Math 345A, Differential Equations
Course Syllabus
Instructor: Dr. Fred Park
Spring 2017

1 Course Description

This is a semester long first course in the theory of first-and second-order ordinary differential equations including their series solutions, introduction to Laplace Transforms with applications, including the solutions of differential equations, systems of ordinary linear differential equations, introduction to Fourier Series and integrals with applications, difference equations, partial differential equations with applications, introduction to the boundary and initial value problems and their applications. Also other selected topics in ordinary and partial differential equations depending on the particular emphases of the students in the class. Pre-req: C- or better in 141B.

Instructor Information

Instructor: Dr. Fred Park
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OH's: TBA

Course Information

- Times and Location: MWF 3:30-4:20 in SLC 416
- Textbook: "Differential Equations and Boundary Value Problems" 8th ed. by Zill and Wright

Course Breakdown

Scheme #1:

- HW 20%
- MT 30%
- Final 50%

Scheme #2 (Emergencies Only!!):

- HW 20%
- Final 80%

No makeup exams whatsoever! I highly recommend you taking the midterm exam since scheme #2 is only for emergencies. I will automatically take the higher of both schemes at the end of the course when determining your final grade. An automatic "F" grade will be issued to anyone who does not take the final exam.

Final Course Evaluations

Final Evaluations: 1% total bump in course grade. For example if your final total course average from the higher of scheme #1 and #2 is an 89% total (B+ grade), your final average gets bumped to 90% (Now an A- grade). I highly recommend that everyone does the final course evaluations.

Grading Scale

In this course, I will utilize an A-F scale with +/- grading. The percentage breakdowns based on the highest average from scheme #1 and #2 above are as follows:

- 90-100% A Range
- 80-89.9% B Range
- 68-79.9% C Range
- 58-67.9% D Range

The minimum grading guidelines in terms of percentage of the class are as follows:

- 20% of the class will be in the A Range
- 30% of the class will be in the B Range
- 35% of the class will be in the C Range

To obtain an "A" grade in my course, you will have to work very hard. In general, there are no easy "A's" in my courses.

Exam Dates

The exam dates are set in stone and will not change. Please write these down in your scheduler ASAP.

- Midterm: Take home exam dispersed on Weds March 22nd. Due Friday March 24th by 8pm.
- Final: Take home. Time and date TBA.

Homework

HW is due at the beginning of class on alternate Weds no later than 3:35 PM unless indicated otherwise by the instructor. No HW will be accepted after the 3:35 PM deadline. Please do not walk up and attempt to turn your assignment into the front of class after the 3:35 PM deadline since it will not be accepted. Moreover, such action would be deemed as disruptive to the class. You are allowed to drop 1 of the assignments. Please make sure to keep up with the homework after each lecture.

Coding and Matlab

There will be a computational aspect to this course. This will include programming assignments in Matlab. Software is available on the computers in SLC 416.

Study Time and Class Expectations

For every 1 hour of lecture you should be studying at least 3 hours outside of class. That is at least 9 hours a week outside of class of studying and HW. Math and Computer Science are difficult and time consuming subjects. Please keep up with the work and do not 'Cram' for any exams or HW deadlines since this usually results in very poor results. I recommend at least 15 hours a week of study outside the classroom for this course.

Class Attendance

Class attendance is mandatory! If you will miss more than 2 total lectures (unexcused) throughout the course, your final grade will drop 1/2 letter grade for each absence past the 2 allowed. For example:

- 3 unexcused absences: You drop 1/2 letter grade. e.g. your B– grade now becomes a C+.
- 4 unexcused absences: You drop 1 full letter grade. e.g. your B– grade now becomes a C–.
- 5 unexcused absences: You drop 1-1/2 letter grades. e.g. your B– grade now becomes a D+.

Valid excuses include a doctors note, emergency (documented), or sports related travel. For sports travel, you must bring in the necessary forms ahead of time for me to sign or else your absence will be counted towards the two allowed.

Active Learning

Active learning will be a large component of the class time. You will be required to work in groups, challenged to think, and work problems out in class on a regular basis. There will be a 50/50 split between lecture and group work. Active learning exercises will be graded and required to be turned in. This includes both group work and individual work. There will also be quizzes throughout the semester. You may drop only 1 graded active learning exercise or quiz. No make up quizzes or active learning exercises whatsoever under any circumstances. Attendance is mandatory to take part in the course. Quizzes will be counted towards your HW grade.

Cheating

Cheating will absolutely not be tolerated in any way, shape, or form in this course!! I have not had any issues in the past and do not plan on starting. Cheating in any form will be recorded, the student will receive an automatic 'F' grade in the course, and the student will be sent to the Dean. Cheating has far reaching consequences that can affect your future career path. Quite simply put: Don't Do It!

Group Work

I encourage group work and you may work together. But you must have your own write ups of your HW and only if you completely understand the problem being solved. Please note that if you simply copy a solution from another student, this falls into the category of cheating.

Accomodations

Students desiring accommodations on the basis of physical, learning, or psychological disability for this class are to contact Disability Services. Disability Services is located on the ground floor of the Library, room G003, and can be reached by calling extension 562-907-4825.

Disruptive Behavior

Disruptive behavior will absolutely not be tolerated in any way, shape, or form in this class. This includes cell phone use (talking, texting, email, etc), non-class computer use, talking, chatting, or any other general disruptions. If you are being disruptive in the class to the instructor and your fellow students, you will be asked to leave with the possibility that you may not be allowed back in the class. Furthermore, disciplinary action by way of the Dean may also ensue.

Weekly Breakdown:

Week 1: INTRODUCTION TO DIFFERENTIAL EQUATIONS. Definitions and Terminology. Initial-Value Problems. Differential Equations as Mathematical Models.

Weeks 2,3: FIRST-ORDER DIFFERENTIAL EQUATIONS. Solution Curves Without a Solution. Separable Variables. Linear Equations. Exact Equations and Integrating Factors. Solutions by Substitutions. A Numerical Method.

Week 4: MODELING WITH FIRST-ORDER DIFFERENTIAL EQUATIONS. Linear Models. Nonlinear Models. Modeling with Systems of First-Order Differential Equations.

Weeks 5,6: HIGHER-ORDER DIFFERENTIAL EQUATIONS. Preliminary Theory-Linear Equations. Reduction of Order. Homogeneous Linear Equations with Constant Coefficients. Undetermined Coefficients-Superposition Approach. Undetermined Coefficients-Annihilator Approach. Variation of Parameters. Cauchy-Euler Equation. Solving Systems of Linear Differential Equations by Elimination. Nonlinear Differential Equations.

Week 7: MODELING WITH HIGHER-ORDER DIFFERENTIAL EQUATIONS. Linear Models: Initial-Value Problems. Linear Models: Boundary-Value Problems. Nonlinear Models.

Weeks 8,9: SERIES SOLUTIONS OF LINEAR EQUATIONS. Review of Power Series Solutions About Ordinary Points. Solutions About Singular Points. Special Functions.

Weeks 10,11: LAPLACE TRANSFORM. Definition of the Laplace Transform. Inverse Transform and Transforms of Derivatives. Operational Properties I. Operational Properties II. Dirac Delta Function. Systems of Linear Differential Equations.

Weeks 12,13: SYSTEMS OF LINEAR FIRST-ORDER DIFFERENTIAL EQUATIONS. Preliminary Theory. Homogeneous Linear Systems. Nonhomogeneous Linear Systems. Matrix Exponential.