MAP2302: (SECTIONS 4985, 5590, 5592) Elementary Differential Equations, Fall 2020

Course webpage: https://people.clas.ufl.edu/calistusnn/courses/map2302/

Course, meetings, and Instructor's information

Term	Fall 2020
Course	MAP2302
Section	4985, 5590, 5592
Credits	3
Days	Monday, Wednesday, Friday
Period	3
Time	09:35 - 10:25
Venue	Online via zoom

Instructor	Calistus N. Ngonghala
Office	Zoom link will be provided through canvas
Contact	Tel.: (352) 294-2335, Email: *calistusnn@ufl.edu*
Office hours	1) Monday, Friday: 10:40-11:30 (4th period) Wednesday: 08:30-09:20 (2nd period) 2) By appointment
Remark	*Don't feel constrained by the scheduled office hours. You can ontact me for an appointment.*

Textbook

R. Kent Nagle, Edward B. Saff and Authur David Snider. Fundamentals of differential equations and boundary value problems. Seventh Edition. (2019). ISBN: 978-0321977106.
Each student is required to have a copy of this textbook.

Pre-requisite(s)

A grade of C or better in MAC2312, MAC2512 or MAC3473.

Course Description

MAP2302 is a 3 credit hours course in differential equations that covers topics such as: first order linear, separable, exact, homogeneous, and Bernoulli equations, second order homogeneous and non-homogeneous ordinary differential equations with constant and variable coefficients, the Laplace transform and its applications, power series solutions of ordinary differential equations, and applications of differential equations.

Course Objectives

Differential equations constitute a language through which the laws of nature are expressed. Many of the fundamental laws of applied Mathematics, Physics, Chemistry, Biology, Engineering, Economics, Finance, etc., can be formulated as differential equations. Hence, it is essential for students in engineering, the physical, biological, and social sciences, etc., to be familiar with differential equations.

The major objective of MAP2302 is to introduce students to the basic concepts and applications of ordinary differential equations. Students will be expected to understand the basic concepts of differential equations well enough to be able to decide when, how, and why to apply them to real-world phenomena and to be able to interpret and communicate the results. This course is designed to help students progress in developing analytical thinking, critical reasoning, problem-solving, and communication skills. The goal is to obtain a useful mastery of basic concepts and methods to fully understand and appreciate the theory and practice of differential equations.

Upon successful completion of this course, students should be able to:

- classify differential equations and investigate the existence and uniqueness of solutions to the equations;
- solve first order ordinary differential equations (separable, linear, exact, homogeneous, Bernoulli) using appropriate techniques;
- solve linear second order ordinary differential equations (homogeneous, nonhomogeneous, constant coefficients, variable coefficients, etc.) using appropriate techniques;

- model simple phenomena (population biology, tank flow, mechanical and electrical vibration, etc.), with first ordinary differential equations;
- define and use Laplace transforms to solve initial value problems;
- use power series to solve ordinary differential equations.

Course outline and detailed course schedule

Date	Chapter	Section	Topic	Homework
08/31/2020	0	0	Syllabus, Office hours, and background	
			Introduction	
09/02/2020		1.1	Background	
	1	1.2	Solutions and initial value problems	Homework 1
09/04/2020		1.3	Direction Fields	Homework 2
			Quiz 1	
			First Order Differential Equations	
09/09/2020		2.1	Motion of falling body	
09/11/2020		2.2	Separable equations	Homework 3
09/14/2020		2.3	Linear equations	Homework 4
09/16/2020	2	2.4	Exact equations	Homework 5
			Quiz 2	
09/18/2020		2.5	Special integrating factor	Homework 6
09/21/2020		2.6	Homogeneous and Bernoulli equations	Homework 7
09/23/2020		2.6	Bernoulli equations	Homework 8
09/25/2020	1, 2		**Exam 1**	
			Mathematical modeling with first order ordinary differential equations	
09/16/2020		3.1	Introduction	
		3.2	Compartmental analysis	Homework 9
09/28/2020	3	3.3	Heating and cooling of buildings	Homework 10
09/30/2020		3.4	Newtonian mechanics	Homework 11
10/02/2020		3.5	Electrical circuits	Homework 12
			Quiz 3	
10/05/2020	3		**Exam 2**	
			Linear second order equations	
10/07/2020		4.1	Mass-spring oscillator	Homework 13
10/09/2020		4.2	Homogeneous linear equations	Homework 14
10/12/2020		4.3	Auxiliary equations with complex roots	Homework 15
10/14/2020		4.4	Method of undetermined coefficients	Homework 16
	4		*Quiz 4*	
10/16/2020		4.5	Superposition principle	Homework 17
10/14/2020		4.6	Variation of parameters.	Homework 18
10/19/2020		4.7	Equations with variable coefficients	Homework 19
10/21/2020		4.9	Free vibrations	Homework 20
10/23/2020		4.10	Forced vibrations	Homework 21
10/26/2020	4		**Exam 3**	
			Laplace transforms	
10/28/2020		7.1-7.2	Definition of the Laplace transform	Homework 22
10/30/2020	7	7.3	Properties of Laplace transforms	Homework 23
11/02/2020		7.4	Inverse Laplace transform	Homework 24

Continued on the next page...

Date	Chapter	Section	Topic	Homework
			Quiz 5	
11/04/2020		7.5	Solving initial value problems	Homework 25
11/06/2020	7	7.6-7.7	Discontinuous and periodic functions	Homework 26
11/09/2020		7.8	Convolution	Homework 27
11/13/2020	7		**Exam 4**	
			Series solutions of differential equations	
11/16/2020		8.1	The Taylor polynomial	
11/18/2020		8.2	Review of power series	Homework 28
11/20/2020	8	8.3	Power series solution	Homework 29
			Quiz 6	
11/23/2020		8.3	Power series solution	
11/30/2020		8.4	Equations with analytic coefficients	Homework 30
12/02/2020			Review for exam 5	
12/04/2020	8		**Exam 5**	
12/07/2020			Make-up exam	

Student responsibilities and expectations: Students are advised to keep pace with the course material as it is being presented. Consequently, students should endeavor to attend all class meetings, be early for class, and spend sufficient time working on assigned homework problems. If for any reason a student misses a class, he/she should endeavor to obtain the notes and learn the missed material before the next class meeting. I will be glad to go over the material covered in class with the student during one of my office hours or during a scheduled appointment. Students should not hesitate to ask questions or seek additional assistance to ensure that they are staying on pace with the class. Students will be expected to come to class prepared and ready to participate actively. Please, turn off your cell phones and put aside any unrelated material before class begins. Also, students should exhibit a great sense of responsibility and respect towards fellow students. Late-coming to class or early departure from class meetings will not be allowed.

Course policies and procedures

Announcements: Announcements will be made in class and through canvas. It is the student's responsibility not to miss any announcement made in class and to check his/her canvas account regularly. Unless otherwise stated, exam, quiz and homework grades will be posted on canvas as soon as they are graded.

Examinations: There will be five exams during the term (but only the best four will count towards the final grade). Two attempts will be allowed for each exam. Although the purpose of the one dropped exam. is to cater for any missed exam, any student with a duly justified and documented reason for missing an exam, will be offered a chance to make-up for the exam. Exams will be open in Canvas from 9 am to 11:59 pm on their date, and you may take each exam up to two times. Exams will be proctored using HonorLock.

Quizzes: A total of six quizzes will be administered periodically throughout the semester. Quizzes are meant to test the understanding of the topics that have been covered, giving a benchmark prior to the exams. Because there will be no make-up quiz, only the best five quizzes will count towards the final grade. However, any student with a duly justified and documented reason for missing a quiz, will be offered a chance to make-up for the quiz. Quizzes will be open in Canvas from 11 am to 11:59 pm on their date, and you may take each quiz up to two times. Quizzes will be proctored using HonorLock.

Homework: The purpose of homework is to develop more skills in the material covered. It will be the student's responsibility to solve the assigned homework problems. In particular, students who intend to do well in the course are advised to solve the homework problems. Students should feel free to approach the instructor with difficulties

from homework problems. Problems in which students encounter difficulties may be discussed in class. Students will be required to complete thirty assignments. All thirty assignments will be graded and will count towards the final grade. Homework will be due by the next class time.

Class Attendance and Missed Exams, Assignments, and Quizzes: Requirements for class attendance and make-up exams, assignments, quizzes, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx. Attendance will be taken during each class and this will count towards the final grade.

Grading and Grade Scale: Your final grade will be based on the cumulative total of points acquired through exams, quizzes, homework, class participation and attendance. For information on current UF grading policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

Assessment item	Points
Exams (4)	400
Quizzes (5)	50
Homework (30)	30
Attendance	10
Participation	10
Total	**500**

Letter grade	Point range
A	465 - 500
$A-$	450 - 464
$B+$	438 - 449
B	425 - 437
$B-$	400 - 424
$C+$	388 - 399

Letter grade	Point range
C	375 - 387
$C-$	350 - 374
$D+$	338 - 349
D	325 - 337
$D-$	300 - 324
E	000 - 299

Remark: Your grade is your responsibility. You have exactly one week once your assignment has been graded to discuss that grade. After that week, the grade is final. No additional points will be awarded to "boost" your grade.

The course instructor reserve the right to make changes to this syllabus if needed. Please check Canvas for changes.

Academic Honesty

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." Students should familiarize themselves with the University's Code of Conduct that is available at: (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) and the university's policy on academic honesty, which may be found in the University of Florida Rules, 6C1-4.

Statement on on-line class recording

Our class sessions may be audio visually-recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Student Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course

menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In addition to the mid-term and final evaluations, I encourage students to furnish me with feedback, either through zoom or skype, by voice mail, or through an email throughout the semester. I look forward to reading your constructive and objective comments.

Special Accommodations

Students requesting classroom accommodations or special arrangements during examinations must first register with the Dean of Students Office (352-392-8565, www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation. The student must then make arrangements with the instructor to meet the requesting accommodation.

Students with Disability

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting disability.ufl.edu/students/get-started. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

U Matter We Care

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu, so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call the University Police Department: 392-1111 or 911.

Diversity Statement

I am committed to diversity and inclusion of all students in this course. I acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements. It is my intent to present materials and activities that are respectful of diversity: race, color, creed, gender, gender identity, sexual orientation, age, religious status, national origin, ethnicity, disability, socio-economic status, and any other distinguishing qualities.

Resources

Free tutoring is available at the Teaching Center which is located on the ground level of SW Broward Hall. The regular hours are Monday-Friday, 8am-5pm. Please check the website http://www.teachingcenter.ufl.edu/ for any changes.

Resources for students with internet issues are available at: https://elearning.ufl.edu/media/elearningufledu/keep-teaching/Connectivity-Options.pdf on the Keep Learning portal: https://elearning.ufl.edu/keep-learning/.