

## DIFFERENTIAL EQUATIONS 11:00-11:50AM SPRING 2012 STUART 103

- Instructor: Jonathan White
- E-Mail: JWhite@Coe.Edu
- Web Page: <http://www.coe.edu/~jwhite/>
- Office: Stuart 316
- Office Hours: 9:00-9:50 MTWF, and by appointment
- Office Phone: 399-8280
- Home Phone: 362-3350 (between 7am and 10pm)
- Text: *Differential Equations*, 2<sup>nd</sup> Edition, Blanchard, Devaney, and Hall
- Problem Sets and Labs: There will be occasional problem sets, as well as lab assignments on designated class days, and together these will total 150 points.
- Math Culture: Math Culture Points will constitute 50 points. These will be earned through participation in various activities outside of class, as detailed on page 3 of this syllabus.
- Exams: There will be three in-class exams administered during class time. The dates of these are indicated in the schedule on the back side of this sheet. These exams will be worth 100 points each.
- The final exam will be held during the finals week at the date and time indicated on the back side of this sheet. The final will be worth 200 points.
- Grading: Grading will approximately follow a 90% A, 80% B, 70% C, 60% D scale.
- Makeups: For the sake of fairness to those who follow the schedule, makeups for exams will be allowed only under extenuating circumstances, with documentation and advance notice when humanly possible. Late problem sets will generally not be accepted, and if accepted due to extenuating circumstances will generally be subject to a penalty of 20% of the possible points for each day past due.

This class is intended to give a solid modern introduction to differential equations. This means that graphical and numerical approaches will be taken as seriously as conventional analytic methods, and that qualitative statements will be as important as quantitative solutions.

The use of technology, particularly computer software, will be an important component of the course. Ability to compute with pencil and paper will also be important, as will conceptual understanding of the topics treated.

This combination of approaches is likely to prove challenging, partly because few people will find that all of these aspects play to personal strengths. Don't let that be overwhelming, though, and remember that I'm around to help. Give it some time, and feel free to take advantage of my office hours to help past the rough spots.

## Tentative Schedule

	Wednesday, January 11 <sup>th</sup> §1.1 Modeling via Diff. Equations	Friday, January 13 <sup>th</sup> §1.2 Separation of Variables
Monday, January 16 <sup>th</sup> <b>No Class – MLK Day</b>	Wednesday, January 18 <sup>th</sup> §1.3 Slope Fields	Friday, January 20 <sup>th</sup> §1.4 Euler’s Method
Monday, January 23 <sup>rd</sup> §1.5 Existence and Uniqueness	Wednesday, January 25 <sup>th</sup> §1.6 Equilibria	Friday, January 27 <sup>th</sup> §1.7 Bifurcations
Monday, January 30 <sup>th</sup> §1.8 Linear Differential Equations	Wednesday, February 1 <sup>st</sup> §1.9 Changing Variables	Friday, February 3 <sup>rd</sup> Lab
Monday, February 6 <sup>th</sup> Series Solutions	Wednesday, February 8 <sup>th</sup> Review	Friday, February 10 <sup>th</sup> <b>Exam 1</b>
Monday, February 13 <sup>th</sup> §2.1 Modeling via Systems	Wednesday, February 15 <sup>th</sup> §2.2 The Geometry of Systems	Friday, February 17 <sup>th</sup> §2.3 Analytic Methods
Monday, February 20 <sup>th</sup> §2.3 Analytic Methods	Wednesday, February 22 <sup>nd</sup> §2.4 Euler’s Method for Systems	Friday, February 24 <sup>th</sup> §2.5 The Lorenz Equations
Monday, February 27 <sup>th</sup> §6.1 Laplace Transforms	Wednesday, February 29 <sup>th</sup> §6.1 Laplace Transforms	Friday, March 2 <sup>nd</sup> Lab
Spring Break		
Monday, March 12 <sup>th</sup> §6.2 Discontinuous Functions	Wednesday, March 14 <sup>th</sup> Review	Friday, March 16 <sup>th</sup> <b>Exam 2</b>
Monday, March 19 <sup>th</sup> §3.1 Linear Systems	Wednesday, March 21 <sup>st</sup> §3.2 Straight-Line Solutions	Friday, March 23 <sup>rd</sup> §3.3 Phase Plane & Real Eigenvalues
Monday, March 26 <sup>th</sup> §3.4 Complex Eigenvalues	Wednesday, March 28 <sup>th</sup> §3.5 Repeated and Zero Eigenvalues	Friday, March 30 <sup>th</sup> §3.7 The Trace-Determinant Plane
Monday, April 2 <sup>nd</sup> §3.6 Second-Order Linear Equations	Wednesday, April 4 <sup>th</sup> §3.8 Linear Systems in 3D	Friday, April 6 <sup>th</sup> Lab
Monday, April 9 <sup>th</sup> Review	Wednesday, April 11 <sup>th</sup> <b>Student Research Symposium</b>	Friday, April 13 <sup>th</sup> <b>Exam 3</b>
Monday, April 16 <sup>th</sup> §4.1 Forced Harmonic Oscillators	Wednesday, April 18 <sup>th</sup> §4.2 Sinusoidal Forcing	Friday, April 20 <sup>th</sup> §4.3 Undamped Forcing
Monday, April 23 <sup>rd</sup> §5.1 Equilibrium Point Analysis	Wednesday, April 25 <sup>th</sup> Review	
Final Exam – 11am on Saturday, April 28 <sup>th</sup>		

Any students with disabilities which might affect their performance in this class should contact me as soon as possible to arrange accommodations.

Coe’s faculty has adopted an academic integrity policy. It is your responsibility to understand and follow it.

Diversity, in all its forms, is valuable.

### Math Culture Points

A significant portion of the grade for this course may take the form of Math Culture Points. These will be earned through activities outside of class including, but not necessarily limited to, those listed below:

Activity	Points	Max #
Colloquium Attendance	5	–
Colloquium Presentation	5-15	2
Meeting Attendance Nebraska Conference for Undergraduate Women in Mathematics (Jan. 27 - 29) Iowa Council of Teachers of Mathematics (February 17) SIGCSE Technical Symposium (Feb 29- March 3) Midwest Undergraduate Mathematics Symposium (April 13 - 14)	15 10 10 10-15	2
Mathematics Competition Participation Mathematical Contest in Modeling (Feb. 9 - 13) Iowa Collegiate Mathematics Competition (February 25)	10	2
Math Culture Reading Some weeks specific readings will be posted on the course web page Articles from <i>Math Horizons</i> With approval, columns on maa.org, articles from <i>Math. Magazine</i> , <i>The College Math. Journal</i>	5	– 3 3
Math Club Activities (when appropriate) Winter Break Book, Movies, Pi Day celebration, Speakers, etc.	5-10	5
Volunteer Math Outreach Working with students at Polk Elementary, etc.	5	3
Other Appropriate Coe Activities Contemporary Issues Forum Attending a Quantitative Research Symposium Presentation Psychology Experiment Participation	5	–

Generally Math Culture Points can be earned for at most two activities in any given week, so you should plan to spread your participation throughout the semester. In each case above, credit assumes both full participation and posting a brief summary/response on Moodle. These reflections should generally be between 100 and 300 words, and include both a brief summary and your personal thoughts on the event, **and must be submitted within one week of the event.**

