MATH 312, Ordinary Differential Equations, Autumn, 2011
Walla Walla University

BULLETIN DESCRIPTION: : Study of solutions of first order differential equations, solutions of linear differential equations of order n, linear systems, and series solutions. Prerequisite: MATH 283

INSTRUCTOR: Dr. Kenneth L. Wiggins, 338 KRH, 527-2088, ken.wiggins@wallawalla.edu

OFFICE HOURS: 2 TuWTh, 3 M, 1 F, Other Office hours by appointment

OBJECTIVES: After finishing this course, the student should be able to organize and effectively communicate ideas involving:

- *First-order equations.* Picard's existence and uniqueness theorem; separable equations, exact equations, linear equations (integrating factors), solutions by substitutuion, applications of first order equations.

- *Higher-order Equations.* Existence and uniqueness results, reduction of order, homogeneous equations, differential operators, undetermined coefficients, variation of parameters, harmonic motion, series solutions.

- *The Laplace Transform.* The inverse Laplace transform, translation theorems, transforms of derivatives, solving initital-value problems with Laplace transforms.

- *Systems of Differential Equations.* The Laplace transform method, differential operators, matrix methods using eigenvalues and eigenvectors.

TEXTBOOK: : *A First Course in Differential Equations with Modeling Applications*, 9th edition, by Dennis G. Zill, Brooks-Cole, 2009, ISBN-13: 978-0-495-10824-5, ISBN-10: 0-495-10824-3

SOFTWARE The primary software for the class is Maple, which is freely available in the computer labs. This software can be used in lieu of a calculator. If you wish to have your own copy of Maple I can arrange for you to do that for $75.

ASSESSMENT: All assessment will be based on both correctness and quality, including the quality of your presentation.

Category	Weight
Homework & quizzes	25%
Three tests	45%
Final exam	30%

Grade	Percent	Grade	Precent
A	91-100%	C	70-74%
A-	89-90%	C-	65-69%
B+	86-88%	D+	62-64%
B	83-85%	D	58-61%
B-	80-82%	D-	55-57%
C+	75-79%	F	0-54%

**Issac Newton
MATH 312
Nov 2, 1665
W5**
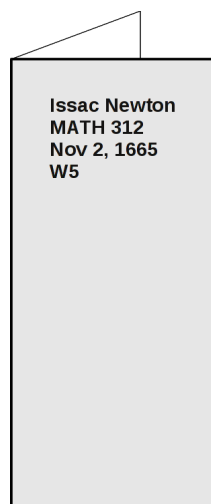
HOMEWORK: The surest way to succeed in MATH 312 is to study each day. To aid you in your study, homework problems will be assigned each day. Most of this homework will be done on the computer, but you will hand in a weekly written assignment. Be sure to show all work neatly and indicate your answers clearly. The weekly assignments are given specifically for you to practice clear and precise presentations. Please fold your paper homework lengthwise and label it as illustrated in the diagram above. Your written homework will be due Friday mornings at the beginning of class.

QUIZZES: Occasionally quizzes may be given over the lectures and homework.

TESTS: Three 50-minute examinations will be given during the quarter. These will cover the lectures and the homework, and you will take these tests without calculators.

FINAL EXAMINATION: This test is scheduled for 12-1:50 PM, Monday, December 12. Attendance is required, so make your travel plans early with this appointment in mind.

CLASS ATTENDANCE: Students are expected to attend all classes. In addition, students are expected to give their full attention to the class discussions, and to be courteous, respectful, and supportive of the learning environment. Cell phones, computers, personal organizers, and all other electronic devices are not to be used by students during class. Modifications to the homework assignments or test schedule may be announced in class.

DISABILITIES: If you have a physical and/or learning disability and require accommodations, please contact your instuctor or the Special Services office at 527-2366. This syllabus is available in alternative print formats upon request. Please ask your instructor.

SPECIAL CONSIDERATION FOR EXTRA EFFORT: Your lowest test grade will be dropped and replaced with your final examination grade if you meet the following conditions: You

must

- Be present, on time, and attentive for at least 37 or the 39 scheduled class sessions

- Turn in at least 95% of the homework on time.

- Make a higher grade on the final examination than you did on your lowest test.

ACADEMIC INTEGRITY: Some collaboration on homework is allowed, but the work you submit for grading must be your own. A ny type of cheating on a test or examination, including but not limited to copying another student's work or using unauthorized notes or electronic equipment, will result in a zero grade for the test or a failing grade for the quarter, and possibly futher disciplinary action taken by the Associate Vice President for Academic Administration.

TOPICS BY WEEK:

Week 1

- Terminology
- Initial Value Problems
- Mathematical Models
- Solution Curves

Week 2

- Separable Variables
- Linear Equations
- Exact Equations
- Substitutions

Week 3

- Linear Models
- Catch-up/review
- Test #1
- Nonlinear Models

Week 4

- Higher-order equations-theory
- Continuation
- Reduction of Order
- Homogeneous equations

Week 5

- Undetermined coefficients
- Continuation
- Variation of parameters
- Cauchy-Euler equation

Week 6

- Catch-up / review
- Test #2

- Linear IVP's
- Continuation

Week 7

- Linear BVP's
- Series solutions
- Singular points
- Laplace transform

Week 8

- Inverse transform
- Translation theorems
- Transforms of derivatives
- Applications

Week 9

- Catch-up/review
- Test #3
- First-order systems
- Homogeneous linear systems

Week 10

- Nonhomogeneous linear systems
- Continuation
- Review