Differential Equations I
Dr. Michael M. Dougherty
Spring 2010

Course Catalog Description: Solutions of ordinary differential equations with applications. Prerequisite: MATH 3834 (Calculus III) or Department Approval.

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Office Hours: Besides these, any other time you can find me in the office and I do not have other pressing work, I will be happy to discuss the course or other topics. In particular I will often be in the office in the afternoons. For times other than those listed below, it is best to make an appointment, or just call (on campus, 3057) to see if I am there. Below is the regular office hour schedule.

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O.B.A. = “Or By Availability”

Course Philosophy and Objectives: My day-to-day goal in this course is to keep you very busy reading about differential equations and working on differential equations. It is the only way to learn these topics.

Advancing from the derivatives and integrals of Calc I–Calc III to Differential Equations is like moving from arithmetic to algebra. The techniques are many and varied, though intuitive with practice. They rely upon knowledge and insights from Calculus I, II and III, and a bits from other fields such as linear algebra and complex variables which will be introduced as we need them. There are many technicalities involved along the way, and knowledge from Calculus will be assumed and used extensively.

There are four main objectives we will pursue in this course:

1. acquiring knowledge of the techniques for solving differential equations (our primary objective);
2. acquiring the ability to implement the techniques with precision;
3. acquiring and demonstrating the ability to communicate the arguments which lead to solutions through clear mathematical writing;
4. exercising and sharpening the ability to read mathematics independently.

Assuming the prerequisite knowledge of calculus, the most important factor in determining success is time spent studying and problem solving. Both the quantity and quality of time are important, though the quantity is arguably more important than the quality. “Cramming” time is not quality time, and results in predictable frustration and poor grades.

Give a man a fish and you feed him for a day; Teach him to fish and you feed him for a lifetime. —Anonymous

Do him a real favor: teach him to teach himself!—Dr. Dougherty

There will at times be more burden on the students to learn outside of class than in previous calculus courses. In particular there will be numerous reading assignments, and classroom lectures will often be complementary to those (rather than replacements for the reading, as is often assumed to be the case in a mathematics course).

The day to day structure of this course will vary depending upon the topic. It is important for students to be in class to receive instructions for completing work. However, I will maintain a course website for reference:

http://faculty.swosu.edu/michael.dougherty/DiffEqI

Textbooks: There are two textbooks for the course.

- Farlow, Stanley J., An Introduction to Differential Equations and Their Applications, Dover Publications, 1994. This will be our main textbook for the course. For our level here, it is quite complete and reader friendly.
- Coddington, Earl, An Introduction to Ordinary Differential Equations, Dover, 1961. This textbook has less breadth but is more sophisticated. It is important to learn to read such textbooks as well.

1Showing why he’s not in the Language Arts Department.
Handouts: There will also be some supplementary material in the form of class handouts. These will constitute reading assignments, and will contain some homework assignments as well. A three-ring binder is suggested to organize these, returned work and perhaps classroom notes.

Grading Policy: Grades are based on homework, midterm exams and a comprehensive final exam.

- Mid-term examinations (the number depending upon available time, most likely three), collectively worth 60%.
- A comprehensive final examination, worth 25%.
- Homework and (rare) quizzes, collectively worth 15%.

Thus the formula for computing the final semester score $\Sigma$ will be

$$\Sigma = 0.60(\text{Midterm Average}) + 0.25(\text{Final}) + 0.15(\text{Homework Percent}),$$

with a maximum of 100. If the final examination score is higher than the lowest mid-term examination score, then the final score will replace that (one) midterm examination score as well. Each quiz and homework is weighed the same, and the four lowest of those scores will be dropped when computing the homework score.

There may be take-home components of examinations, which students are expected to work independently, or face disciplinary action for academic dishonesty.

Attendance: Students are expected to attend every class. Chronic or consistent absence will put the student at risk of being disenrolled from the course. A student who cannot be present for an exam should explain the situation promptly, or risk being disenrolled or receiving a zero for the exam.

Homework: Homework is expected to be worthy of an upper-level course. It should be on time, neat, complete and self-contained. The instructor will provide feedback to clarify what is acceptable and what is not.

Quizzes: Quizzes may be given on occasion, each counting as a homework score. These are designed to give further feedback on student preparation for the examinations, and to encourage regular review of recent topics.

Mid-Term Examinations: These will usually be in-class, fifty-minute exams, based on the material covered since the previous exams, and in the spirit of the homework problems. The number of exams will depend upon the pace of the course. There will be at least three.

Final Examination: This will be cumulative, and studying for it should be a priority throughout the semester. It is nominally worth 25%. However, the final examination can replace the weakest midterm examination if it will increase the student’s overall average. No other score substitutions will be considered.

Getting Help: If needed, students are expected to seek help outside of the classroom. The primary source is the instructor, though other willing instructors and some senior students can also be consulted. Students are also encouraged to find other textbooks in the library for further or alternative presentations of the material.

Academic Honesty: The usual rules, along with the Code of Hammurabi for academic honesty will apply. Students are expected to present work which reflects their own efforts and understanding. Collaboration on homework and seeking outside help (after first attempting the work alone) is encouraged, but blatant plagiarism will not be tolerated, and students may be asked to verbally defend their work (by showing they can perform the computations themselves, at the board for instance).

Also, attempts to smuggle information into exam or quiz settings in any form such as notes or calculator memory constitute cheating. Work will be confiscated and no credit will be given. Changing exam responses after they are turned back, in an attempt to receive points not earned, will also result in zero credit received for the exam in its entirety. Cases of academic dishonesty may be referred to the Dean for other disciplinary action. Any exam on which cheating occurred may be given zero credit, not to be replaced by the final exam.

A.D.A.: Students with verified disabilities are entitled to reasonable accommodations in order to complete educational goals while attending Southwestern. For accommodations to be provided, students must request accommodations and provide appropriate documentation. With your permission, the Dean of Students (774-3767) will notify faculty of your specific requests. However, it is still up to the student to discuss any approved accommodations with me in detail prior to exams.