# MTH 244-2000 Differential Equations  Summer session  II - 2018

Instructor:     Orlando Merino, merino@math.uri.edu, 200F Lippitt Hall, 8744442
Textbook:      Elementary Differential Equations, by William F. Trench (open source)
                      Both the text and student solution manual are also available at Sakai site of the course
Technology:  Calculator is not required, and it not allowed in tests.
                       We will use Mathematica software for certain homework or projects.
Meets:          MTuWTh,  8-9:50 a.m.,  201 Swan Hall.
Office Hrs:     MTuWTh, 12:30-2 p.m. or by appointment.
Prerequisite   MTH142 (Calculus II) or equivalent

**About the course**  MTH 244 is a first course in ordinary differential equations. Differential equations are used by scientists and engineers to model physical, biological and economic phenomena. In this course we will learn both how to use differential equations to describe different phenomena and mathematical techniques for solving differential equations. For this we will use numerical, graphical, and analytical methods. The methods to be discussed include elementary analytical techniques that lead to exact solutions of certain classes of problems, numerical algorithms or series expansions for approximating solutions, and geometric analysis. Also, the Mathematica software may be used in some computer projects to explore/expand class discussions.

**Objectives**  At the end of the session you will be able to  use numerical, graphical, analytic techniques to analyze and/or solve scalar and systems of differential equations, and to apply these concepts in the study of basic mathematical models.

**Assignments**  We will have homework collected every day of class, with some exceptions. Also computer homework will be assigned. Homework questions will be answered at the beginning of class. You may also email me your questions (merino@uri.edu). Please see the Sakai site for a list of assignments.

Solutions to Problems:  It is your responsibility to communicate clearly in writing up solutions for homework, quizzes, and exams. Your results must display your understanding well and be written in a correct, complete, coherent, and well organized fashion. The rules of language still apply in mathematics, and apply even when symbols are used in formulas, equations, etc. Neatness counts!

**Evaluation**
Your grade will be based on tests (on Mondays, except on first day of class), homework, quizzes, computer projects, and a comprehensive final exam (given on the last day of class) as follows:
        Four exams(12.5% each),    Final Exam (25%),    Assignments (25%).

**Expectations**  You are expected to attend every lecture, and to submit your work on time -- no late work will be accepted (exceptions allowed for medical reasons). You must check SAKAI frequently.

**In class**  Please ask questions at any time. I will make an effort to clarify difficult concepts, or to explore any interesting ideas you may offer.  Class participation has a positive impact on the student's learning, and I encourage it.

# MTH 244 Differential Equations  Summer session  II - 2017

**Topics:** Applications Leading to Differential Equations, First Order Equations, Direction Fields for First Order Equations, Linear First Order Equations, Separable Equations, Existence and Uniqueness of Solutions of Nonlinear Equations*, Transformation: nonlinear to linear or separable*, Euler's Method, The Improved Euler Method and Related Methods, The Runge-Kutta Method, Growth and Decay, Cooling and Mixing,  Elementary Mechanics, Homogeneous Linear Equations of order 2, Constant Coefficient Homogeneous, Nonhomgeneous Linear Equations, The Method of Undetermined Coefficients I, The Method of Undetermined Coefficients II, Reduction of Order, Variation of Parameters*, Spring Problems I, Spring Problems II,  The  RLC  Circuit,  Introduction to the Laplace Transform, The Inverse Laplace Transform, Solution of Initial Value Problems,  The Unit Step Function, Constant Coefficient Equations with Piecewise Continuous Forcing, A Brief Table of Laplace Transforms, Review of Power Series, Series Solutions Near an Ordinary Point I, Series Solutions Near an Ordinary Point II,  Introduction to Systems of Differential Equations, Linear Systems of Differential Equations, Introduction to Linear Higher Order Equations, Higher Order Constant Coefficient Homogeneous Equations, Undetermined Coefficients for Higher Order Equations

**Outside of class**  To keep up with the rapid pace of the class requires that you spend several hours every day doing homework, reviewing notes, reading the book, and working out extra problems, all in addition to the time spent in class.

**Disability**   Any student with a documented disability is welcome to contact me as early in the semester as possible so that we may arrange reasonable accommodations (contact Disability Services for Students Office at 330 Memorial Union 401-874-2098).

**Academic Honesty**  Cheating is defined in the University Manual section 8.27.10 as  *the claiming of credit for work not done independently without giving credit for aid received, or any unauthorized communication during examinations* (of course, this includes use of the "internet"). Students are expected to be honest in all academic work. The resolution of any charge of cheating or plagiarism will follow the guidelines set forth in the University Manual 8.27.10 - 8.27.20.

**Civility** If you must come in late or leave early, let me know and please do not disrupt the class.  Please turn off all cell phones, ipads, etc.  Please refrain from texting during class.

**Make-Up Policies:** Make-up quizzes and exams will only be given for documented, extenuating circumstances at the instructor's discretion. The instructor must be notified before the day of the assessment if you will be participating in a University-sanctioned event or if you have some other reasonable conflict. If you are sick or are experiencing some other emergency, you must notify the instructor by email within two hours of the end of the class period for which any assessment is scheduled. Make-up assessments must be scheduled before the class meeting directly following the quiz unless specific arrangements have otherwise been made. Documentation must be provided to prove that any excuse is legitimate.

**Incomplete Grade** We will follow the university manual 8.53.20-8.53.21