Linn-Benton Community College

Differential Equations

Math 256 Shannon Harbert Fall 2020 Remote CRN: 25728

Course Information

Zoom Meeting ID: 266-855-221 Password: mathrocks
Zoom Meeting Times: Mondays and Wednesdays from 10-10:50am.
Discord: https://discord.gg/Suy2vKs
myOpenMath ("MOM") Course ID: 87826 Enrollment key: mathrocks
Office hours by appointment.
Math Help Desk Zoom
Open from 9am - 7pm Monday through Friday, 11am - 4pm Saturday, and, *new this term*, 11am - 4pm on Sunday.
Tutortrac

Our Free e-book (click here)
"Introduction to Differential Equations" by Jeffrey Chasnov.
Free e-book available at: https://www.math.ust.hk/~machas/differential-equations.pdf.
Our course will cover Chapters 1 through 6 of this material.

Course Description

Beginning course in differential equations for students majoring in mathematics, sciences or engineering. Covers ordinary differential equations, series solutions, systems of first order differential equations, and Laplace transforms.

I will be making videos of our lecture material as well as supplementing with videos done by other professors. When we "meet" twice a week this will be a time to work with classmates over the ICAs of the week, to talk about concepts, as well as ask questions.

Course Prerequisite

The required prerequisite for Math 256 is a course in multi-variable calculus (Math 254). The calculus and algebra techniques that students should review thoroughly at the beginning of the course are as follows:

- Completing the Square, e.g. $x^2 - 6x + 7 = (x-3)^2 - 2$
- Partial Fractions Decomposition (both repeating and non-repeating factors)
- Basic derivatives, including the chain rule
- Basic antiderivatives, including u-substitution

Course Topics

- What is a differential equation?
- Modeling with differential equations, including identifying dependent and independent variables
- Theory of first-order and second-order linear differential equations
- Customary solution techniques to common differential equations

• Modeling free and forced oscillations (mechanical and electrical)
• Introduction to the Laplace transforms
• Solving a variety of equations using the Laplace transform
• Using the Laplace transform to model forced oscillations with continuous or discontinuous forcing terms

Course Learning Outcomes

1. Write the appropriate differential equation to model a variety of problems and interpret the solution to the differential equation in the context of the given problem.
2. Identify the necessary method and construct the analytical solution of typical ordinary differential equations.
3. Develop at least one numerical method of solving first-order and second-order differential equations.
4. Compute the Laplace transform of continuous and discontinuous functions.
5. Apply the Laplace transform to solve a variety of differential equations, including those with discontinuous forcing terms.

Grading Policy

Online Homework (MOM)	20 %
In Class Work (ICA)	15 %
Quizzes (MOM)	15 %
2 Midterm	30 %
Final Exam	15 %
Attendance	5 %

Final Grade: 90%-100%=A, 80%-89%=B, 70%-79%=C, 60%-69%=D, <60%=F
A grade of Incomplete may be assigned at the discretion of the instructor under special circumstances. The student must have completed the majority of the course, been in regular attendance and passing the course prior to the "special circumstance."

Online Homework (MOM):

Your assignments on MyOpenMath come with six (6) late passes you can use at your convenience. After that, late assignments will earn the score achieved by the due date. Late passes on MyOpenMath extend the assignment by 48 hours from the due date. For assignments due on Sunday evening, using a late pass will extend your due date to Tuesday evening. Please note that using the late pass in that scenario on Monday will still extend the due date to Tuesday evening.

In Class Work (ICAs):

These are short assignments or activities, given and completed the same day/week the material is covered (I will put these on our calendar in Moodle). Typically you will work in small groups, putting what you just learned into immediate practice. My idea is that you can work with classmates during one of our two mandatory weekly zoom meetings. The ICAs are due the day that they appear in our calendar (unless otherwise noted) by midnight. Although, No late ICAs accepted. I will drop the lowest.

Please be prepared to upload your completed work as a pdf file (in Moodle). Please be

sure items are numbered and pages are in order. One single combined document for each assignment. You can upload through Moodle (see my tutorial in Moodle) or find an easy to use PDF converter if needed (Cam Scanner works nicely).

Quizzes (on MOM):

There will be approximately weekly quizzes. I will drop your lowest quiz at the end of the term. This is to help those who have missed a quiz due to unforeseeable circumstances. Although, No late Quizzes accepted. I will drop the lowest quiz.

Tests (2 Midterms and 1 Final): (more info to come)

- The *tentative* test dates are listed on the course calendar. If you have been missing class prior to a test, it is your responsibility to confirm the date of the test as it may change.
- I believe we have been given proctoring access through Moodle. I will put more information here when I have it!!

Expectations:

- I expect that my students will be involved in and working on this class many times a week. This includes asking questions and participating in group discussions, watching videos, etc.
- Spend **at least 12-16 hours per week working on this class** (including watching videos).
- You should log into Zoom office hour appointments prepared (this means you should have your notebook, table/laptop, work, etc. ready).
- I expect you will be respectful of everyone in the class, in word as well as behavior. Discord board posts should be respectful and supportive of the success of everyone in the class. We will all need extra patience and kindness this term.

Attendance:

Your attendance is mandatory twice a week in our zoom room. See course description for how I plan on using these times. If you are unable to attend, we will have to find an alternative meeting for you. I will excuse 2 absences in total.

I just want to remind you of how proactive you are going to have to be and also how much I want to be there for you. Please do not forget that there are tutors available for online one-on-one tutoring. You can do this through tutortrac, and you are allowed 3 full hours a week (for free)! Also, the learning center is still open for virtual drop in help and they can help with this class. I have set up a discord site for your class and so has the learning center. Please let me know if you have any questions about the help available to you (or anything else)! Good luck and may the odds be ever in your favor.

How to be successful in this class:

- Even though this term classes are delivered remotely, make a school schedule and stick to it!

· Be prepared for class by reading the assigned materials promptly when asked. Class lectures will be richer for you when you have background information about the subject.

· Review the syllabus and learn policies and procedures for this class. Understand your rights and responsibilities as a student and as a class member.

· When confused, challenged, frustrated or having an "aha" moment, contact the instructor during their 'virtual' office hours or via email or on Discord!

· Don't hesitate to ask questions, whether during 'virtual' office hours or through email.

· Be engaged! You will get out of this class what you put into it. This will be a challenge with the online format adopted this term. Your instructors are here to help you succeed, stay connected with them!

College Policies

LBCC Comprehensive Statement of Nondiscrimination

LBCC prohibits unlawful discrimination based on race, color, religion, ethnicity, use of native language, national origin, sex, sexual orientation, material status, disability, veteran status, age, or any other status protected under applicable federal, state, or local laws.

Disability Services Statement

Students who have any emergency medical information the instructor should know of, who need special arrangements in the event of evacuation, or students with documented disabilities who may need accommodations, should make an appointment with the instructor as early as possible, and no later than the first week of the term. If additional assistance is required, the student should contact the Center for Accommodation Resources (CFAR) at 541-917-4789.

Student Code of Conduct

All students at LBCC are expected to be familiar with and to abide by the published Student Code of Conduct. Violations will be reported to the Associate Dean of Students for possible disciplinary action. 5.4 Academic Dishonesty You must abide by the policies set forth by the college regarding cheating and academic dishonesty. Please see the complete policy at this link. Any evidence of academic dishonesty will result in a zero on the assignment. Please do your own work – you learn more when you approach it honestly.

Basic Needs Statement

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Roadrunner Resource Center for support (resources@linnbenton.edu, or visit us on the web www.linnbenton.edu/RRC under Student Support for Current Students). Our office can help students get connected to resources to help. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to provide any resources that they may possess.