M 274 Introduction to Differential Equations SPRING 2016
MWF 2:10 – 3:00 (room Math 311)

CATALOG DESCRIPTION: M 274; 3 cr. Prerequisites: M 162 or M 171 and knowledge of basic trigonometry. Solution of ordinary differential equations and systems with emphasis on applications, numerical methods and computer software.

LEARNING OUTCOMES: Upon completion of this course, a student will be able to (a) Formulate simple applied models in terms of differential equations and systems of differential equations; (b) Solve linear constant coefficient differential equations and systems of differential equations using various solution techniques; (c) Analyze simple applied models formulated in terms of nonlinear differential equations quantitatively and qualitatively; (d) Use some mathematical software as a tool for analyzing simple models formulated in terms of differential equations.

INSTRUCTOR:
Professor Peter Golubtsov. Office: Math 309, Phone: 243-4373, E-mail: peter.golubtsov@mso.umt.edu

OFFICE HOURS: MWF 3:00 – 4:00, Room Math 309.

TEXT: P. Blanchard, R.L. Devaney, G.R. Hall, *Differential Equations,* 3rd ed., Brooks/Cole Publ. Comp., 2006.

WEBSITE: All the information pertinent to this course will be posted on the course website. In particular, the list of homework assignments, current lecture topics information, etc., will be placed there together with video records of the lectures.

GRADING POLICIES: There will be three tests of 20% of final grade each (the lowest of the three scores will be dropped). There are no make-up tests. After one test is missed, a second missed test will count as a zero except in case of verified illness, or other circumstance pre-approved by the course coordinator. An illness is verified by giving prior notice (for instance, by sending an E-mail to instructor), and by providing a note from the health service (or other physician). It is best to follow the notification/verification procedure for any test missed because of illness. When a test is returned, there is one week from the date of return for contesting the grading. After that period the grade will be accepted as final. The homework assignments will be given every week (20% of final grade). There will be 30% of final grade Final exam during the finals week. The course will also be based on attendance (10% of the final grade).

THE GRADING SCALE IS:
A: [85%, 100%]; B: [70%, 85%); C: [55%, 70%); D: [40%, 55%); F: [0%, 40%); CR: [40%, 100%].

Exceptions to the above rules regarding taking tests, etc., may be made by the course coordinator on an individual basis. Also, extraordinary performance on the final may, at the instructor's discretion, provide the basis for raising a grade. *If you are taking this course as a general education requirement, you must take it for a traditional letter grade (not CR/NCR). A grade of "D-"is considered passing and will earn you credit for the course, BUT it will NOT fulfill your general education requirement and you will have to re-take the class.*

ACADEMIC MISCONDUCT: *All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. You can find it in the "A to Z Index" on the UM home page.*

SOFTWARE, CALCULATORS, COMPUTERS: You are encouraged to use any hardware (calculators/computers) and software of your choice in this class. While all the assignments and tests may be done by hand, using, e.g., graphing and analytical manipulation capabilities of scientific calculators/computers will be helpful.

ON RESERVE: There will be a copy of the text book in the library on reserve.

ADD / DROP POLICIES: Students can add a course online through CyberBear only until **February 2, 2016**. From then on, for adding only, a paper form with the instructor's signature in needed. Students can still drop a course or change the grading option on CyberBear until **February 12, 2016**. Please note that changing the grading option to Audit is not possible after February 12 (not even by petition). February 13 through March 28, students must drop/add with a paper form that is signed by the student's advisor and the instructor. **March 28** is the **DEADLINE** for students to drop/add a course, change sections, change their grading option from Credit/No Credit to a letter grade (or vice versa), or change credit in a variable credit course. From March 29 until May 6, 2016 a student is allowed to make these changes only by **PETITION**, which requires a **signature and recommendation** and a recommendation of an instructor. In the case of drops only, the petition also requires the signature of the Dean of the student's major. **The final deadline for all of these changes is May 6, 2016.**

DISABILITY MODIFICATIONS: The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

IMPORTANT NOTE: You should not be in this class if you are majoring in Mathematics (you need to take M 311 offered every fall semester).

SCHEDULE (TENTATIVE): The main content will be most of Chapters 1 - 5 of the text book.

Jan. 25 – Feb. 26	*First-Order Differential Equations. First-Order Systems.* Examples. Methods of solution: separation of variables, integrating factors. Linear and nonlinear equations. Applications: population biology, electric circuits, mixing problems, etc. The predator-prey model.	Ch.1, 2.
Feb. 29 – April 1	*First Order Systems and Second-Order Linear Equations. Linear and Nonlinear Systems.* Qualitative analysis. Applications: simple harmonic motion, damped vibrations. Equilibrium point analysis.	Ch. 2,3,4
April 11 - May 6	*Forcing and Resonance. Nonlinear Systems of Differential Equations.* Hamiltonian and dissipative systems. Forced harmonic oscillators. Periodic forcing and resonance. Periodic forcing of nonlinear systems and chaos.	Ch. 4,5
Monday, May 9	**Final Exam** 3:20pm – 5:20pm	