

## Math290 Differential Equations - Spring 2021

**INSTRUCTOR:** Dr. Tsun-Zee Mai; **OFFICE:** Rm 4-224; **EMAIL:** tmai@scupi.cn

**OFFICE HOURS:** M,W,Th 10:00am – 11:30am & 2:00pm – 4:00pm at Rm 4-224, or by appointment.

**LECTURES:** Tuesday Sec01: 8:15am – 11:00am; Sec02: 1:50pm – 4:25pm at Rm 3-102.

**TEXTBOOK:** Polking, Bogges, and Arnold: *Differential Equations with Boundary Value Problems, 2<sup>nd</sup> ed.*

**DESCRIPTION:** Introduction to analytic methods for solving differential equations. Topics include the numerical Euler's method, qualitative behavior of first order equations, analytic techniques for separable and linear equations, applications to population models and motion problems; techniques for solving high order (most second order) linear differential equations with constant coefficients such as the method of undetermined coefficients, reduction of order, and variation of parameters; applications to mass-spring models; the Laplace transform method to solve initial value problems with discontinuous forcing functions; Fourier Series and PDE will be introduced. The use of mathematics software is an integral part of the course.

### General Learning Outcomes:

1. Students will be able to identify key concepts in the arts, sciences, humanities, or mathematics to provide a broad perspective.
2. Students will be able to demonstrate effective oral and written communication skills.

### Learning Outcomes for This Course:

1. Students will learn to classify an ordinary differential equation in terms of its degree, linear or nonlinear, homogeneous or non-homogeneous and pick the technique most likely to solve it.
2. Students will be exposed to analytical methods for solving nonlinear first-order ordinary differential equations.
3. Students will be able to solve linear second-order ordinary differential equations with nonhomogeneous terms.
4. Students are introduced to the concept of mathematical modeling of simple physical, chemical and biological phenomena.
5. Students will learn how to solve ordinary differential equations indirectly by using Laplace transforms.
6. Students will be exposed to the Fourier Series and partial differential equations.

**GRADE:** The final grade will be based on the **score**, which is a number between 0 and 100 determined by

**Quiz: 15% InClassWork: 10% Major Exams: 45% Final Exam: 30%**

The final letter grade is determined from the following table.

A: 90 – 100	A-: 85 – 90	B+: 80 – 84	B: 76 – 80	B-: 73 – 76
C+: 70 – 73	C: 66 – 70	C-: 63 – 66	D: 60 – 63	F: < 60

**ASSIGNMENTS:** You should do all homework assignments, but I will not collect them. It is your obligation to make sure you understand how to do those assignments correctly. Homework assignment solutions will be provided a week after the assignments are given.

**QUIZZES:** In-class 10-minutes quiz will be given on some lecture days and recitation classes.

**EXAMS:** There are three major monthly tests and a final exam. Each major test will emphasize material since the previous exam, but may include anything covered previously. The lowest test score may be replaced by the final exam score if the final is higher. Example: if a student's grades are: QZ(85), ICW(80), tests (70, 80, 75), and final (78), then the lowest test score 70 is replaced by 78. Thus, the student grade determination is  $85 \times 15\% + 80 \times 10\% + (75+80+78)/3 \times 45\% + 78 \times 30\% = 79.1$  which is a B. The final exam will be comprehensive. There is **NO** Make up for all the exams. Tentative exam dates are the following:

**EXAM 1: Fri. April 2; EXAM 2: Frit. May 7; EXAM 3: Fri. June 18; FINAL: Sat. 6/26**

**RECITATION:** We will decide a common time for a 45-min recitation every week for answering your questions. **Some quizzes** will be held during recitation.

**GRADE REBUTTAL:** You must receive your own test or quiz paper. For any test or quiz, you have only one week to request correction if you feel your answer is mis-graded. No correction will be made after a week when the test paper is returned.

**MAKEUP FOR THE COURSE:** **Only students who made a score of 40 - 59 are eligible to take a makeup exam for the course. If the makeup course exam is successful, the course grade will be changed to a D.** Students whose course scores are lower than 40 are not eligible to have a makeup exam for the course.

**ATTENDANCE:** You are expected to attend all the classes. I will check the attendance but will not be used toward your grade. A student who misses a class is responsible for finding out what was covered in the class.

**ACADEMIC MISCONDUCT:** All students in attendance at the SiChuan University are expected to be honorable and to observe standards of conduct appropriate to a community of scholars. The University expects from its students a higher standard of conduct than the minimum required to avoid discipline. Academic misconduct includes all acts of dishonesty in any academically related matter and any knowing or intentional help or attempt to help, or conspiracy to help, another student. These include, but is not limited to, cheating, plagiarism, fabrication of information, misrepresentation, and abetting any of the above. The Academic Misconduct Disciplinary Policy will be followed in the event that academic misconduct occurs. Students should refer to the Student Handbook.

**NON-ACADEMIC MISCONDUCT:** All cell phones and other electronic devices are to be turned off and out of sight while you are in the classroom. All newspapers and other materials not related to the class are to be put away once class begins. Operating these devices and reading unrelated materials while in class is disrespectful of your instructor and

fellow classmates. If you fail to abide by this rule, the instructor has the right to confiscate the device or materials. If you have an emergency and need to have your phone turned on during class, ask your instructor for permission.

<b>Tentative Schedule</b>		
<b>WK</b>	<b>DE. Topics</b>	<b>Tuesday</b>
2	2.1 - 2.2	3/8
3	2.4 - 2.6	3/15
4	2.7 - 2.9	3/22
5	3.1 - 3.3	3/29
5	Test 1	4/2
6	4.1 – 4.4	4/5
7	4.5 – 4.7	4/12
8	5.1 – 5.3	4/19
9	5.3 – 5.5	4/26
10	5.5 – 5.7	5/3
10	Test 2	5/7
11	9.1 – 9.3	5/10
12	9.3 – 9.4	5/17
13	9.7 – 9.9	5/24
14	12.1 – 12.2	5/31
15	12.2 – 12.3	6/7
16	13.1 – 13.3	6/15
16	Test 3	6/18
17	Review	
18	Final Exam	TBA