Differential Equations and Their Applications

Math 2255 Sections 0010 and 0020 – Summer 2019 (updated 6/4/19)

Instructor:

Nathan Broaddus

Office: MW650
Email: broaddus.9@osu.edu
Webpage: https://people.math.osu.edu/broaddus.9/
Phone: 614-292-0605
Office Hours: Mon. & Wed. 3:20pm-4:20pm in Math Tower (MW) 650

Meeting times and locations:

Section 0020	MWF 11:40PM-1:15PM	in Scott Laboratory (SO) N048
Section 0010	MWF 1:30PM-3:05PM	in Scott Laboratory (SO) N048

Course webpage:
https://people.math.osu.edu/broaddus.9/2255

Textbook:
W. Boyce and R. C. DiPrima, *Ordinary Differential Equations and their Applications*, **OSU custom 10th edition**, Wiley 2015. (Available from https://ohiostate.bncollege.com/)

About this course:
Welcome to Math 2255! This course is an introduction to modeling with and solving ordinary differential equations.

What you should get out of this course:
During the course of this semester we will cover the following topics:

1.3 Classification of Differential Equations

2.1 Linear Equations; Method of Integrating Factors

2.2 Separable Equations

2.4 Differences Between Linear and Nonlinear Equations

2.5 Autonomous Equations and Population Dynamics

2.6 Exact Equations and Integrating Factors

2.7 Numerical Approximations: Euler's Method

2.8 The Existence and Uniqueness Theorem

2.9 First Order Difference Equations

3.1 Homogeneous Differential Equations with Constant Coefficients

3.2 Solutions of Linear Homogeneous Equations; the Wronskian

3.3 Complex Roots of the Characteristic Equation

3.4 Repeated Roots; Reduction of Order

3.5 Nonhomogeneous Equations; Method of Undetermined Coefficients

3.6 Variation of Parameters

3.7 Mechanical and Electrical Vibrations

3.8 Forced Vibrations

6.1 Definition of the Laplace Transform

6.2 Solution of Initial Value Problems

6.3 Step Functions

6.4 Differential Equations with Discontinuous Forcing Functions

6.5 Impulse Functions

6.6 The Convolution Integral

4.1 General Theory of nth Order Linear Equations

4.2 Homogeneous Equations with Constant Coefficients

4.3 The Method of Undetermined Coefficients

4.4 The Method of Variation of Parameters

5.1 Review of Power Series

5.2 Series Solutions Near an Ordinary Point, Part I

5.3 Series Solutions Near an Ordinary Point, Part II

5.4 Euler's Equation; Regular Singular Points

5.5 Series Solutions Near a Regular Singular Point, Part I

5.6 Series Solutions Near a Regular Singular Point, Part II

5.7 Bessel's Equation

Grading:
Your grade will be computed using the follows weights:

- 40% Final exam – 1:30pm-3:05pm Friday, July 26
- 20% Midterm 1 – Friday, June 28
- 20% Midterm 2 – Friday, July 12
- 20% Homework

Your grades will be recorded on Carmen and your final grade will be curved. Consequently, it is impossible to give *apriori* a precise course-total-to-letter-grade correspondence. However, the grading scale below should give you a rough idea of the score-to-letter-grade correspondence. **There is no extra credit** in this course.

Grading Scale:
A 93% A- 90% B+ 87% B 83% B- 80% C+ 77% C 73% C- 70% D+ 67% D 60% E 0%

Homework:
Homework will be announced on the website (https://people.math.osu.edu/broaddus.9/2255) and is **due at the beginning of class**. **No late homework will be accepted!** If you cannot make it to class be sure to make arrangements for a classmate to hand in your homework for you. Your lowest homework grade will be dropped. It is your responsibility to check the website daily to make sure that you do not miss

a homework assignment. Homework must be submitted in person. **No electronic submission will be accepted** except in the case of a documented emergency and in those cases only print-ready formats (pdfs or docs) are acceptable.

Working Together:
You are encouraged to work together on homework assignments. In fact it is a very good idea to find someone a classmate to work with on a regular basis. However, you should write up your homework solutions separately.

Help:
If you are having trouble in the class you can

1. ask lots of questions in class (this is my favorite option)
2. come to my office hours (Mondays and Wednesdays 3:20pm-4:20pm in MW 650) or make an appointment with me for another time

Don't let yourself fall behind. This class moves very quickly.

Calculators and other electronic devices:
Smart phones, tablets, computers, calculators, and other electronic computation devices are not allowed during midterm and final exams. You are encouraged to do further research on your homework online, but you should not consult online solution sets for this course for homework that you have not handed in or hope to have graded in the future.

Disability Statement:

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.