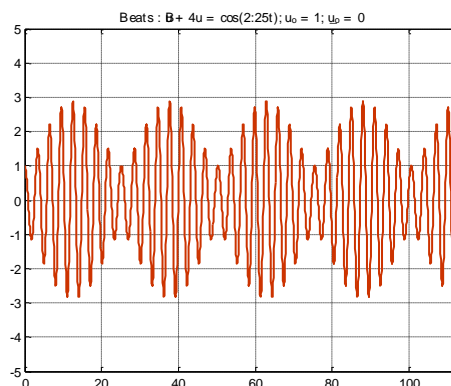
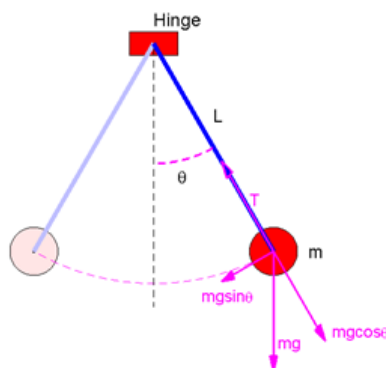
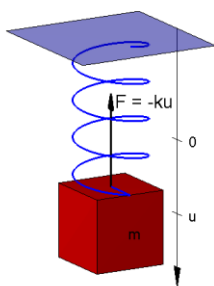


Differential Equations, Math 2233-007

Spring 2016

Instructor:	David Stapleton		
Office:	MSCS 436	Office phone:	744-2302
Office hours:	Mon. 10:30-11:20, Wed. 8:45-9:15 AM, Fri. 8:45-9:15 AM, 12:30-1:20 with the <i>Friday afternoon hour held at the Mathematics Learning Success Center (MLSC)</i> , 5 th floor of Edmon Low Library.		
D2L material:	https://oc.okstate.edu/login.asp		
E-mail:	david.stapleton@okstate.edu		



I. **Course Description:** Methods of solution of ordinary differential equations with applications. First order equations, linear equations of higher order, series solutions and Laplace transforms. Various applications are considered, especially for engineering and the sciences. Numerical approximations, existence and uniqueness, and qualitative analyses of solutions are considered.

II. **Prerequisites:** MATH 2153 with a grade of C or better

III. **Text and Resources:**

1. Introduction to Differential Equations, by Boyce and DiPrima, 10th Ed., Wiley
2. D2L class notes and practice problems
3. Paul's Online Math Notes, <http://tutorial.math.lamar.edu/Classes/DE/DE.aspx>
4. "Handbook of Differential Equations," by Daniel Zwillinger, Academic Press (not required).
5. <http://www.sosmath.com/diffeq/diffeq.html>
6. TI-89 or TI-Nspire CAS (don't get it without the CAS!) or similarly equipped calculator suggested
7. <http://it.okstate.edu/students> has information on software: MATLAB, Mathematica, Maple that can solve some differential equations but these will not be part of the class.
8. There will be tutoring available for this class (time TBA) at the MLSC.

IV. **Course Objectives:**

1. Broaden students' knowledge/appreciation of the powers and applications of differential equations..
2. Familiarize students with definitions, symbolism and general procedures of differential equations.
3. Help students recognize common types of ordinary differential equations and apply methods (including calculator methods) of solving them.
4. Acquaint students with common applications in physics, engineering, biology and finance.
5. Introduce numerical approximations for solving differential equations.
6. Provide an understanding of common conditions under which the existence and uniqueness of solutions can be guaranteed.

$$\frac{du}{dt} + p(t)u = f(t) \quad u = \frac{1}{\mu(t)} \int \mu(t)f(t)dt, \quad \text{where } \mu(t) = e^{\int p(t)dt}$$

V. **Evaluation Criteria:**

There will be three midterm examinations, several quizzes, and a final examination, with the quizzes in total worth 50 points, each midterm exam worth 100 points and the final exam also worth 100 points. The exam grades will be determined by

A: 87-100%, B: 74-86%, C: 61-73%, D: 48-60%

unless easier curves are announced in class for specific exams. Midterm Exam dates will be **2/12, 3/11, 4/13** and the final exam time is **May 4 (Wednesday) 10:00-11:50 AM**. If you must miss an examination other than the final exam then it may be made up, provided the reason for missing is approved by the instructor and the exam is made up within one class week.

VI. **Dishonest Work:** Participating in a behavior that violates academic integrity will result in an official academic sanction. Violations may subject you to disciplinary action including the following: receiving a failing grade on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript, and being suspended from the University. You have the right to appeal.

VII. **Office of Student Disability Services (SDS)** 315 Student Union/405-744-7116 <http://sds.okstate.edu/> . According to the Americans with Disabilities Act, each student with a disability is responsible for notifying the University of his/her disability and requesting accommodations. If you think you have a qualified disability and need special accommodations, you should request verification of eligibility for accommodations from the Office of SDS.

VIII. **Syllabus Attachment:** For additional policies that apply (to all courses at OSU) see the University attachment: From <http://academicaffairs.okstate.edu> click on Resources for Students and then on Current Syllabus.

IX. **Outline:**

Section	Topic
1.1	Some Basic Mathematical Models; Direction Fields
1.2	Solutions of Some Differential Equations
1.3	Classification of Differential Equations
2.1	Linear Equations; Method of Integrating Factors
2.2	Separable Equations
2.3	Modeling with First Order Equations
2.4	Differences Between Linear and Nonlinear Equations
2.5	Autonomous Equations and Population Dynamics
2.6	Exact Equations and Integrating Factors
3.1	Homogeneous 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
5.1	Review of Power Series
5.2	Series Solutions Near an Ordinary Point, Part I
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
4.1-4.3 (briefly)	Methods for Higher Order Linear Equations