

Lamar University

Department of Mathematics

Syllabus, MATH 3301-03, Ordinary Differential Equations

Fall 2017, August 28 - December 12

TR 12:45-2:05, Cherry Engineering C1000, 3 credits

Instructor:	Dr. Mohsen Maesumi
Office:	L206 Lucas
Contact:	409-880-8766, maesumi@lamar.edu , maesumi@gmail.com
Office Hours:	Online + TR 10:00-10:45, 2:15-3:00, MW 3:15-4:15, knock on door Other times available by appointment.
Recommended Texts:	Elementary Differential Equations (and Boundary Value Problems) by W. E. Boyce & R. C. DiPrima, 10th edition,
Prerequisites:	C or better in Calculus II Math 2414 or its equivalent. Students should be comfortable with functions, differentiation, and integration.
Required Access Code	WebAssign homework access code is required Register with class key: <input type="text" value="lamar"/> <input type="text" value="3117"/> <input type="text" value="4172"/>
Website Preferred	http://www.math.lamar.edu/faculty/maesumi/syllabi.html
Prerequisites:	Calculus I,II,III, Physics I,
Short To-Do list:	Sign on WebAssign,(sign roll) Read, print, sign and return Class Regulation Sheet , (sign roll) Give a hard copy + Email resume, (sign roll) Prepare binder+100 pages+4 examination Blue Book notebooks (small size). Correct preferred Banner email address (if you get a note from me about it.)

Class Regulations:

During the last few years my courses have been redesigned to have an “open access” policy. For example, you have access to your notebook on tests. Also app-based instruction is used extensively to help students excel in their courses. As a result the grades have gone up from their historical average of 55 to well over 75. However a small group of students have taken unfair advantage of the course openness and engaged in various violations of academic honesty standards. For the grading system to be fair to all students it is essential that certain minimal and common-sense standards to be observed by all students.

To enforce these standards I will employ a “penalty schedule” for various infractions. Students are to read the class information here and online, and then sign a statement, at the latest by the census day, stating that they have read, understood, and agreed with class rules and the penalty schedule. As these will be strictly enforced you should take this seriously and if there are issues send an email and come to see me.

Please note that the first rule states: “Saying ‘I did not know’ will double the penalty.”

Catalog 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. Prerequisites: Grade of C or better in MATH 2414 or its equivalent. Prepares for: Partial Differential Equations MATH 4302, and Numerical Analysis MATH 4315. Offered: Fall, Spring, Summer.

Learning Outcomes: Upon successful completion of this course, students will be able to:

1. Describe applications to sciences and engineering.
2. Sketch direction fields and interpret solution behavior from the sketch.
3. Solve first order differential equations and use them to model certain physical situations such as mixing problems, population dynamics, and falling bodies.
4. Solve homogeneous and nonhomogeneous second order differential equations and use them to investigate vibration problems.
5. Solve differential equations using Laplace transforms.
6. Solve systems of differential equations and sketch the phase portrait for the system (if time permits)

Topics to be Covered:

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| 1- Separable differential equations, | Section 2.2 |
| 2- Method of integrating factor, | Section 2.1 |
| 3- Direction fields, | Section 1.1 |
| 4- Solution of Basic ODEs | Section 1.2 |
| 5- Classification of ODEs, | Section 1.3 |
| 6- Modeling with first order ODEs, | Section 2.3 |
| 7- Differences between linear and nonlinear, | Section 2.4 |
| 8- Autonomous equations, stability | Section 2.5 |
| 9- Second order ODEs, | Section 3.1 |
| 10- Reduction of order and repeated roots, | Section 3.4 |
| 11- Complex roots of characteristic equation, | Section 3.5 |
| 12- Mechanical vibrations | Section 3.7 |
| 13- Resonance and forced vibrations | Section 3.8 |
| 14- Laplace Transforms | Section 6.1 |
| 15- IVP via Laplace | Section 6.2 |
| 16- Step functions | Section 6.3 |
| 17- Discontinuous forcing functions | Section 6.4 |
| 18- Impulse functions | Section 6.5 |
| 19- Convolution integral | Section 6.6 |
| 20- Systems of ODEs | Section 7.1 |

Homework: This counts for 50% of your grade. Most of it is to be done on the WebAssign software. Student should consider a target deadline for themselves that is 24 hours earlier than the software deadline. Time extension will not be given for Internet/electrical/financial problems. There is a substantial penalty for late submission. There is an automatic extension button if you are late less than a week. Homework from beginning of semester will lose all of its point value by the end of semester. Course evaluation, conducted during the last few days before final, will be the last “homework” and is required. Submitting the resume is the first “homework”.

Lectures/Discussions: We will have traditional lectures augmented by online resources as found in <http://www.math.lamar.edu/faculty/maesumi/syllabi.html>
Links to video lectures of prior years for this course and prerequisite courses may be available at above URL. The course topics, sections, and homework list will be posted on WebAssign.
Additional homework problems or projects may be posted on course website.

Exams and Grading Policies:

There will be three sectional tests and a cumulative final each counting for 1/8 of the total grade for the course. You are to bring a “Blue Book” to each test. The other 50% comes from homework.

Approximate dates (subject to change): T Sept 19, R Oct 12, T Nov 7,

Cumulative Final TBA .

Grading scale: A>90>B>80>C>70>D>60>F.

In case you want your exam to be reviewed and re-graded you need to notify me within one week from the day grades are given. Two weeks after the final exam your course grade data will be discarded, unless you make a written request in person during the semester.

All issues that may influence your grade should be documented in an email from you to me and acknowledged in an email from me to you. At the time of the final test, and before final grades are given, send a summary email.

Border line cases: Or, When does 89 become an A?

Answer: Please make sure you attend the classes and have done the following early on:

Getting on WebAssign, Sending your resume, Doing the course evaluation.

Mathematical Writing Rules:

Students are to familiarize themselves with type-setting formulas on WebAssign. Some of the basic points of hand-writing mathematics are posted on a separate sheet available on course site.

Test Code:

During tests do not look sideways, you are to look at your own papers and protect them from others. Your face should be visible to the instructor.

No obstruction by sunglasses, hair, hand, caps, etc.

Bring Lamar ID to all tests.

Use of printed sheets, cell phones, advanced calculators, shared calculators or loose paper is not allowed.

Use of unauthorized websites and communication with others, is not acceptable during tests.

Do not give your WebAssign passwords to any other person for any reason.

Unauthorized logins to WebAssign may result in a grade of F for the course.

See the penalty schedule for cost of infractions.

University academic integrity rules apply (see below).

Privacy Issues:

There may be a seating assignment. Every-other seating is preferred when possible.

Your activity on computer will be monitored.

Your papers, calculators, phone and any item on table during tests may be inspected by the instructor.

You may be asked to change your seat during a test.

If you violate the Test Code or class decorum rules you may get a public reminder in class.

Calculator: You are allowed to have a basic scientific calculator on tests. These cost about \$20 new and do not have the following capabilities: graphing, matrix, computer algebra, wireless, or text storage. If you do not have a proper calculator you will take your test without one. Advanced calculators (e.g. TI80), cell phone calculators or sharing is not allowed. See penalty schedule for cost of infractions.

Curving the Grades: The grading style already has a built-in curve by allocating 50% to homework and allowing students to use their notebooks. Asking for an additional “curve” will look very odd. However students usually want to know how to improve their grades. Here are the typical questions and answers, as well as related policies.

Q. How does doing homework improve my grade?

A. First they count as 50% of the grade. Second: Tests are open notebook and mostly based on problems you have already done.

You are allowed to have one binder of entirely handwritten notes on the tests. Your notebook may contain

- (a) Complete statement of problems and their solutions, from WebAssign or the text.
- (b) Lecture notes.
- (c) Handwritten formula tables from trig/algebra/calculus.
- (d) Table of content and an index.

Please use a binder as loose papers are not allowed. Having printed papers results in a penalty.

This is a major privilege, not a right; so please do not abuse it as it may be revoked.

Q. How does attendance improve my test grade?

A. Homework questions are similar to the problems in the text, and these are what we will practice in class. Exam questions are very similar to problems done in class so attendance becomes very important.

Q. How do I improve my exam scores?

A. Try practice tests (under time constraints) before exams. The more of these practice tests you do the higher your grade.

How to Succeed:

This class is designed to allow you to get a high passing grade if you consistently apply yourself from the beginning.

For your notebook to be effective it needs to be searchable (as in a well-designed website) with page numbers, index, complete statement of problems and solutions, definitions, methods, and summaries. (Without having done the homework the notebook will not be of much help. So, please do not abuse this privilege!)

Even though you do the homework on WebAssign you should consider writing each problem in your notebook in its entirety so that you can look it up during tests.

Redo each problem several times to build up speed. That is how to do well on tests.

Items Allowed on Tests:

You may have a single binder of entirely hand-written class notes.

You may have hand-written solutions for homework, provided that the entire problem is recorded.

You may have a table of content in your binder, with page numbers, and an index of key phrases.

You may have hand-written formula sheets in your binder (for algebra/trig/integral/derivative).

For including anything else on your notebook ask me before assuming.

You may have a basic scientific calculator (cost: about \$20 new).

See penalty schedule for the cost of infractions.

Course Evaluations: This is the final homework, and an important and required component for the course. You will receive an email reminder through your LU account. Evaluation window is open only for a few days and closes before finals start. Once you get the reminder go to your “MyLamar/Course Evals” link to complete. To prove that you have done the evaluations and get the points you need to print the “[Acknowledgement Page](#)” that comes up once you are done with evaluations. Write your name and your course name on it. Give the sheet to me with the exam booklet of the final test.

Make sure you are on a working printer before you start. The Acknowledgement Page is only available immediately after you are done with evaluations (it disappears upon second login).

Problems: Assessment Office 880-1843.

Student Contact Info: Students are required to have an active email registered with University which shows up on the “class email list”. A trial email will be sent and announced in class. If you do not receive it, it is your responsibility to contact the responsible university office to correct the issue.

A small percentage of students do have problems with their emails. It is typically due to not selecting a “preferred email” during registration. Other issues are misspelling your email, putting parent email, or using email from a cancelled service.

If you ignore this issue, there will be no compensating recourse later.

Please do not change your name or email mid semester.

Instructor Contact Info: Your emails to me must be signed by putting your full name (as on the class roll) and the course name. You may be contacted with some last minute course information by email. Sent to maesumi@gmail.com and maesumi@lamar.edu. If you leave a phone message for me (8766) please speak clearly and duplicate it by an email Do not use reply button if your email is on a new topic. Please do not send zipped mail or any mail that requires additional software for viewing it.

Absence: Class roll may be taken. Do not sign for others. Unexcused absence beyond 10% of classes may reduce your grade by 1 point per missed class. Make up for tests requires notification on the same day and submission of verifiable written proof of emergency within one day. An individual decision will be made in each case. The final exam cannot be postponed. See penalty schedule for the results of fake emergency excuse. The grade for an excused missed test may be constructed through adjusted average of other tests or by using the final exam score.

No: Tardiness, food of any type, drinks, gum, ice, chips, candy, noise, music, headsets, e-activity as in surfing, scrolling, texting in class. Please turn off and put your phones and music devices away. Same rules apply when you come for office visits. See penalty schedule for the cost of infractions.

Teams and Half-time Breaks: We will experiment with a 30-5-25-5-25 timing where each 5 minute period will be a break for asking questions or just walking around. Students will be divided in teams of 4 for joint in-class work. You are encouraged to bring a laptop with you to class but not for surfing.

WebAssign Errors: These do occur but are very rare. Typically the student has made a typo and thinks it is an error in WebAssign. Please read the syntax hints sheet that is posted online. Usually it is the issue of lower case vs upper case, Greek (alpha) vs English (a), 1(one) vs l (ell), 0 vs o, bold font vs ordinary font, [] vs (), etc. Keep a record of typical errors to remind yourself. If you think WebAssign is making a mistake let me know and I will contact the company.

Student Resume: Students are required to make a resume for themselves applicable to this course. Keep it simple and limit it to one page. Items to include: an ID-type photo, detail of math courses taken, major, minor, employment, long-term career plan, responsibilities, and any specific issue I need to know about before we start. Give me one copy by the end of first week and send the same by email. If the grade for this course is especially important to you detail for me the steps you are taking from the beginning of the semester to ensure your success.

Extension Time on Tests and Votes: Students typically ask for extension time on tests. This requires unanimous approval of students who are present. During a test I may ask if you agree to extend the test by 0, 5, 10, 15 minutes. We will go by what is feasible and approved by all in attendance. In case of an in-class vote, if you are not in class during the vote and do not contact me within 6 hours of class vote time then you accept the result of the vote cast by others.

Audit Students: These students should contact me before signing on WebAssign. Uninvited students, multiple registrations, dropped students will be removed from the class list.

Letters of Recommendations: Students who are applying to graduate schools or scholarships are encouraged to do a project in addition to course requirements in order to get a strong letter.

Corrections: While I have made a sincere effort to ensure that this syllabus is correct, changes may be required. I will announce any substantive changes during a regularly scheduled class or by email. If you have suggestions or concerns feel free to bring it to my attention.

Important University-Wide Information for Students

Lamar University expressly prohibits intimidation and harassment of students, faculty, staff, or applicants. See <http://students.lamar.edu/academic-support/code-of-conduct.html>

Drop Policy: Please make note of the three dates indicated in this drop policy. Any drop will be your responsibility; I will not drop a student from the course.

Sept 13, 2017: (Census Date-Six Drop Rule does not apply) A student may drop or withdraw without consulting with the instructor. The Six Drop Rule does not apply to a drop before 5:00 PM.

Sept 29, 2017: (Six Drop Rule applies) A student may drop or withdraw from the course without academic penalty and receive a Q, however, the Six Drop Rule applies. The student will consult with the instructor and the Records Office to initiate a drop.

Nov 03, 2017: (Six Drop Rule applies) Last day to drop or withdraw with academic penalty; the student must be passing the course at the time of the requested drop in order to receive a Q. The drop form, including all required signatures, must arrive in the Records Office by no later than 4:00 PM. No drop is allowed after this date except in extreme extenuating circumstances. Any “late drop” must be approved by the instructor, department chair, college dean, and provost.

Academic Integrity: 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. Students are specifically warned against all forms of cheating and plagiarism. The *Lamar University Student Handbook* clearly reads: “Any student found guilty of academic dishonesty in any phase of academic work will be subjected to disciplinary action. Punishable offenses include, but are not limited to, cheating on an examination or academic work which is to be submitted, plagiarism, collusion, and the abuse of source materials.” One aspect of the *Handbook*’s definition of cheating includes “purchasing or otherwise acquiring and submitting as one’s own work any research paper or other writing assignment prepared by an individual or firm.” Plagiarism is defined as “the appropriation and the unacknowledged incorporation of another’s work or ideas into one’s own and submitted for credit.” Faculty members in the College of arts and Sciences investigate all cases of suspected plagiarism. Any student who is found cheating in this course will receive a course grade of F. <http://students.lamar.edu/student-handbook.html>

Accommodations: Lamar University is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is located in the Communications building room 105. Office staff collaborate with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact the DRC at [409-880-8347](tel:409-880-8347) or drc@lamar.edu to arrange a confidential appointment with the Director of the DRC to explore possible options regarding equitable access and reasonable accommodations. If you are registered with DRC and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course. <http://www.lamar.edu/disability-resource-center/>

Campus Closure: In the event of an announced campus closure in excess of four days due to a hurricane or other disaster, students are expected to log in to Lamar University's website's homepage for instructions about continuing courses remotely. <http://lamar.edu>

Emergency Procedures: Many types of emergencies can occur on campus; instructions for severe weather or violence/active shooter, fire, or chemical release can be found at: <http://www.lamar.edu/about-lu/administration/risk-management/index.html>

Following are procedures for the first two:

Severe Weather Procedure:

- Follow the directions of the instructor or emergency personnel.
- Seek shelter in an interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside.
- If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building.
- Stay in the center of the room, away from exterior walls, windows, and doors.

Violence/Active Shooter Procedure:

- **CALL** 8311 from a campus phone (880-8311 from a cell phone). Note: Calling 9-1-1 from either a campus phone or cell phone will contact Beaumont City Police Dispatch rather than University Police.
- **AVOID**- If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
- **DENY**- Barricade the door with desks, chairs, bookcases or any other items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it is safe.
- **DEFEND**- Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.