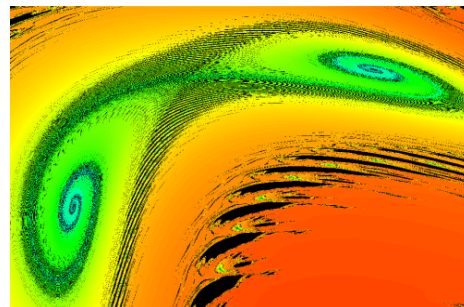


**MTH 336 Differential Equations  
Semester 112 (Winter 2012)  
Course Syllabus**

**Instructor:** Karen E. Donnelly. Office: Core  
257  
**Office Phone:** 6297  
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**Office Hours**

Monday 3:00 p.m. -- 4:00 p.m.

Tuesday 1:00 p.m. -- 3:00 p.m.

Wednesday 3:00 p.m. -- 4:00 p.m.

Thursday 1:00 p.m. -- 3:00 p.m.

Friday 10:00 a.m. -- 11:00 a.m.

Contact for appointment during other times

**Home page** [www.saintjoe.edu/~karend](http://www.saintjoe.edu/~karend)

**Differential Equations Web Page:** [www.saintjoe.edu/~karend/m336](http://www.saintjoe.edu/~karend/m336)

**Text:** Nagle, Saff, and Snider: Fundamentals of Differential Equations, Eighth Edition. Addison Wesley-Longman, 2012. ISBN 0-321-74773-0

**Course Objectives:** To study the theory and applications of ordinary differential equations, including first order differential equations, second order linear differential equations, phase plane analysis, Laplace transforms, and power series solutions of differential equations.

**Course Outline:**

1. Introduction (Chapter 1, Sections 1.1, 1.2, 1.3, 1.4)
2. First Order Differential Equations (Chapter 2, Sections 2.1, 2.2, 2.3, 2.4)
3. Applications -- Compartmental Analysis (Chapter 3, Section 3.2)
4. Linear Second Order Equations (Chapter 4, sections 4.2, 4.3, 4.5, 4.6)
5. Introduction to Systems and Phase Plane Analysis (Chapter 5, Sections 5.2, 5.4)
6. Laplace Transforms (Chapter 7, Sections 7.1, 7.2, 7.3, 7.4, 7.5, 7.6)
7. Series Solutions of Differential Equations (Chapter 8: Sections 8.1, 8.2, 8.3)
8. Matrix Methods for Linear Systems (Section 9.5, 9.6)

This course includes a weekly laboratory component where Maple™ software will be used. Some homework assignments will include Maple exercises. The final exam will have a portion that will require the use of Maple. A recommendation for MTH 336 is Maple Student Edition. You are entitled to purchase at a discounted price – see [attached instructions](#).

**Exam Schedule :**

Exam # 1 – Friday Feb 10th

Exam # 2 – Friday March 14th

Exam # 3: -- Friday April 11th

Final Exam (comprehensive) -- Wed. May 2<sup>nd</sup> 2:00 p.m.

**Grade Distribution:**

Assignments:	30%
Three Tests :	40%
Final Exam:	25%
Attendance and Participation	5%

**Grading Scale:**

93%-100%	A	90%-92%	A-		
87%-89%	B+	83%-86%	B	80%-82%	B-
77%-79%	C +	73%-76%	C	70%-72%	C-
67%-69%	D+	60%-66%	D		
59% or Below	F				

### Expectations and Requirements:

*Special Note:* If you are a student with a disability, please meet with me immediately to discuss the accommodations you will need during class activity, examinations, and out of class assignments in order to participate fully and demonstrate your abilities.

**1. Academic Honesty:** Plagiarism or other forms of academic dishonesty on any assignments, tests, or quizzes will not be tolerated. If the instructor finds that a student has engaged in dishonesty, the student may be referred to the Dean of Academic Affairs for appropriate action.

**2. Quizzes and Exams:** Students are expected to be present for all exams. **No exams or quizzes may be made up** unless the student has contacted the instructor and received permission **prior** to the date of the original exam or quiz. This includes students participating in athletics who must arrange to take the quiz or exam **on or before the scheduled date**.

**3. Assignments:** Assignments, unless otherwise specified by the instructor, are to be **completed individually**. While students are encouraged to **consult** each other for ideas for assignments, the solutions should be completed individually. Any help one student gives another should be instructional help only. If the instructor feels that a student has not completed an assignment individually, the instructor may question the student on that assignment. The student should be able to explain how he/she worked the problem and should be able to work similar problems. **Late assignments will not be accepted without permission. If permission is given, the following penalties may be assigned:**

**1 day late: 10% reduction; 2 days late: 20% reduction; 3 days late: 30% reduction**

**Not accepted after 3 days late.**

Homework Guidelines:

- Write out complete answers NEATLY and CLEARLY.
- Number each exercise to the left.
- Problems should proceed in numerical order from top to bottom.
- You must show your work! Correct mathematical notation must be used. Partial credit is given when work is shown even if answer is incorrect. However, correct answers without any work shown will in general be given no credit.
- If the problem is a computation leading to a final answer, box the answer.
- **Use pencil and eraser** -- do not scratch out work.
- **Staple** your pages together before submitting.

Start homework early and see me for help with problems you don't know how to work! *It is inappropriate to ask how to do a problem in class the day it is due!!!!* My office is Core 257-- See my schedule for office hours or call or send email for an appointment. I am always delighted to help.

### 4. Class Preparation and Participation:

a) **Keep up with reading assignments.** To receive the maximum grade on attendance and participation the student must read assignments **prior** to class, be prepared to ask and respond to questions, and be an actively engaged participant in class.

b) Take good notes and **review notes** on a regular basis as well as promptly begin and continue work on assignments as they are assigned.

c) **Attendance is required.** If you must miss class due to illness or other valid excuse (e.g. athletic event) please send me email or telephone with an explanation prior to the class date.

d) **Electronic Equipment in class.** No devices with headphones may be used in class. All cell phones must be turned off during class. No laptops may be used in class unless permission is given by instructor.

### 5. Getting Help:

Students who do not understand a concept should do the following:

a) Ask questions in class. (More than likely other students do not understand as well.)

b) Seek individual help from the instructor. I am more than willing to give you the extra help you may need. Come in during office hours or make an appointment. Tutoring (free) can also be arranged either through me or through counseling services.

c) Share with me any concerns you may have or any suggestions you have for the class structure that will help you learn more effectively.

*The above content and requirements are tentative and subject to change according to time constraints and other factors as determined by the instructor.*

Date	Exams and Quizzes	Reading Assignment -- Complete by date given	Homework Due -- (Tentative -- Check for updates) (see <a href="#">list of problems</a> below)
Wed. 01/11		Section 1.1: Background Section 1.2: Solutions and Initial Value Problems	
Fri. 01/13		Section 1.3: Direction Fields	Exercise Set 1 (Section 1.1)
Mon. 01/16		Section 1.4: Euler's Method	Exercise Set 2 (Section 1.2)
Wed. 01/18			Exercise Set 3 (Section 1.3)
Fri. 01/20		Section 2.2: Separable Equations	Exercise Set 4 (Section 1.4)
Mon 01/23		Section 2.3: Linear Equations	
Wed 01/25			Exercise Set 5 (Section 2.2)
Fri. 01/27		Section 2.4: Exact Equations	Exercise Set 6 (Section 2.3)
Mon 01/30			
Wed 02/01		Section 3.2: Compartmental Analysis	Exercise Set 7 (Section 2.4)
Fri 02/03		Section 4.2: Homogeneous Linear Equations	
Mon 02/06		Section 4.3 Auxiliary equations with complex roots.	Exercise Set 8 (Section 3.2)
Wed 02/08		REVIEW	Exercise Set 9 (Section 4.2)
Fri 02/10	Exam 1		Exercise Set 10 (Section 4.3)
Mon 02/13			
Wed 02/15		Section 4.4 Method of undetermined coefficients	
Fri 02/17			
Mon. 02/20		Section 4.5: Superposition Principle	Exercise Set 11 Section 4.4
Wed. 02/22			
Fri. 02/24		Section 4.6: The Method of Variation of Parameters	Exercise Set 12 Section 4.5
Mon. 02/27			
Wed. 02/29		Section 5.2: Elimination Method to solve systems of linear equations.	Exercise Set 13 Section 4.6

Fri. 03/02			
Mon 03/05-Fri 03/09		<b>SPRING BREAK – NO CLASS</b>	
Mon. 03/12		<b>Section 5.4: Phase Plane Analysis</b>	
Wed. 03/14			<b>Exercise Set 14: Section 5.2</b>
Fri. 03/14	<b>Exam 2</b>		<b>Exercise Set 15: Section 5.4</b>
Mon 03/19		<b>Section 7.2: Laplace Transforms</b>	
Wed 03/21		<b>Section 7.3: Important properties of the Laplace</b>	
Fri 03/23		<b>Section 7.4: Inverse Laplace Transforms</b>	<b>Exercise Set 16: Section 7.2</b>
Mon 03/26			
Wed 03/26		<b>Section 7.5 Solve IVP using method of Laplace Transforms</b>	<b>Exercise Set 17: Section 7.3</b>
Fri. 03/30			<b>Exercise Set 18: Section 7.4</b>
Mon. 04/02		<b>Section 7.6: Modeling functions with jump discontinuities</b>	<b>Exercise Set 19: Section 7.5</b>
Wed. 04/04			
Fri. 04/06		<b>GOOD FRIDAY – NO CLASS</b>	
Mon. 04/09		<b>EASTER MONDAY – NO CLASS</b>	
Wed. 04/09		REVIEW	<b>Exercise Set 20: Section 7.6</b>
Fri. 04/11	<b>Exam 3</b>		
Mon. 04/14		<b>Section 8.1 and 8.2: Taylor Polynomials</b>	
Wed. 04/16		<b>Section 8.3: Power Series Solutions</b>	<b>Exercise Sets Set 21 and Set 22: Sections 8.1 and 8.2</b>
Fri. 04/18		<b>Section 9.5 Homogeneous Linear Systems with Constant Coeffs</b>	
Mon. 04/22		<b>Section 9.6: Systems with Complex Eigenvalues</b>	<b>Exercise Set 23 (Section 8.3)</b>
Wed. 04/24			<b>Exercise Sets 24 and 25 (Sections 9.5 and 9.6)</b>
Fri. 04/26		<b>Review for Final</b>	
Wed. 05/02		<b>Final Exam Comprehensive 2:00 p.m.</b>	

Differential Equations Problem Assignment List Semester 112

Exercise Set 1	Section 1.1, page 5: 2, 4, 6, 8, 10, 12, 14, 16 (For 14, 16: Note “is proportional to” means “equals constant times”)
Exercise Set 2	Section 1.2, page 13: 2a,b; 4, 8, 10, 12, 22, 24, 26, 27, 28
Exercise Set 3	Use Maple for these exercises and e-mail Maple worksheet with work completed and answer questions in text cells, with appropriate documentation. Section 1.3, page 21 1, 2, 7, 10, 13 For number 1: part a) -- modification: Verify that $y = -2x - 2 + Ce^x$ is a general solution to the differential equation. Then find the constant C so that the initial condition $y(0) = -2$ is satisfied. Sketch this curve. <a href="#">Link to sample Maple commands for some of the exercises.</a>
Exercise Set 4	Section 1.4, page 29: 3, 4, 6, 10, 15
Exercise Set 5	Section 2.2, page 46: 1, 3, 4, 6, 8, 10, 11, 18, 22, 25, 28, 34, 35
Exercise Set 6	Section 2.3, page 51: 2, 4, 5, 6, 8, 9, 20, 24, 37
Exercise Set 7	Section 2.4, page 61: 1, 2, 4, 5, 10, 12, 16, 18, 22
Exercise Set 8	Section 3.2, page 104: 2, 4, 8, 14
Exercise Set 9	Section 4.2, page 165: 2, 4, 5, 12, 14, 15, 18, 27, 28, 32
Exercise Set 10	Section 4.3, page 173 : 2, 4, 11, 12, 16, 32, 33
Exercise Set 11	Section 4.4, page 182: 1, 2, 3, 6, 11, 13, 16, 24, 27, 28, 32
Exercise Set 12	Section 4.5, page 187: 2, 4, 5, 12, 15, 16, 17, 18, 24, 28
Exercise Set 13	Section 4.6, page 193: 3, 4, 12, 19 (For evaluating def. integral for 19 use Maple or calculator)
Exercise Set 14	Section 5.2, page 250: 5, 8, 11, 14, 19, 31, 32
Exercise Set 15	Section 5.4, page 272: 4, 6, 12, 20, 28
Exercise Set 16	Section 7.2, page 360: 2, 3, 4, 8, 10, 14, 19, 21, 22, 27, 28
Exercise Set 17	Section 7.3, page 365: 2, 5, 6, 13 (Use $(\sin(t))^2 = (1 - \cos(2t))/2$ ), 16 (Use answer to 13 and last entry in table 7.2), 21, 25
Exercise Set 18	Section 7.4, page 374: 1, 2, 3, 4, 6, 7, 9, 11, 12, 22, 23, 26, 28
Exercise Set 19	Section 7.5, page 382: 4, 6, 7, 11, 16, 18
Exercise Set 20	Section 7.6, page 393: 2, 4, 6, 7, 11, 14, 16, 17, 29, 30, 59
Exercise Set 21	Section 8.1, page 426: 2, 3, 4, 9
Exercise Set 22	Section 8.2, page 434: 2, 5, 10, 17, 22
Exercise Set 23	Section 8.3, page 445: 2, 5, 8, 11, 14, 20, 23, 26
Exercise Set 24	Section 9.5, page 534: 12, 13, 27, 28
Exercise Set 25	Section 9.6, page 541: 2, 3, 4