

MATH 334-001 – Differential Equations, Summer Terms II&III Summer 2009, Liberty University, Lynchburg, VA	Class Meets in: by appointment. Lecture Times: by appointment.
<i>Even though I walk through the valley of the shadow of death, I will fear no evil, for you are with me; your rod and your staff, they comfort me.</i> <i>Psalm 23:4 (E.S.V.)</i>	Instructor: Dr. James S. Cook Office: Applied Science 105 Office Hours: by appointment. Email: jcook4@liberty.edu office phone: 434-582-2476

I. Course Description

Differential equations of the first order and first degree, linear equations, variation of parameters, methods of undetermined coefficients, inverse operators, Laplace transforms, systems of differential equations, and applications 3 hours credit

II. Rationale

This course is required for the engineering major. The study of differential equations introduces the student to a thorough treatment of the use of differential equations to solve, understand, and set models to physical problems. The study of differential equations involves concepts studied in calculus; however, many of the concepts studied differential equation will be new to the student.

III. Prerequisite Statement

To enroll in this course you must have successfully completed Math 231 and Phys 231 or have permission of the instructor.

It is the student's responsibility to make up any prerequisite deficiencies, as stated in the Liberty University Catalog, which would prevent the successful completion of this course

IV. Materials List

- Required Notes: See my website for course notes. Also, there will be a variety of solved problems similar to the material covered by this course.
- Required Text: fundamentals of Differential Equations and Boundary Value Problems, Fifth Edition, By Nagle, Saff, and Snider Brooks/Cole Publishing Co. 2008. [3rd or 4th editions will also work, but may be inconvenient for matching homework assignments, do NOT get later editions, they are different and lack crucial sections we will cover]
- No graphing calculator is required for this course. Mathematica can do much more than even the best graphing calculator. I will allow (basic) scientific calculators during tests, but **no graphing calculators**, laptops, PDAs, IPODS, cell phones, bluetooth-type devices, or any other electronic device capable of either data storage or communication. If in doubt ask.

V. Learning Outcomes

This course will emphasize understanding calculus principles as well as skill. Upon completing this course students should be able to:

1. Solve first order ordinary differential equations by appropriate methods.
2. Solve homogeneous and nonhomogeneous constant coefficient ordinary differential equations.
3. Apply the method of Laplace transforms to solve differential equations with discontinuous forcing functions.
4. Use power series and Fourier series techniques to solve differential equations.
5. Demonstrate proficiency in the ability to take the knowledge acquired and apply it to select real-world applications such as the forced harmonic oscillators, RLC-circuits, circuits with switching, heat dissipation in a solid, and travelling waves.

VI. Assignments/Requirements

- Cognitive growth – Demonstrate mathematical proficiency by working exercises and solving problems related to the topics discussed. (See the course description and the outcomes listed in Section V above.)
- Product – Daily assignments and readings, four Problem Sets, four tests, and a comprehensive final exam
- Process – A students will demonstrate individual progress by solving problems in homework and tests. (See the outcomes listed in Section V above.)

VII. Grading Policies

- Late assignments are accepted, but penalized by 30% per day late in general.
- Students are expected to abide by the Liberty University Honor Code as stated in *The Liberty Way*.

Your score for the course is earned as follows:

1. [40%] Problem Sets: there will be four Problem Sets, each is worth 100pts.
 2. [40%] Tests: there will be four tests, each is worth 100pts
 3. [20%] Comprehensive final exam is worth 200pts.
 4. Bonus points are weighted with test points.
 5. End of course average can be computed by $(\text{Points Earned}/1000) \times 100\%$.
- **Course Grade:** Your final course grade will be determined by the course average described above and following point scale (no rounding)
90%-100% = A 80%-89% = B 70%-79% = C 60%-69% = D 0-59% = F

I do not “give grades”, rather you EARN your grade through your responsible and continual efforts to master the material. I want everyone to pass my course, but it is you who must do the work. I will do everything in my power to help you work effectively. The recipe for passing is quite simple: come to class, pay attention, do your homework. I rarely fail anyone who actually does these three simple things.

- **Missed Tests:** If you have an emergency absence then the weight of the final may be increased. If your absence is known ahead of time then you need to notify me so we can make arrangements.

VIII. Other Policies

Dress Code: Students are expected to come to class dressed in a manner consistent with The Liberty Way.

Honor Code: We, the students, faculty, and staff of Liberty University, have a responsibility to uphold the moral and ethical standards of this institution and personally confront those who do not.

Academic Misconduct: Academic misconduct includes: academic dishonesty, plagiarism, and falsification. See The Liberty Way for specific definitions, penalties, and processes for reporting.

Disability Statement: Any student with a documented disability may contact the Office of Disability Academic Support (ODAS) in Teacher Education Building-TE 127 in order to make arrangements for an academic accommodation.

IX. Calendar for the semester/term

A tentative list of practice homework is given on the course webpage, the practice homework should help you prepare for the Problem Sets which should in turn help prepare you for the Tests. Additions or deletions of problems on the tentative list may occur mid-semester. However, such modifications will be emailed and/or announced in lecture. I do expect you check email on a daily basis. (I send hints sometimes, especially if someone asks me a good question whose answer will help the whole class). The Problem Sets will be posted on the course webpage in pdf-format.

Assignments	Due Date (to be completed in order listed, starting at the top)
Problem Set I	10pm - 2 days before Test 1 is taken
Test 1 (on sections 2.2-2.5, 3.4, 4.2, 4.3, 6.2)	Proctored (2hrs: someday between June 8 and July 31, 2009)
Problem Set II	10pm - 2 days before Test 2 is taken
Test 2 (on sections 4.4-4.7, 4.9-4.10, 6.1-6.3)	Proctored (2hrs: someday between June 8 and July 31, 2009)
Problem Set III	10pm - 2 days before Test 3 is taken
Test 3 (on sections 7.2-7.6a and on sections 8.3, 8.4, 8.6, 8.7)	Proctored (2hrs: someday between June 8 and July 31, 2009) + Take-home
Problem Set IV	10pm - 2 days before Test 2 is taken
Test 4 (on sections 10.1-10.7)	Proctored (2hrs: someday between June 8 and July 31) + Take-home
Comprehensive Final Exam.	Proctored (3hrs: someday between June 8 and July 31, 2009)

X. Homework Assignments and Course Calendar

See the website <http://www.supermath.info> for detailed instructions and due dates.

XI. Disclaimer:

While I have attempted to completely specify the content of this course, I reserve the right to change this syllabus if necessary. It is your responsibility to monitor your Liberty University email account for any changes in the syllabus. I will notify you via email and announce in class in the event something needs modification.

XII. Motivation comments from your instructor:

Differential equations and power series approximations are ubiquitous elements of current scientific discussion. In other words, Calculus is used to phrase many of the laws of physics which describe much of the natural world. This means that if we know calculus then we can better appreciate the general revelation of God.

It is important that you master the techniques of MATH 334. I look forward to helping you toward that goal, but ultimately you must think for yourself. The ability to think in math comes from practice (for most of us anyway) so make sure you set aside plenty of time throughout the week to work out the subject for yourself.

It is possible that you may not use calculus in your daily life, but there is still something to be gained by its study. As Christians we are called to sharpen our minds towards the purpose of defending our faith and winning others to Christ. Mathematics demands that we think more precisely than in many other avenues of discussion. In short, I argue that mathematics can help you think better. Think of it as weight lifting for your brain. No pain, no gain.

Finally, there is beauty. Mathematics can be beautiful and we can thank our Creator for allowing us to comprehend that beauty. A well crafted proof can be appreciated much the same way as other fine art. This is often sufficient motivation for pure mathematicians.