



GOSHEN COLLEGE
MATHEMATICS DEPARTMENT
MATH 321 DIFFERENTIAL EQUATIONS – FALL 2018

Motivation	The study of differential equations and the calculus originated with the work of Isaac Newton and Gottfried Wilhelm Leibnitz. The development of these theories is considered one of the major intellectual achievements of the seventeenth century. The theories were developed in order to explain the physical motion of objects. Since that time, differential equations have been used to explain and predict the course of chemical reactions, animal populations, radioactive decay, military arms races, economic growth, the spread of diseases and rumors, and more. The techniques of differential equations are standard tools for engineers, physical scientists, and applied mathematicians.
Learning Objectives	Students will have the ability to (1) create and critique differential equation models of a variety of natural phenomena, (2) solve ordinary differential equations using qualitative, analytic, and numeric techniques, and (3) interpret solutions of ordinary differential equations. At a higher level, each student will improve her or his ability to solve problems, communicate clearly and precisely, learn from a variety of resources, utilize technology, and appreciate the applicability of mathematics.
Placement Advice	The catalog prerequisite of Math 211 provides sufficient calculus background to be successful in this course; however, this is an upper-level mathematics course that requires a certain level of mathematical maturity. You will be asked to assimilate new mathematical and computational concepts and techniques at a deeper level than in your earlier mathematics courses.
Instructor	David Housman, SC 117, dhousman@goshen.edu, 574-535-7405, 574-612-7185 (cell). Office hours will be posted on Moodle.
Class	MWF 1:00 – 1:50 AM in SC 107. Attendance and participation are expected. Unexcused absences may result in a lower course grade. Class activities will complement, not substitute, for the reading, problem solving, and concept discussing students engage in outside of class.
Text & Software	<i>Differential Equations, Fourth Edition</i> by Paul Blanchard, Robert L. Devaney, and Glen R. Hall, Brooks/Cole Cengage Learning, 2012, Print ISBN: 9781133109037, eText ISBN: 9781133388081. The DE Tools software that may come bundled with the text is useful but optional. Mathematica is a useful tool that has been used in past versions of this course, but because of cost it will also be optional. We will rely on freely available software as needed.
On-line	Moodle (https://moodle.goshen.edu)
Grading	Grades will depend upon your performance on assignments, laboratories, and two comprehensive exams. Each of these three components will be weighted equally. Numerical scores will be assigned with the following interpretation: 20 for A+, 19 for A, 18 for A-, 17 for B+, 16 for B, 15 for B-, and so forth. Some upward adjustment may be made based upon class participation and individual effort and progress.
Assignments	Exercises assigned will test your ability to solve problems similar to those presented in class and the text. Each student will turn in a complete set of solutions. An assignment containing correct solutions with complete explanations will earn full credit.
Extra Credit	Receive extra credit toward your assignments grade by doing one or more of the following: (1) find errors in the text or posted course materials and describe the error in writing; (2) attend a quantitative presentation (e.g., Science Speakers) or participate in a quantitatively based activity and describe in writing some interesting mathematical aspect of the presentation or activity; or (3) participate in a Career Services event and describe your most important discovery. For any of these activities, the description should be two or three substantive paragraphs and be submitted to the instructor. For a 50-minute Science Speakers presentation, up to 3 points can be earned.

Laboratories	A laboratory is a more open-ended and complex exploration of mathematical ideas, often involving a real-world application. The laboratories assigned should help you synthesize and apply course concepts and techniques. Six laboratories will be assigned and completed by groups of one to three students. Lab5 is optional extra credit. The grading criteria are similar to those for assignments with an added importance placed on concision, completeness and depth of explanations, and proper grammar, spelling, and punctuation.
Exams	Exhibit your ability to use differential equation concepts and techniques in well-defined contexts and without assistance or collaboration. Think of the midterm exam (worth 1/3) as a practice for the final exam (worth 2/3) because the final exam grade, if higher, will replace your midterm exam grade.
Due Date Policy	Assignments, laboratories, and exams can only be rescheduled or made up if (1) there is a serious medical problem, a death in the immediate family, or an irreconcilable conflict with another official Goshen College activity; (2) there is written documentation signed by proper authorities; and (3) the instructor is notified prior to the due date or as soon as possible afterwards.
Tutoring Assistance	The Academic Success Center provides tutoring and writing support for free to all undergraduate students. Make an appointment at goshen.edu/asc . Tutoring will be available beginning Sunday, September 2, 2018. Unfortunately, there is only one or two current students who have previously taken this course. Therefore, your best bet to receive assistance is to make use of David's office hours.
Disability Services	Goshen College is committed to providing all students equal access to programs and facilities. Students who need accommodations based on disability should contact the Director of the Academic Success Center (ASC). Students must register with ASC before faculty are required to provide reasonable accommodations. For more information or to register, please contact the Director of the ASC, Judy Weaver, Good Library 112, jweaver@goshen.edu or 574-535-7560. To ensure that learning needs are met, contact the director of the ASC the first week of classes.
Collaboration and Academic Integrity	<p>You are encouraged to use all available resources in order to learn the concepts and techniques discussed in this course. In particular, conversations with other students and the instructor can be an effective learning method. Reading other books and web pages can be another effective learning method. However, copying someone else's work subverts the learning process.</p> <p>For assignments and laboratories, you may look at and discuss another student's work, but any written work developed during collaboration with another student should be destroyed before writing your own solutions. You should give written acknowledgement to people with whom you have had discussions and to any written materials (other than the text) that were helpful.</p> <p>For exams, you may <i>not</i> use any resources unless a specific exception is stated by the instructor.</p> <p>Failure to observe the above rules will result in a zero on the assignment, miniproject, or exam. Any violation of academic integrity will be reported to the Associate Dean.</p> <p>Observation of the above rules will help you learn the material well and give you the satisfaction of knowing that you have earned your grade.</p>

Structure

We will usually cover two or three sections in the text every week or so (see the tentative schedule below). Depending upon your learning style, you may read the text in preparation for class and/or use the class as an introduction to the reading. Homework exercises should be completed individually as much as possible and then compared with answers found in the text and solutions that are posted on Moodle. On the class day we start a new topic, I will answer questions pertaining to the topic just completed, and then assignments will be due at the beginning of the next class.

	Class 1	Class 2	Class 3	Class 4	Class 5
Topic x	Questions	Assignment due			
Topic y	Lecture	Lecture	Lecture	Questions	Assignment due
Topic z				Lecture	Lecture

I urge you to complete as much of the assignment as possible by the Questions class. This will allow you to ask the most helpful questions and keep you from falling behind with the new material.

Tentative Schedule

The table shows the sections of the text I currently plan to cover and the laboratories that will be due during the class dates shown. The Moodle course page will be updated as the semester progresses.

Topic	Class Dates	Text	Labs
1	Aug 29, 31	1.1-2	
2	Sep 3, 5, 7	1.3-5	
3	Sep 10, 12, 14	1.6-8	Lab 1.1 or 1.2
4	Sep 17, 19, 21, 24	2.1-6	
5	Sep 26, 28, Oct 1, 3	3.1-3	Lab 1.3, 1.4, or 1.5
6	Oct 5, 8, 10, 12	3.4-5	
7	Oct 22, 24, 26	3.6-7	Lab 2.1, 2.3, 2.4, or 2.5
	Oct 29	In-class Midterm Exam	
8	Oct 31, Nov 2, 5	4.1-3	
9	Nov 7, 9, 12	4.4-5	Lab 3.1, 3.2, 3.3, or 3.6
10	Nov 14, 16, 19	5.1-3	
11	Nov 21, 26, 28, 30	5.3-6	Lab 4.1 or 4.3
12	Dec 3, 5, 7	8.1-4	Lab 5.1, 5.2, 5.3, or 5.4
13		6.1-4	
	Dec 12, 3:30-5:30pm	Comprehensive Final Exam	