DIFFERENTIAL EQUATIONS
MAP 2302 - SPRING 2020
(CRN 13271, 3 CREDITS)

Course Introduction

Welcome to Differential Equations!!! This is the ultimate course in mathematical modeling. Simply put, equations that contain a derivative are referred to as differential equations. You will learn how to solve first-, second-, and higher-order equations. Equations can be designed to represent heat flow through a steel beam, change in current in an electric circuit, and cell growth in a petri dish, to describe a few relevant scenarios.

My name is Galen Papkov and I will be your guide in learning how to solve these real-world models. To find the course more pleasant, you should be strong in taking derivatives, as this process can be used to check your solutions. Furthermore, you should be adept at all integration methods, but especially partial fraction integration. Naturally, solving an equation that contains a derivative will (usually) require integration.

My Contact Information

Office: Whitaker Hall, Room 205.
Email: gpapkov@fgcu.edu
Office Hours: **Monday/Thursday 1:30-4:30pm**
Office hours will be used to help students better understand course material, not to teach a lesson that has been missed.

1. Basic Course Information

Textbook: *Elementary Differential Equations with Boundary Value Problems by William F. Trench.* - Access via link on Canvas.
Class Room & Time: Whitaker 129 on MWF 9:30-10:20am.

Course Description & Prerequisite: An introduction to differential equations and their applications, based upon a knowledge of calculus. Topics to include: initial value problems of the first-order, numerical solutions, systems of differential equations, linear differential equations, Laplace transforms, and series solutions. The prerequisite for this course is MAC 2312 with a minimum grade of C.

Helpful Online & Text Resources:

(1) Paul's Online Notes at Lamar University: `http://tutorial.math.lamar.edu/Classes/DE/DE.aspx`

(2) Wen Shen's Notes at Penn State University: `https://www.math.psu.edu/shen_w/LNDE.pdf`

(3) Cliffs Notes: `http://www.cliffsnotes.com/study-guides/differential-equations`

(4) *Differential Equations by Boyce & DiPrima,* 10^{th} *Edition*

Date: January 6, 2020.

The following is a *tentative* list of the content that will be covered and corresponding learning outcomes. ***Denotes chapters that will be covered if time permits.

TABLE 1. Content and Learning Outcomes

Ch.	Sections	Outcomes
1	1-3	• Understand definitions of order & linearity • Familiar with some applications • Interpret direction fields
2	1-6	• Solve first-order separable equations • Apply integration factor • Differentiate between DiffEQ methods
3	1	• Approximate via Euler's Method
4	1-4	• Formulate real-world models • Differentiate between autonomous equation scenarios • Solve real-world contexts
5	1-7	• Recognize homogeneous vs nonhomogeneous equations • Solve second-order equations • Determine best method to use for solving
6	1-3	• Formulate and solve spring and circuit problems
7***	1-3	• Approximate solutions via power series
8	1-7	• Apply Laplace transforms • Use step functions and impulses • Generate convolutions
9	1-3	• Recognize and solve via characteristic function or the method of undetermined coefficients
10***	1-6	• Reduce an equation into a series of equations of order one lower

2. Grading Policy

Your grade will be a weighted average of the following:

Weights for Grading

Online HW	15%	
Worksheets	20%	
Quizzes	50%	(given frequently)
Final Exam	15%	Saturday, May 2, 2020, 7 : 30 – 9 : 45am

A tentative, general, grading scale is described below. Boundaries for letter ranges may change and plus and minus signs may also be implemented; however, a C- will never be used. The "0.5 rounding rule" will be applied to final grades.

Range	Letter Grade
90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

2.1. **Online Homework:**

- Homework will be assigned via the online system called WebWork.
- Access the site through the link under Modules on Canvas.
  - Username = 1st letter of first name and first four letters of last name (e.g. John Smith has username jsmit)
  - Password = 9-digit student ID number
- Expect an assignment nearly every TR, though it is the student's responsibility to check whether an assignment is available to be completed. I will aim to give *at least* 5 days to do any online assignment.
- You will have an *unlimited number of attempts* for each incorrect online homework problem, prior to its due date, unless otherwise stated in the problem.
- **No late submissions will be accepted.**

2.2. **Worksheets:**

- Worksheets will be given periodically throughout the course and are intended to be completed individually and in groups. In particular, students should
  - solve all problems on their own,
  - then post individual solutions to your group's discussion board,
    - you will not be allowed to view others' answers until you have posted your own and

    * `https://www.camscanner.com` is useful for taking images of your work and posting to the discussion board

  – finally, converge on a common group solution and submit one copy of the solution on Canvas via Assignments (not the Discussion Board).

  – Work must be shown to receive full credit. You should be able to explain your solution and justify all steps. Reporting a solution process that differs drastically from what was shown in class or you likely do not understand will receive minimal, if any, credit.

- A student that fails to post their individual solution to their group's discussion board will suffer a 20% penalty to their own grade for that particular worksheet.
- In general, **late worksheets will not be accepted** and a grade of 0 will be given for the assignment. If, however, a member has an acceptable excuse as to why they were unable to assist in a solution for a worksheet that was posted at least a week prior to its due date AND provides documentation in advance of the due date supporting the impossibility, then the worksheet will be excluded and the particular student's grade will be based on the results of their non-excluded worksheets.

2.3. **Quizzes:**

- Given nearly every week, in-class, usually without notice.
- On **any** topic that has been covered in class, a worksheet, or in an online assignment.
- Missed quizzes will earn a grade of 0. If official documentation is provided within two weeks of the absence, justifying the absence, then the missed quiz will be excluded and the student's grade will be based on the other quizzes. **This policy may be applied a maximum of two times.**

2.4. **Bonus Towards Quizzes.** As of the start of the semester, **every student has 7 bonus points** towards the quiz component of the course. These are not points that need to be earned, but instead points to lose. Problems will be given in class or handouts will be posted on Canvas. To maintain your bonus points, complete **all** of the problems. The general process is as follows:

Process

(1) The entire problem set will be collected at a specified date. A submission with at least two problems attempted will receive a gain of 0.1 point. A complete submission will receive an additional 0.2 point. Attempting fewer than two problems will not yield any additional points.

(2) *One* problem will be chosen for evaluation. Points will be lost as follows:

Quality of Work	Outcome to Bonus
correct solution; complete with minor mistakes	0
complete, valid approach with major mistakes; correct, partial solution	-0.1
partial or full solution based on an invalid approach	-0.3
no attempt at a solution	-0.5

(3) Sometimes, students will be split into mini-groups to solve a problem for a possible +1 bonus point for all members. A fixed amount of time will be given to solve the problem and for all members to improve their understanding of the topic. At the end of the designated time period, one member will be selected at random from a few of the groups. The selected students will approach the front of the room, without any notes, to present their solutions. A correct solution will earn 1 point. If a presenter is uncertain of their solution, they can use one lifeline to have another group member selected at random to assist with the problem. A correct solution, after using a lifeline, will result in a gain of 0.5 point.

Students cannot go negative nor can they go above 10 bonus points.

Incompletes will require advance written justification.
Withdrawals are the sole responsibility of the student.

2.5. **Attendance Policy & Class Conduct.** Attendance is not factored into the grading system. If a student is absent, the student is responsible for all material covered in class and all assignments. Experience has shown a definite correlation between poor class attendance and low grades. Cheating will not be tolerated and your cell phone is not an acceptable alternative to an actual calculator. Please refrain from texting during class time. Texting during an exam will be treated as a suspicious act and the student will be treated as though he/she cheated. Cheating will result in a grade of zero for the assignment. Technology restrictions are designed to help you focus on coursework. Cell phones, pagers, PDAs, or similar communication devices must be turned off during class meetings. IPod, MP3 players, and all portable music players must be turned off before class. Laptop computers are only acceptable for reviewing or taking class notes. Anyone who violates the policy will be asked to leave class. Finally, feel free to ask questions throughout the course. Students should be comfortable asking questions in the classroom, where the atmosphere should be one of openness and respect. Any student that is disrespectful to the professor or any other student during class will be evicted from the classroom.

Academic Behavior Standards and Academic Dishonesty

All students are expected to demonstrate honesty in their academic pursuits. The university policies regarding issues of honesty can be found in the FGCU Student Guidebook under the **Student Code of Conduct and Policies and Procedures** sections. All students are expected to study this document which outlines their responsibilities and consequences for violations of the policy. The FGCU Student Guidebook is available online at `http://studentservices.fgcu.edu/judicialaffairs/new.html`.

University Nondiscrimination Statement

Florida Gulf Coast University is committed to ensuring equity and fairness for all University employees, students, visitors, vendors, contractors and other third parties. As such, the University prohibits discrimination on the bases of race, color, national origin, ethnicity, religion, age, disability, sex (including sexual harassment/assault), gender identity/expression, marital status, sexual orientation, veteran status or genetic predisposition with regard to admissions, employment, programs or other activities operated by the University. This prohibition extends to enforcement of **Title IX** of the Education Amendments of 1972. Questions or complaints should be directed to the Office of Institutional Equity and Compliance (OIEC). The OIECs phone number is (239)745-4366; the OIEC email address is OIEC@fgcu.edu.

Disability Accommodations Services

Florida Gulf Coast University, in accordance with the Americans with Disabilities Act and the university's guiding principles, will provide classroom and academic accommodations to students with documented disabilities. If you need to request an accommodation in this class due to a disability, or you suspect that your academic performance is affected by a disability, please contact the Office of Adaptive Services. The Office of Adaptive Services is located on the first floor of the Student and Community Counseling Center (behind Seidler Hall). The phone number is (239)590-7956 or TTY (239)590-7930.

Student Observance of Religious Holidays

All students at Florida Gulf Coast University have a right to expect that the University will reasonably accommodate their religious observances, practices, and beliefs. Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith. Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence. Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances. Where practicable, major examinations, major assignments, and University ceremonies will not be scheduled on a major religious holy day. A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence.

Video and/or Audio Recording

Video and audio recording of class lectures is expressly prohibited unless the FGCU Office of Adaptive Services has documented your disability and determined the best reasonable accommodation for you is to allow recording and you have executed a written agreement regarding the limitations on use of such recordings and their disposition at the end of the semester.

****The instructor reserves the right to amend this syllabus at any time.****

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