



MATH 3502 (CRN 775)
Differential Equations
Spring Semester 2020

Instructor: Allen G. Fuller

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Office location: Instructional Complex 240

Office hours:

Monday: 9:00-9:30; 12:30-2:00

Wednesday: 9:00-9:30; 12:30-2:00

Friday: 9:00-11:00; 1:00-3:00

And by appointment

Class Location: Instructional Complex 310

Class Times: 2:00-3:15 Monday,
Wednesday

Course Description:

Study of methods for solving differential equations including first-order and higher order differential equations. Includes power series solutions and numerical methods.

Pre or Co-requisites: MATH 1502

Required materials:

- **CALCULATOR:** A graphing calculator is required.
- **TEXT:** Zill, Dennis. 2001. *A First Course in Differential Equations: The Classic Fifth Edition*. 5th edition. Brooks/Cole Cengage Learning. ISBN: 9780534373887

Area Requirements/Skills and Competencies:

This objective is directed toward the following general education expected outcome of the college:

Mathematical Skills: Students will demonstrate a basic knowledge of the fundamentals of college-level mathematics.

Specific Learning Outcomes:

Upon completion of Differential Equations, students should have an understanding of:

1. Solving various types of first-order differential equations.
2. Solving higher-order differential equations.
3. Power series solutions to differential equations.
4. Numerical methods for solving differential equations.
5. Using Laplace transforms to solve differential equations.

6. Applications of differential equations.

Grade Scale:

89.5% +	79.5 – 89.4%	69.5 – 79.4%	59.5 – 69.4%	Less than 59.5%
A	B	C	D	F

Grading Scheme:

The student's final grade will be computed as follows:

Assignments	15%
Tests	60%
<u>Final Exam</u>	<u>25%</u>
TOTAL	100%

Assessments:

- A. There will be seven (7) take-home assignments given during the semester. The due dates for the assignments are: Wednesday, January 24; Monday, February 5; Friday, February 16; Monday, March 5; Wednesday, March 28; Wednesday, April 11; and Wednesday, April 18, 2018. Assignments are due at the **beginning of class** on the date due. **Late assignments will NOT BE ACCEPTED.** However, I will drop your lowest assignment grade. Just having the correct answer to a homework question will **NOT** earn you credit for the problem; you must use clear mathematical reasoning and clear mathematical writing to show me how you arrive at your solution.
- B. There will be three (3) in-class tests given during the semester. The dates of the tests are: Wednesday, February 5; Wednesday, March 11; and Wednesday, April 22, 2020. **If a make-up test is required, there will be 20% penalty unless there is a documented medical excuse or documented death in the immediate family.** A make-up test **must** be taken within **48 hours** of your return to class or the last day of class (whichever comes first), after which you receive a grade of zero. **All test will be taken without references of any description.** Just having the correct answer to a test question will **NOT** earn you credit for the problem; you must use clear mathematical reasoning and clear mathematical writing to show me how you arrive at your solution.
- C. There will also be a comprehensive Final Examination given on Thursday, May 7, 2020 from 2:45-4:45 PM. Gordon College policy states the Final Examinations must be taken at the scheduled time. Therefore, students are **not** permitted to take the Final Examination early. Please make your plans accordingly.
- D. If your grade on the Final Exam is higher than your highest test score, then the grade on the Final Exam will replace your lowest test score.

Student Rights and Responsibilities:

- A. **Title IX:** Gordon State College is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic violence, dating violence and stalking. If you (or someone you know) has experienced or experiences any of these incidents, know that you are not alone. All faculty members at Gordon State College are mandated reporters. Any student reporting any type of sexual harassment, sexual assault, dating violence, domestic violence or stalking must be made aware that any report made to a faculty member under the provisions of Title IX will be reported to the Title IX Coordinator or a Title IX Deputy Coordinator. If you wish to speak with someone confidentially, you must contact the Counseling and Accessibility Services office, Room 212, Student Life Center. The licensed counselors in the Counseling Office are able to provide confidential support. Gordon State College does not discriminate against any student on the basis of pregnancy, parenting or related conditions. Students seeking accommodations on the basis of pregnancy, parenting or related conditions should contact Counseling and Accessibility Services regarding the process of documenting pregnancy related issues and being approved for accommodations, including pregnancy related absences as defined under Title IX.
- B. **ADA and 504:** If you have a documented disability as described by the Americans with Disabilities Act (ADA) and the Rehabilitation Act of 1973, Section 504, you may be eligible to receive accommodations to assist in programmatic and/or physical accessibility. The Counseling and Accessibility Services office located in the Student Center, Room 212 can assist you in formulating a reasonable accommodation plan and in providing support in developing appropriate accommodations to ensure equal access to all GSC programs and facilities. Course requirements will not be waived, but accommodations may assist you in meeting the requirements. For documentation requirements and for additional information, contact Counseling and Accessibility Services at 678-359-5585.
- C. **House Bill 280:** For information regarding House Bill 280, see the University System of Georgia at the following link: <http://www.usg.edu/hb280>.
- E. **Religious Holidays:** Gordon State College acknowledges that the academic calendar can sometimes conflict with major holidays from among our diverse religious traditions. If a student must miss class due to the observance of a religious holiday, that absence may be excused. To be excused, the student must inform his/her instructors before the absence and make alternate arrangements for any work due at the time of the absence. An excused absence for the observance of a religious holiday does not excuse student from responsibility for required course work.
- F. **Hightower Collaborative Learning Center & Library:** The Hightower Collaborative Learning Center & Library offers Gordon State students specialized library research assistance. Students can meet with their personal librarians for one-on-one help in each discipline, major, or course to search and evaluate information sources effectively. Go to schedule an appointment by clicking the **Personal Librarian** tab or click on the **Presentation Practice Room** tab to make a reservation. For immediate help, call **678-359-5076** or stop by the

Circulation/Check-Out Desk. You can also [Ask a Librarian](#) or drop by the Circulation/Check-Out Desk. Check the library's for [website](#), [hours](#), [electronic resources](#), and [LibGuides](#) (subject- or class-specific research guides).

Additional Information:

- A. **Attendance:** Attendance at class is important. I will take attendance by passing an Attendance Sheet for you to sign. If your signature is not beside your name for a particular day, you are considered absent. It is your responsibility to make sure you sign the Attendance Sheet. Students are responsible for every instruction, every change in the syllabus, and all material covered in class whether or not they are present. Students who enroll in the course late are responsible for material covered before they enrolled.
- B. **Tardiness:** Tardiness to class is NOT tolerated. I will give you a grace period of approximately five minutes to come into the classroom. During that time the door to the classroom will be left open. After that time, I will close the door to the classroom. If the door of the classroom is closed, you may not enter. DO NOT ENTER THE CLASSROOM AFTER THE DOOR HAS BEEN CLOSED.
- C. **Attire:** As in all professional environments, appropriate dress is required in the classroom. I reserve the right to refuse you admittance to class if I deem your attire to be inappropriate and/or distracting. Please dress appropriately.
- D. **Working Problems:** Most students will benefit by working many, many problems for practice. On the Tentative Course Outline is a list of suggested "Practice Problems" for each section covered. These are intended to give the student practice in specific concepts that are taught in class. The problems will not be graded. However, I strongly encourage you to work them to better prepare for the tests. I will use approximately the first ten minutes of class to answer any questions about the homework problems. Math is not a spectator sport!
- E. **Group Work:** I encourage students to work together on homework.
- F. **Academic Honesty:** Each student must do his or her own work on exams without any assistance from any outside source not specifically authorized by me. The student handbook details school policies on academic honesty.
- G. **Calculator Policy:** A graphing calculator is required. The TI-83 or TI-84 is recommended. I will not provide calculators for your use. However, graphing calculators can be checked out at the Library. Also, sharing calculators during a test will be considered cheating.

H. **Electronic Devices Policy:**

1. **Cell Phone Use:** Studies show that use of a cell phone or similar device during lecture strongly impairs a student's ability to take notes and remember information later, and that students significantly underestimate how much cell phone use impairs their ability to learn (Sana et al [2]). In class texting has been linked to an average drop of half a letter grade in a course (Kamenetz [1]). Furthermore, use of electronic media by students reduces the ability of other students near them to take notes by 17% (Sana et al [2]).

Use of cell phones or other electronic communication devices during lecture is prohibited, except where explicitly allowed by the instructor. Unauthorized use can result in a loss of some or all of a student's participation points for the day, at the discretion of the instructor.

- [1] A. Kamenetz. "How to get students to stop using their cellphones in class". NPR Ed, Nov 10 2015.
 - [2] F. Sana, T. Westin, and N. Cepada. "Laptop multitasking hinders classroom learning for both users and nearby peers". *Computers and Education*, 62:24-31, Mar 2013.
2. **Electronic Devices During Tests and Quizzes:** The use of electronic devices (iPhone, iPad, smartphones, tablets, laptops, iPods, etc.) is prohibited during quizzes and tests.

- I. **Testing Procedure:** You will be asked to leave books and other personal items at the front of the room during tests and exams. For that reason, you may want to leave expensive electronic devices and other valuable articles in cars or at home. The instructor will remain in the classroom during tests and exams, but he/she cannot guarantee the safety of easily pocketed items.

- J. **Statute of Limitations:** While the instructor does his best to accurately review and assess student work, instances may occur where an error in assigning a grade may occur. The student has exactly three class periods from the time of receiving a grade to ask the instructor to review the grade. After this time has elapsed, all grades will be considered carved in stone.

- K. **Classroom Etiquette:** Students are expected to treat the instructor and other students with respect. Please refrain from the following during class time:

1. Talking with other students (other than during classroom or group activities).
2. Leaving class early (other than an emergency).
3. Leaving the desk to sharpen a pencil in the middle of a lecture.
4. Cell phones ringing during class. Placing or receiving cellular phone calls during class.
5. I-pods or other music listening devices should NOT be in use during class time.

- L. **Gordon E-mail:** Your Gordon e-mail address is where all official communication from Gordon College is sent. This includes registration information, etc. Please check your Gordon e-mail account periodically for important information. You should also delete junk e-mail to keep your mailbox from getting full. If your mailbox is full, you may not receive

important e-mail notifications. Also, if I need to communicate with you via e-mail, I will send the message to your Gordon e-mail account.

M. **Office Procedures:** When you come to my office for help, please be prepared by doing the following.

1. Bring you class notes and your calculator.
2. Make sure you have read the section in the text, read the class notes, and studied the examples.
3. Be prepared to show me at least two odd-numbered problems from the section that you have worked.
4. Bring your incomplete or incorrect solution to each problem about which you have a question.
5. Ask for help as early as possible. **Don't wait until the day of a test! I will *NOT* help you if you come for help the day of the test!!**

N. **Harry's House:** The mission of [Harry's House](#) is to distribute food and toiletries to students to alleviate stress associated with short term food insecurity and other financial constraints in order to effectively reduce hunger and support educational success.

Tentative Lecture Schedule

Date	Section	Assignment	Homework
Mon, Jan 13	1.1: Basic Definitions and Terminology		1-53 odd
Wed, Jan 15	1.2: Some Mathematical Models		1, 3, 4, 10, 11, 21, 22
Mon, Jan 20	<i>Martin Luther King, Jr. Holiday – No Class</i>		
Wed, Jan 22	2.1: Preliminary Theory		1-13 odd
	2.2: Separation of Variables	12, 18, 34, 50 (Due Wed, Jan 29)	1-49 odd, 57, 59
Mon, Jan 27	2.3: Homogeneous Equations	32, 35 (Due Wed, Jan 29)	1-43 odd
	2.4: Exact Equations	26, 34 (Due Mon, Feb 5)	1-43 odd
Wed, Jan 29	2.5: Linear Equations	18, 36, 50 (Due Mon, Feb 5)	1-53 odd
	2.6: Equation of Bernoulli, Ricatti, and Clairaut	8, 14 (Due Mon, Feb 10)	1-23 odd, 27, 29, 30
Mon, Feb 3	2.7: Substitutions	8 (Due Mon, Feb 10)	1-27 odd
Wed, Feb 5	TEST I		
Mon, Feb 10	3.1: Orthogonal Trajectories	16, 28 (Due Wed, Feb 19)	1-27 odd, 39
	3.2: Applications of Linear Equations	6, 12 (Due Wed, Feb 19)	1-17 odd, 21-27 odd
Wed, Feb 12	3.3: Applications of Non-Linear Equations		1-11 odd
Mon, Feb 17	4.1: Initial Value and Boundary-Value Problems; Linear Dependence and Linear Independents; Solutions of Linear Equations	6, 28 (Due Wed, Feb 19)	1-43 odd
Wed, Feb 19	4.2: Constructing a Second Solution from a Known Solution	8 (Due Mon, Mar 11)	1-29 odd
Mon, Feb 24	4.3: Homogeneous Linear Equations with Constant Coefficients	44, 54 (Due Wed, Mar 11)	1-63 odd
Wed, Feb 26	4.4: Undetermined Coefficients – Superposition Approach	30 (Due Wed, Mar 11)	1-41 odd
Mon Mar 2	4.5: Differential Operators		1-31 odd
	4.6: Undetermined	8 (Due Wed, Mar 11)	1-39 odd

Date	Section	Assignment	Homework
	Coefficients – Annihilator Approach		
Wed, Mar 4	4.7: Variation of Parameters	6 (Due Wed, Mar 11)	1-33 odd
Mon, Mar 9	5.1: Simple Harmonic Motion		1-25 odd
	5.2: Damped Motion		1-23 odd
Wed, Mar 11	TEST II		
Mon, Mar 16 – Fri, Mar 20	<i>Spring Break – No Class</i>		
Mon, Mar 23	6.1: Cauchy-Euler Equation	12, 26 (Due Wed, Apr 1)	1-45 odd
Wed, Mar 25	6.2: Review of Power Series; Power Series Solutions	28 (Due Wed, Apr 1)	1-29 odd
Mon, Mar 30	6.3: Solutions About Ordinary Points	10, 18 (Due Wed, Apr 1)	1-21 odd
Wed, Apr 1	7.1: Laplace Transform		1-31 odd, 37-41 odd
	7.2: Inverse Transform		1-13 odd, 17-33 odd
Mon, Apr 6	7.3: Translation Theorems and Derivatives of a Transform		1-5 odd, 9-37 odd, 41, 43, 45-50 <u>all</u> , 51-63 odd
Wed, Apr 8	7.4: Transforms of Derivatives, Integrals, and Periodic Functions		1, 2, 3-29 odd, 37
Mon, Apr 13	7.5: Applications	4, 10, 16, 60 (Due Mon, Apr 20)	1-19 odd, 29-37 odd
Wed, Apr 15	9.1: Directions Fields		1-21 odd, 25-29 odd
Mon, Apr 20	9.2: The Euler Method	4, 14(a) (Due Wed, Apr 22)	1-13 odd
	9.3: The Three-Term Taylor Method	6, 8 (Due Wed, Apr 22)	1-11 odd
Wed, Apr 22	TEST III		
Mon, Apr 27	8.1: Operator Method		1-15 odd
Wed, Apr 29	8.2: Laplace Transform Method		1-11 odd
Mon, May 4	Review		
Thu, May 7 2:45 PM	FINAL EXAMINATION		