Ordinary Differential Equations (ODE), Math 3301

Disclaimer: Dates, number of tests, and other information are subject to change. Attend all classes and update/check your emails to get the latest information.

Resources for the course:
1: Main text: *Elementary Differential Equations and Boundary Value Problems*, by William E. Boyce, Richard C. DiPrima.
2: Simplified Text: *Notes on Diffy Qs, Differential Equations for Engineers*, by Jiri Lebl, available in PDF and HTML forms at www.jirka.org/diffyqs . You may want to download a copy to use offline.
3: Online resources: Screen-recorded lectures and links to texts, apps, videos, and software available at **http://www.math.lamar.edu/faculty/maesumi/MathExpo.pdf** .

Prerequisites: Working knowledge of Calculus I, II, especially as it relates to correct and fast applications of rules of differentiation and integration.

Coordinates: MATH 3301 Section 02, MWF, 11:30-12:25, L118.
Exams: Mondays Feb 4, 25, March 25, April 15, May 6.
Instructor Office hours : Dr. Maesumi, PhD, Lucas 206, MWF 12:40–1:40, TR 2:10–3:10, 409-880-8766, maesumi@gmail.com (this email is the only regularly monitored contact point).

How to prepare for office visit: Mark the problems you want to ask in your notebooks and bring other supporting material if applicable. If you are sending e-mail include your full name and course name, and use a heading that makes your e-mail stand out, e.g. ODE. Keep a copy and e-mail it again if you do not get a reply within one business day. The preferred contact form is through email given above, however if you want to leave a message on phone make it brief, speak clearly, and resend same information by email.

Exams and Grading: Subject to change
Exams are sectional and count equally. Even though we do not have a cumulative exam some basic concepts do show up throughout semester. Students need to know all of the differentiation and integration formulas and methods on all tests. Grade scale: $A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60$.

How are the grades curved? How does homework/participation/projects improve my grade?
1- Open notebook tests: You are allowed to have your handwritten lecture/homework notebook on tests. (So if you attend lectures regularly, take careful notes, make your notes searchable with a complete index cross-listed with numbered pages, write the complete statement of homework problems and their solutions carefully, and give yourself timed practice tests to reach optimal speed then your grades will be quite high.)
2- Exams are sectional. Focusing on a smaller set of topics will increase your grades.
3- There are five exams so you have multiple chances of making a good grade.
4- For every problem you do at the board you get up to 2 points added to your next test.
5- For every project you complete you get up to 5 points added to your next test.
6- You get 5 points added to your final test for completing the course evaluation.

Projects: Differential equations are one of most common ways of modeling natural and physical phenomena. A few simple projects will be assigned to illustrate applications of ODEs. Each project is worth 5 extra points. The first project is on Newton's Law of Cooling.

Calculator Policy: You are allowed to use a basic scientific calculator on all tests. Basic calculators cost less $20 new, and are not capable of drawing graphs, solving equations, differentiating, integrating, storing text, or wireless communication. You do need to purchase and practice your calculator early on. Do keep the manual or find its web site. No advanced calculator (e.g. TI 80, etc) or phone calculators are allowed.

Absence and Exam Make Up Policy:
If you are absent from an exam let me know as soon as possible and be prepared to show written proof of emergency. An individual decision will be made in each case.

Catalog Course Description:
First order equations: modeling and population dynamics, stability, existence and uniqueness theorem for nonlinear equations, Euler's method. Second order equations: nonlinear equations via reductions methods, variation of parameters, forced mechanical vibrations, resonance and beat. Laplace Transform: general forcing functions, the convolution integral. Systems of ODEs: eigenvalues and phase plane analysis.

Course Objectives: Successful completion of this course means the students will
1. Sketch direction fields and interpret solution behavior for a given differential equations.
2. Solve first order differential equations and use them to model certain physical situations such as mixing problems, population dynamics and falling bodies.
3. Solve homogeneous and non-homogeneous second order differential equations and use them to investigate vibration problems.
4. Solve differential equations using Laplace transforms.
5. Solve systems of differential equations and sketch the phase portrait for the system.

Audience: Mathematics, Engineering, Science, especially Physics, Computer Science.

Students with Disabilities: Please register with the office of Services For Students With Disabilities (SFSWD) and come to see me or inform me by the second class day.

Course Evaluation: Students who complete the course evaluation and return the completion form by the assigned deadline will get 5 point added to their lowest score. When you finish evaluating a course a page comes up declaring that your are done. Print just that page when it appears first and give it to me. Do not print your private answers! Do put your full name and course name on the page.

Why not to delay differential equations to the last semester before graduation:
1- Prerequisites: Math courses are like links in a chain. Once the chain is broken and a time gap introduced between successive courses then significant additional time and energy has to be spent to repair the chain. Normally you are to take calculus 1 and 2 in the freshman year and calculus 3, linear algebra, and differential equations by the fall of junior year. If you wait until the very end to take ODE then it generally means that you have been out of practice with math for two years. This will create substantial problems, now you have to review algebra, trig, and calculus to be up to speed with everyone else. The negative effect on class is that if the remedial items are not reviewed then students feel the lectures are too fast, and if they are reviewed then the complaint shifts to statements about lack of interesting material in the course.
2- Relevance: If ODE can be delayed to the last semester before graduation then it looks as if the course were not necessary and it is irrelevant. But every motion is a solution of a differential equation, so every area of science depends on some ODE. In other words an ODE is the mathematical description of the law of evolution of a system. Going through a math or science or engineering degree without an ODE class looks questionable.
3- What should I do if I have made the mistake of postponing this course? You need to double your effort. You will be graded like everyone else.

No: Noise, food, chips, ice, drinks, gum, coffee, chewables, edrugs (ipod, texting, surfing, etc).

Test Code: Your face is visible to the instructor. Your papers are not visible to your neighbors. You do not look at your neighbors' papers. No loose papers. No exchange of papers. Write on your own exam papers only. One person per table if possible. Bring your own basic calculator. Only one solid notebook of your own handwritten notes are allowed.

Academic Honesty Policy: Students are expected to engage in academic pursuits in a manner that is above reproach. Students are expected to maintain complete honesty and integrity in their academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. Full policy description is given at http://students.lamar.edu/academic-support/academic-policies.html