

Lamar University

Department of Mathematics

Syllabus, MATH 3301-04, Ordinary Differential Equations

Fall 2018, August 27 – December 11

TR 2:20-3:40, Maes 212B, 3 credits

Instructor:	Dr. Mohsen Maesumi			
Office:	L206 Lucas			
Contact:	409-880-8766, maesumi@gmail.com			
Office Hours:	Online + Before/After each class + Walk-in + By Appointment TR 9:00-10:45, knock on door			
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, for Fall 2018 Register with class key <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>lamar</td></tr></table> <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>3328</td></tr></table> <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>8499</td></tr></table>	lamar	3328	8499
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Website Preferred	http://www.math.lamar.edu/faculty/maesumi/syllabi.html			
Prerequisites:	I suggest you take this course after Calculus I,II,III, Physics I,II			
Short To-Do list:	*Be prepared for strict time management, substantial homework, reading the text *Sign on WebAssign, *Read, and as proof of agreement, upload the Class Regulations Sheet *Make and upload a one-page resume with photo ID for this class *Correct “Preferred Banner email address” if instructed; and notify me. *Prepare: a binder+200 pages+4 examination Blue Book notebooks (small size)+ a basic scientific calculator (\$15)+ multiple color tags and pens *Submit class evaluation at the end of semester			

Notable Differences:

How does this class differ from comparable classes?

- 1- You have access to your lecture/homework notebook on exams.
- 2- Your homework counts as 50% of your grade.
- 3- The above policies are equivalent to a 25+ point curve on your grade.
- 4- If you apply yourself from the beginning you can end up with a high grade.
- 5- Additional bonus points may be given for a well-written notebook, attendance and participation.

Why are we in a computer lab?

- 1- We will use many apps and online graphic software to visualize mathematics/applications.
- 2- We may use WebAssign in class. Exam questions can be in a PDF file.
- 3- But, PLEASE, no food or drink or YouTube/Tweeter/Email/chat.! Or other distractions!

WARNINGS

Red Flags:

You are working so many hours to pay for a class you cannot attend.

You do not know why you are taking this class.

You do not have access to an online computer.

You do not have financial preparation to get the required items for the course.

You took calculus so long ago you have forgotten much of what you learned.

Your knowledge of functions, differentiation, and integration is spotty.

Class Regulations and Penalty Schedule:

(Read and upload this document as your first assignment on WebAssign)

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. 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.”**

Fair Use Policy (or how to avoid plagiarism charge on homework/project/take-home exams):

Students are encouraged to try do the homework problems/projects/papers without seeking help. But it is OK to consult the instructor, or other students and resources. If you want to seek help on a problem the acceptable process is the following:

- (a) Throw away whatever you have written on that problem so far
- (b) Get input from and consult with as many sources as you wish
- (c) Write the solution of the problem all by yourself without using any other source
- (d) If you get stuck again go back to Step (a)

At the end you should be able to reproduce and justify the steps of the solution you submit. For example, by coming to the board and explaining it from scratch and without reading from your notes.

Term papers are not to be outsourced or copied from the Internet. Come to office regularly to show your progress and the revisions of the drafts of your paper. [\(See Penalty Schedule\)](#)

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 of face by sunglasses, hair, hand, caps, etc.

No obstruction of ears by headsets or articles of clothing.

Bring Lamar ID to all tests.

No printed sheets, cell phones, advanced calculators, shared calculators, loose papers.

Use of unauthorized websites and communication with others may result in a grade of F for the course.

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 the cost of infractions.

University academic integrity rules apply (see below). [\(See Penalty Schedule\)](#)

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. Identify homogeneous equations, homogeneous equations with constant coefficients, and exact and linear differential equations.
2. Solve ordinary differential equations and systems of equations using:
 - a) Direct integration
 - b) Separation of variables
 - c) Reduction of order
 - d) Methods of undetermined coefficients and variation of parameters
 - e) Series solutions
 - f) Operator methods for finding particular solutions
 - g) Laplace transform methods
3. Determine particular solutions to differential equations with given boundary conditions or initial conditions.
4. Analyze real-world problems in fields such as Biology, Chemistry, Economics, Engineering, and Physics, including problems related to population dynamics, mixtures, growth and decay, heating and cooling, electronic circuits, and Newtonian mechanics.
5. Sketch a direction field of first order differential equations and interpret solution behavior from the direction field;
6. Identify and classify equilibrium points/solutions for a differential equation;
7. Use numerical methods to approximate the solution to a differential equation;
8. Work basic modeling problems such as Population Dynamics, Falling Body, and Mixing Problems;
9. Find the Fundamental Set of Solutions for a differential equation;
10. Find and apply the Wronskian to a second order differential equation;
11. Apply the techniques used to solve second order differential equations to higher order differential equations;
12. Work with the Heaviside function in the transform and inverse transform process;
13. Work with the Dirac-Delta function in the transform and inverse transform process;
14. Work with convolution integrals in the transform and inverse transform process;
15. Sketch the phase portrait for a system of differential equations;
16. Solve a system of differential equations using eigenvalues and eigenvectors.

Sections to be covered:

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 ODEs.....	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

Lectures/Discussions: We will have traditional lectures augmented by online resources as found in Course website where links to video lectures of prior years for this course and prerequisite courses may be available. The course topics, sections, and homework list will be posted on WebAssign. Additional homework problems or projects may be posted on course website. Some lectures will be delivered online.

Reading is required! Students should expect that they will be required to read the text. We won't have the necessary time to explain every fact, step, prerequisite, etc.

Grading Plan: 50% homework, and 50% tests.

Homework: This is listed on WebAssign and counts for 50% of your grade.

*Students are to show complete statement of each problem and its solution in their binder notebook and then enter final answer on WebAssign software. Student have access to their notebook on exams and the completeness of your notebook influences your bonus points.

*Webassign has various helpful features, e.g. "show me an example" etc. If you have a question about a homework problem you may use "ask your instructor" button. Short questions can be answered online, however, if it is lengthy I will ask you to come and see me in office or bring it up during class.

*Students should consider a homework target deadline for themselves that is 24 hours earlier than the software deadline. Time extension will not be given for Internet/electrical problems. There is a substantial penalty for late submission. There is an automatic extension button if you are not too late. Homework from beginning of semester will lose most of its point value by the end of semester. If you download the key to homework you cannot get an extension.

Exam Policies: (This information is subject to change)

*There will be three sectional tests and a cumulative final each counting for 1/8 of the total grade for the course. The tests, together, account for 1/2 of the final grade and homework accounts for the other 1/2.

*Approximate exams dates: Thursday September 20, Tuesday October 16, Thursday November 8, Final Tuesday December 11, 2-4:30.

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

*Exams are open notebook. You are allowed to have a handwritten lecture notebook including the solution of all homework problems. You are advised to have applicable tables of formulas, index, and page numbers.

*You are to have a picture ID placed on table during tests.

*You are to have a basic scientific calculator on tests, (these typically cost less than \$15).

*You are to print your name on the exam attendance sheet, on the seat map.

*If you leave early you are to time-stamp the attendance sheet under your name.

*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.

*If an emergency prevents holding the final exam for the whole class, a substitute grade will be made from existing grades at the instructor's discretion.

Curving the Grades and the Borderline Cases:

Or, when does 89.99 become an A?

Note that there is never a good answer to this issue. Because no matter where a line is drawn, the person behind the line would want to cross it. However, the following policy may be used:

I will calculate a MAX grade based on completing all homework, all other bonus points, and matching the highest grade obtained on each test. Then, at my discretion, I may add UP TO $(100-MAX)/2$ to the individual grades based on the following factors:

Attendance and participation in classes as indicated by quizzes and coming to the board.

Having a neat and complete binder for all homework.

Doing the course evaluation (print and give the acknowledgement page right before final starts).

Registering on WebAssign on the first day.

Sending your resume within the first week.

Observing class regulations.

Also note that you have access to your notebook on your tests, and most of the questions are just as done in class or homework. This policy is equivalent to a 25-point curve.

How to Succeed and Improve Your Grades: This class is designed to allow you to get a high passing grade if you consistently apply yourself from the beginning. The grading style already has a built-in curve by allocating a substantial percentage to homework and allowing students to use their notebooks.

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?

I. It counts as a substantial part of course grade.

II. Your homework notebook determines your bonus point.

III. 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 algebra/trig/calculus.
- (d) Table of Content and an Index.

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. Even though you enter the homework on WebAssign for a grade 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.

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?

- I. Your homework is very similar to problems we will do in class.
- II. Exam questions are very similar to homework problems.
- III. Your attendance influences your bonus points.

Q. How do I improve my exam scores?

Drive, time-management and pro-active mind-set are the main ingredients of success.

Try timed-practice tests before exams. The more of these practice tests you do the higher your grade.

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 (\$15-30 new).

See penalty schedule for the cost of infractions.

DRC: Students are to arrange a meeting with me as early as possible.

Privacy Issues:

There may be a seating assignment. Students are to use the front rows first.

Every-other seating is preferred during tests 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.

WebAssign Syntax, Mathematical Writing Rules:

Students are to familiarize themselves with type-setting formulas on WebAssign. [See this.](#) Also pay attention to these [basic points](#) of hand-writing mathematics.

Calculator: You are allowed to have a basic scientific calculator on tests. These cost about \$15-30 new and do not have the following capabilities: graphing, computer algebra, matrix, wireless, or text storage.

If you do not have a proper calculator you will take your test without one. Advanced calculators (e.g. TI80 etc), cell phone calculators or sharing is not allowed. See penalty schedule for 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. This page should list all courses you are registered for. Print the entire page. Clearly write your name and your course name on it. Give the sheet to me right before the final test starts.

Make sure your PC has a working printer before you start. 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 me and 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 forgetting the email you used during the first registration, 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. My only contact is through the following address: maesumi@gmail.com . If you leave a phone message for me (8766) please duplicate it by an email. Please do not use other email addresses, links or clickable address to reach me. Do not use reply button if your email is on a new topic.

Absence: There is no make-up for in-class activities or quizzes etc. Class roll may be taken. Do not sign for others. Unexcused absence beyond 10% of classes may reduce your final 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. At instructors discretion the grade for an excused missed test may be constructed through adjusted average of other tests or by using the final exam score.

Buddy System: Students are to form groups for helping each other in case of absence (for example giving each other copies of notes) or for group study.

No: Tardiness, food of any type, drinks, gum, ice, chips, candy, noise, music, headsets, e-activity as in surfing, scrolling, texting, etc 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 45-5-40 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 if possible. You are encouraged to bring a laptop with you to class, but only if it is used for lecture-related activities.

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 f vs upper case F, Greek (alpha) vs English (a), 1(one) vs l (ell), 0 vs o, bold font F vs ordinary font F, [] 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.

WebAssign Compatibility: Check your PC for compatibility with WebAssign. You may have to update your browser or Flash or other components. Check that graphs and formulas show properly. This has to be done well in advance of any critical deadline for any assignment. Usually tablets or phones might not work as expected.

Student Resume: Students are required to make a resume for themselves applicable to this course. Items to include: an ID photo, detail of math courses taken, major, employment, long-term career plan, responsibilities, and any specific issue I need to know about. Give me a hard copy and also 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: Occasionally students 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 on the day of class vote 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. In case of multiple registration you might lose points already earned.

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

Please double check ALL deadlines on [academic calendar](#) and [Important Dates Fall 2018](#)

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.

September 12, 2018: Last day to drop with full refund.

(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.

September 28, 2018: (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.

November 2, 2018: (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 login 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.

Grade of Incomplete:

A grade of "Incomplete" may be recorded in the case of a medical emergency documented prior to the final exam and if the student is passing at the time. Such a request must be in writing and include a plan for completion of the course. No "Incomplete" will be authorized after the final exam.

From: <https://catalog.lamar.edu/general-academic-policies/index.html> :

The grade of "I" may be given when any requirement of the course, including the final examination, is not completed. Arrangements to complete deficiencies in a course should be made with the instructor prior to the end of the semester or term. Incomplete work must be finished during the next long semester or the Records Office will change the "I" to the grade of "F." While the extension may be granted by the instructor with the approval of his/her Department Chair and Academic Dean, once the "I" is changed to an "F" it cannot be changed back to an "I." In this case, either a "change of grade" procedure must be initiated or the course must then be repeated if credit is desired. The instructor may record the grade of "F" for a student who is absent from the final examinations and is not passing the course.