes –**May 10, 2-4pm, online.** The exam will be strictly timed. You will have 120 minutes for work plus 40 minutes for submission (total 160 min). 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*.

Disclaimer: The contents of this syllabus are tentative. The instructor reserves the right to make changes to this syllabus during the semester.

Tentative schedule

Week	Monday	Wednesday	Friday
Week 1 1/11-15	Jan 11 no class	Jan 13 no class	Ch.1 & Sec. 2.1 Intro to differential equations
Week 2 1/18-22	Martin Luthur King Jr. Day	Sec. 2.4 Linear 1st order equations (Method of integrating factors)	Sec. 2.2 Separable equations
Week 3 1/25-29	Sec. 2.6 Exact differential equations	Sec. 2.9 Autonomous equations and stability	Sec. 4.1 The 2nd-order equations – general theory
Week 4 2/1-5	Sec. 4.1 (Cont.)	Sec. 4.3 Linear homogeneous equations with constant coefficients	Sec. 4.3 (Cont.) Complex roots
Week 5 2/8-12	Sec. 4.4 Harmonic motion	Sec. 4.5 Method of undermined coefficients	Sec. 4.7 Forced harmonic motion
Week 6 2/15-19	President's Day	Sec. 5.1 Laplace transform - Definition	**Exam 1 via same zoom as for the lectures**
Week 7 2/22-26	Sec. 5.2 Properties of Laplace transform	Sec. 5.3 Inverse Laplace transform	Sec. 5.4 Solving ODEs using Laplace transform
Week 8 3/1-5	Sec. 5.5 Discontinuous forcing	Sec. 5.5 (Cont.)	Sec. 5.6 Delta function
Week 9 3/8-12	Sec. 5.7 Convolutions	Sec. 7.1 Vectors and matrices	Wellness Day (No classes)
Week 10 3/15-19	Sec. 7.1 (Cont.) Sec. 7.2 Systems of linear equations	Sec. 7.1 (Cont.) Sec. 7.2 Systems of linear equations	Sec. 7.3 Solving systems of linear equations
Week 11 3/22-26	Sec. 7.6 Inverse matrices	Sec. 7.8 Determinants	**Exam 2 via same zoom as for the lectures**
Week 12 3/29-4/2	Sec. 9.1 Eigenvalues and eigenvectors	Sec. 8.1 & 8.4 Intro to systems of ODEs	Sec 8.5 and 9.1 Properties of linear systems
Week 13 4/5-9	Sec. 9.2 & 9.3 Planar systems	Wellness Day (No classes)	Sec. 9.2 & 9.3 Planar systems
Week 14 4/12-16	Sec. 9.2 & 9.3 Planer systems (cont.)	Sec. 9.5 Higher dimensional systems	Sec. 9.5 (Cont.)
Week 15 4/19-23	Sec. 9.9 Inhomogeneous linear systems (method of variation of parameters)	Sec. 10.1 Linearization of nonlinear systems	Sec. 10.2 Long-term behavior of solutions
Week 16 4/26-30	Sec. 10.5 Conserved quantities	Sec. 10.5 continued	Exam review