

MAT 282 – Differential Equations
Course Syllabus
Siena Heights University
Winter 2014

Instructor:	Jeff Kallenbach
Phone:	264-7641
Office:	SC29B
Hrs:	Whenever I am not in class or a meeting. See schedule on my door.
Course Meets:	TWRF 1:00-1:50, SC25
Prerequisites:	Successful completion of Calc II and Linear Algebra
Text:	<u>Free On-Line Text by Prof. William Trench</u>
Software:	Maple will be the primary software for this course. It is available in the classroom, the Math Lab (SC26), and from the SHU VMWare portal.
Handheld:	A TI-NSpire CAS will be the handheld model of choice
Course Management:	Course management will be accomplished using <u>Engrade</u> and <u>my website</u>
Other Resources:	<u>Student Solution Manual for text</u> <u>Paul Dawkins' DiffEq notes page</u>

Grading Scale		Grade Apportionment	
90+%	A	Hour Exams	30%
80-89.9%	B	Homework/Quizzes	25%
70-79.9%	C	Technology/Labs	10%
60-69.9%	D	Projects & Write-Ups	10%
0-59.9%	E	Final Exam	25%

[Amendments:](#)

The instructor reserves the right to make changes to this syllabus as needed.

Overview:

This course introduces the math, science, and engineering student to the beginnings of the theory and application of differential equations. After beginning with begin with some motivational settings, we will proceed to

- A qualitative introduction to DE applications such as projectile motion, population growth, radioactive decay, heating and cooling, and periodic motion.
- Theory of solutions including slope fields and domains of solutions.
- Applications and solution techniques for first order equations – separable, linear, exact, and integral equations
- Numerical techniques and approximate solutions, including computer (Maple) implementation of Euler and Runge-Kutta methods

- Linear second order applications and solutions. We will cover periodic motion (springs and pendula), the mathematics of RLC circuits, characteristic equations, undetermined coefficients, and variation of parameters.
- Series solutions to DE.
- LaPlace Transforms, inverse transforms, IVPs, and convolutions.
- Linear systems of equations, with applications, matrix techniques, the theory of solutions and homogeneous systems.
- If time permits we begin Boundary Value Problems and Fourier Series.

Method of Evaluation

- **Hour Exams** – 4 of them, roughly during weeks 3, 6, 9, 12. 50 minutes in length. Combine for 30% of your grade.
- **Homework & quizzes**
 - I will be assigning problems nearly every day to make sure we've comprehended the lesson material. Also, 2-3 days during the weeks that we don't have an exam, we will have a quiz consisting of 1-2 problems directly from homework assignment from the sections currently under discussion. Each will count for 10 points. No makeup quizzes will be given. To allow for the bad day/missed class, the lowest **three** HW quiz scores will be dropped.
 - All homework quizzes and collected assignments together will count for 25% of your grade.
- **Labs/Technology Activities/Large Assignments**
 - Throughout the semester, we will have a few labs/computer assignments in Maple, the TI Calculator, or both. Each assignment/lab will be graded on a scale of 1-20.
 - From time to time during the semester I will assign some homework to be collected. These may be completed/submitted in groups (pre-determined), and will generally count the same as two quizzes (20 points).
 - Your percentage on these activities & labs together will make up the 10% of your grade.
- **Projects & Write-ups**

Differential Equations have a number of applications in the real world. A few times during the semester we will investigate these applications with a laboratory project, accompanied by a write-up. These will be done primarily in Maple and MS Word. The final submissions will be suitable for submission to a publication. Details will be forthcoming as the projects near. All of the projects together will make up 10% of your grade.
- **Final Exam** – 25% of your grade, time & location TBA

Daily Homework:

Homework problems will be assigned for each section that we cover. The problems will be listed on the Master Schedule for this course, and probably in the [Engrade](#) calendar for that

particular day. These problems are primarily for practice, as the questions on the Homework Quizzes and Hour Exams will be based closely on the assigned homework problems. I will usually collect 1-2 of the problems, the others are for practice.

Late Work:

Collected assignments are to be submitted at the beginning of the class session on the due date (unless otherwise specified). No late assignments will be accepted.

Course Methods:

- The focus of this class is on learning through daily activities. In this pursuit, we'll use technology: calculators (TI-Nspire CAS) and computers (Maple software) to enhance your understanding of the concepts being developed. We will review and discuss daily assignments to provide instant and interactive feedback on your learning. You should keep a notebook of worked examples and written homework assignments. Plan to be active participants in class discussions. *Successful completion of this course requires a substantial amount of out of class study – around 8-10 hrs/week.* You are encouraged to work together on the homework and help each other grasp the material. **Homework is assigned for every section, and you should plan to complete it once that section is covered in class unless otherwise stated. We will be discussing the assignment at the beginning of the next class, before proceeding to the next topic.** Mainly odd-numbered problems will be assigned, so you will be able to check to see if you've gotten to the correct answer.
- Visit the [Paul Dawkins' DiffEq notes page](#). The resources there can provide some supplementary information to that presented in class. You are encouraged to visit the site as needed to enhance your understanding of the course material.
- Visit the [Engrade](#) site for this course regularly. Announcements, schedule changes, hints, links to helpful web sites, and other such information will be posted there

On Getting Through the Course

- Come to class prepared: review notes, read book, do problems.
- **USE YOUR GRAPHING CALCULATOR & COMPUTER** whenever possible (even if not assigned). Graphs & Numerical tables provide concrete visual representations of important concepts, patterns & abstract relationships. Technology gives you the freedom to explore realistic problems & examples, and to spend your time learning concepts, w/o getting bogged down by difficult and/or tedious hand calculations.
- **Ask** questions **DURING** class: if you're confused, seek clarification. The beginning of each class period will be spent answering questions from the previous lesson. If you haven't attempted these exercises you will get next to nothing from this time.
- **Answer** questions **DURING** class. Lead group discussions and help others: tell us what you've learned and let us learn from you.
- Study in groups as **SOON** after class as possible: help -- but don't copy from each other ...we call that plagiarism.

Learning Outcomes

The **Mathematics Department** has identified the following learning outcomes to be achieved by majors and minors in its program.

1. Students will read and understand mathematics, differentiating between correct and incorrect mathematical reasoning.
2. Students will demonstrate abilities to work independently and in-groups to develop mathematical models using appropriate technologies.
3. Students will demonstrate a mathematical maturity leading to independent investigations, increased responsibility for learning.
4. Students will demonstrate mastery of the content of the courses required for the major including the calculus, foundations, algebra, and analysis.

Academic Honesty:

The search for truth and dissemination of knowledge are the central missions of a university. Siena Heights University pursues these missions in an environment guided by our Roman Catholic tradition and our Dominican heritage. Integrity and honesty are therefore expected of all members of the University community, including students, faculty members, administration, and staff. Actions such as cheating, plagiarism, collusion, fabrication, forgery, falsification, destruction, multiple submission, solicitation, and misrepresentation, are violations of these expectations and constitute unacceptable behavior in the University community. The penalties for such actions range from verbal warning, all the way to expulsion from the University.

Students are responsible for their own work and accomplishments. You are encouraged to discuss problems with others, but the actual written work submitted should be your own. The first occurrence of cheating on any assignment will result in a grade of zero on that assignment. The second time the same student is observed cheating will result in that student being given an E for the course. All cases of academic dishonesty will be documented and reported to the appropriate authorities on campus. For a complete explanation of the Academic Dishonesty Policy, refer to the current SHU Undergraduate Catalog.

Students With Disabilities

Section 504 of the rehabilitation act of 1973 and the Americans With Disabilities Act of 1990 require that the institutions such as SHU not discriminate against qualified students with disabilities and that effective and reasonable academic accommodations be provided for eligible students. In accordance with University policy and the equal access laws, I am available to discuss appropriate academic accommodations that you may be eligible for as a student with a disability. Please contact me for an appointment to discuss possible accommodations. Students must register with the Office for Students with Disabilities for disability verification and determination of reasonable accommodations. Requests for accommodations must be done in a timely manner.