

# Math 17: Differential Equations and Linear Algebra

## Syllabus and Course Outline for Spring 2016

### Class Information

Section: 56723  
 Day: Monday, Tuesday, Wednesday, Thursday, and Friday  
 Time: 11:00-11:50pm  
 Building: Forestry, Engineering, & Math  
 Room: 3

### About Your Instructor

Name: Ryan Lowenstein  
 Email: ryan.lowenstein@reedleycollege.edu  
 Office phone: (559) 638-3641 ext. 3420

### Office Hours

Daily: 10:00-10:45am  
 Room: Forestry, Engineering, & Math 1N

### Textbook Required

Differential Equations and Linear Algebra  
 Author: C. Henry Edwards and David E. Penney  
 Edition: 3  
 ISBN: 978-0-13-605425-2

### Supplementary Textbooks

Elementary Linear Algebra by Larson, Edwards, and Falvo  
 Ordinary Differential Equations by Tenenbaum and Pollard

### Textbook Note

Homework Assignments will come directly from the Edwards and Penney text. This textbook is available at the bookstore for the price of \$202.25.

### Estimated Schedule:

Week	Month	Day	Section(s) Covered	Course Topic
1	January	11	Syllabus	First Order Differential
		12	1.1	Equations
		13	1.2	
		14	1.3	
		15	1.4	
2		18	Martin Luther King Day (No Class)	
		19	1.5	
		20	1.6	
		21	2.3	First Order Applications
		22	2.4	
3		25	3.1	Linear Algebra Basics
		26	3.2	
		27	3.3	
		28	3.4	
		29	3.5; Last day to drop without "W"	
4	February	1	3.6	
		2	3.6 continued	
		3	3.7	
		4	4.1	Vector and Inner
		5	4.1 continued	Product Spaces

5		8	4.2	
		9	4.2 continued	
		10	4.3	
		11	Test 1	
		12	Lincoln's Birthday (No Class)	
6		15	Washington's Birthday (No Class)	
		16	4.3 continued	
		17	4.4	
		18	4.4 continued	
		19	4.5	
7		22	4.5 continued	
		23	4.6	
		24	4.6 continued	
		25	4.7	
		26	4.7 continued	
8		29	5.1	
	March	1	5.1 continued	Linear ODE's with Order
		2	5.2	at Least Two
		3	5.2 continued	
		4	5.3	
9		7	5.3 continued	
		8	5.4	
		9	5.4 continued	
		10	5.5	
		11	5.5 continued; Last Day to drop	
10		14	6.1	Eigenvalues
		15	6.1 continued	
		16	Test 2	
		17	Review for Midterm	
		18	Midterm	
11		28	6.2	
		29	6.2 continued	
		30	6.3	
		31	6.3 continued	
	April	1	7.1	Linear ODE Systems
12		4	7.1 continued	
		5	7.2	
		6	7.2 continued	
		7	7.3	
		8	7.3 continued	
13		11	7.4	
		12	7.4 continued	
		13	7.5	
		14	7.5 continued	
		15	8.1	
14		18	8.1 continued	
		19	8.2	
		20	8.2 continued	

		21	8.3	
		22	8.3 continued	
15		25	9.1	Nonlinear ODE's
		26	9.1 continued	
		27	9.2	
		28	9.2 continued	
		29	10.1	Laplace Transforms
16	May	2	10.1 continued	
		3	10.2	
		4	10.2 continued	
		5	11.1	Power Series Methods
		6	11.1 continued	
17		9	11.2	
		10	11.2 continued	
		11	Test 3	
		12	Review for Final Exam	
		13	Review for Final Exam	
18		16	Final Exam	

### Catalog Description

First order differential equations, including separable, linear, homogeneous of degree zero, Bernoulli and exact with applications and numerical methods. Solutions to higher order differential equations using undetermined coefficients, variation of parameters, and power series, with applications. Solutions to linear and non-linear systems of differential equations, including numerical solutions. Matrix algebra, solutions of linear systems of equations, and determinants. Vector spaces, linear independence, basis and dimension, subspace and inner product space, including the Gram-Schmidt procedure. Linear transformations, kernel and range, eigenvalues, eigenvectors, diagonalization and symmetric matrices.

### Grade Breakdown

Category	Weight of Overall Grade
Tests	90%
Quizzes and Participation	10%

### Grading Scale

Minimum Percent Required	Grade
91	A
82	B
73	C
64	D

Grades will be updated regularly Online

### Test Dates

Test	Sections	Date	Weight of Overall Grade
1	1.1-4.3	Thursday, February 11	14%
2	4.3-6.1	Wednesday, March 16	14%
Midterm	1.1-6.1	Friday, March 18	19%
3	6.2-11.2	Wednesday, May 11	14%
Final	1.1-11.2	Monday, May 16	29%

### Test Materials

Approved	Unapproved
Pencil	Textbook
Eraser	Notes
MATLAB	Scientific Calculator
Ruler	Cellphone
Pen	Anything Else

Formula sheets and scratch paper will be provided

### Types of Test Questions

Difficulty	Brief Description	Prevalence
Basic	Easier Question from Homework	30% of Test
Proficient	Harder Question from Homework	60% of Test
Advanced	Modified Question from Homework	10% of Test

Test questions are **randomly** selected from the homework

### Miscellaneous Test Information

Only **one** person may leave the room at a time

Requirements to Receive Full Credit for a Question
Work Leading to Correct Answer
Correct Answer

There is a 50 minute time limit

### Homework

On a weekly basis, questions will be assigned from the textbook, but will **not** be collected.

### Quizzes

Several unannounced quizzes will be administered throughout the semester. Quiz questions will be randomly selected from previously due homework assignments and will be graded in the same way as in exams.

### Participation

Typical classwork assignments include clicker questions, group work, and other activities. About 90% of these assignments must be completed in order for a student to earn full participation for the semester. Students who complete less than 90% of the classwork will earn no credit for participation. Also, students who miss more than five classes will automatically be dropped from the class.

## Behavior

<b>Expected</b>	<b>Unwelcome</b>
Asking Questions	Talking over the Instructor
Taking Notes	Texting or on the Phone
Helping Others	Checking Facebook or Email
Participating	Sleeping
Positive Attitude	Doing Homework
Punctual Attendance	Packing up Early

The instructor has the right to remove students from the classroom at any time

### **Make-Up Test Policy**

Students who miss a test or a quiz are **never** guaranteed a make-up. Make-up tests are only administered to students in extenuating circumstances and must be scheduled as far in advance as possible. Students may replace their lowest test score with the grade they earn on the final exam only if they complete all homework from the semester with the exception of four missing assignments or less.

### **Tutoring**

Both Reedley College's Tutorial Center (Library Building, Room LRC 111) and STEM Math Study Center (Forestry, Engineering, & Math, Room 1) offer free tutoring for both students who need help with the concepts presented in this class (recommended when one's grade falls below 82%) and students who have trouble meeting deadlines.

## Examples of Cheating

<b>Tests</b>	<b>Classwork and Homework</b>
Using a forbidden test material	Copying another person's assignment
Looking away from one's paper	Looking at the solutions (manual or online)
Talking to another person	Having another person do the assignment for you

Cheating violates Reedley College's Academic Integrity; zero credit will be earned for cheated assignments

### **Universal Design**

This class will try its best to incorporate the special needs of English Learners, students with disabilities, and everyone else. If one feels that his or her needs are not being met, please bring this to the instructor's attention so a solution can be found.

### **Students with Disabilities Policy**

In compliance with ADA guidelines, students who have any condition, either permanent or temporary, that might affect their ability to perform in this class are encouraged to inform the instructor at the beginning of the term. Use of accommodations can start when the instructor receives the Notification of Authorized Services form with the accommodations listed. The granting of any accommodation will not be retroactive and cannot jeopardize the academic standards or integrity of the course.

### **Equity and Diversity**

Reedley College is committed to ensuring equality and valuing diversity. Students and instructors are reminded to show respect at all times.

### **Course Outcomes**

At the end of the course, students should be able to use matrices and their applications to solve linear systems of equations. Similarly, they should be able to perform matrix computations, solve linear systems of equations and determine the bases of related vector spaces, find eigenvalues and eigenvectors, and diagonalize matrices when applicable. In addition, they should be able to find solutions to first order and higher order differential equations and apply them to various application problems. Also, they should be able to find the solutions to systems of differential equations using matrix methods. Lastly, they should be able to use Laplace transforms to find solutions to initial value problems.

### **Course Objectives**

In the process of completing this course, students will:

1. Create and analyze mathematical models using ordinary differential equations
2. Verify solutions of differential equations
3. Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order and selected higher order ordinary differential equations
4. Apply the existence and uniqueness theorems for ordinary differential equations
5. Find power series solutions to ordinary differential equations
6. Determine the Laplace Transform and inverse Laplace Transform of functions
7. Solve Linear Systems of ordinary differential equations
8. Find solutions of systems of equations using various methods appropriate to lower division linear algebra
9. Use bases and orthonormal bases to solve problems in linear algebra
10. Find the dimension of spaces such as those associated with matrices and linear transformations
11. Find eigenvalues and eigenvectors and use them in applications
12. Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors, properties of subspaces, linearity, injectivity and surjectivity of functions, and properties of eigenvectors and eigenvalues

### **Personal Statement**

The instructor of this course understands that the subject of mathematics is difficult and carries a negative preconception among many students. Hence, he values a conceptual understanding of the content and wants to help students succeed in his class, as long as they are willing to do their share of the work.

### **Disclaimer**

The information in this syllabus is subject to change in the event of extenuating circumstances