Math 221
Differential Equations
Spring 2006

Instructor: Fred Schultheis
Office: PPHAC 218
Office Hours: **MTW** 1:00-2:00 and I am always available by appointment.
Phone: 610-625-7887
Text: Differential Equations with Applications and Historical Notes, George F. Simmons, 2nd edition

At many colleges and universities, a first course in differential equations is often called Calculus IV since it is a natural continuation of the 3 semester calculus sequence in which one applies most of the concepts of calculus. It is important that you have a very firm grasp of ordinary and partial differentiation, basic techniques of integration, and power series. The main content of the course is contained in Chapters 1, 2, 3, 5, 8, and 9 of the text.

Course Description
The course meets on **Monday, Wednesday, and Friday from 11:25-12:30** in room **PPHAC 330.** Homework assignments will be given at each class meeting. Students are expected to complete these assignments by the next class meeting, where they will be discussed. No one can learn mathematics without doing it themselves and so, to the student, homework is the most important part of the course. In addition to the daily homework assignments (ungraded) there will be regular problem sets (graded). Since class participation is important, students are expected to attend every class.

Coarse Goals
Upon completing the course, successful students will
- be able to identify and classify the various types of ordinary differential equations,
- be proficient in the various techniques needed to solve several different types of differential equations,
- understand ordinary differential equations conceptually and be able to use them to model problems.

Grading
Your final grade will be based on; cultural awareness (40 points), Maple projects (50-100 points), 3 graded problem sets (100 points each), 3 equally weighted hourly exams (100 points each), and a comprehensive final exam (at most one third of your total grade).

Cultural Awareness
One goal for this course is to develop an appreciation of the beauty and utility of mathematics. To help foster this appreciation you are encouraged to spend some time outside of class thinking and discussing mathematics.

There are no specific assignments for this portion of the course but many opportunities for you to satisfy the requirements. Some examples of activities that foster cultural awareness include: attending talks, giving a talk, reading a paper, or solving a problem.

Some typical cultural events include, but are not limited to
- attending an epsilon talk (5 points)
- attending a Mathematics Colloquium at Moravian (7 points)
- attending a math talk at another LVAIC school (9 points)
- attending the EPADEL conference in April (10 points)
- review an article on differential equations and present it to the class (7 points)
- solving a problem outside the scope of the class (5-infinite points) with 5 additional points available for presenting the solution to the class

If you attend an event relevant to your mathematical growth you need to write a short paper that explains what the event was and how it deepened your appreciation of differential equations or mathematics. At most 3 epsilon talks and 3 Mathematics Colloquiums may count towards your cultural awareness grade. However, once you have reached the 40 points for your cultural awareness grade, you may do additional cultural events for extra credit. **For any talks you attend a write up is due within one week of when the talk was given.**

ACADEMIC HONESTY POLICY GUIDELINES
MATHEMATICS COURSES

The Mathematics and Computer Science Department supports and is governed by the *Academic Honesty Policy of Moravian College* as stated in the Moravian College Student Handbook (pp. 54-59). The following statements will help clarify the policies of members of the Mathematics faculty.

In all homework assignments which are to be graded, you may use your class notes and any books or library sources. When you use the ideas or thoughts of others, however, you must acknowledge the source. For graded homework assignments, you may not use a solution manual or the help, orally or in written form, of an individual other than your instructor. If you receive help from anyone other than your instructor or if you fail to reference your sources you will be violating the *Academic Honesty Policy of Moravian College*. For homework which is not to be graded, if you choose, you may work with your fellow students. You are responsible for understanding and being able to explain the solution of all assigned problems, both graded and ungraded.

All in-class or take-home tests and quizzes are to be completed by you alone without the aid of books, study sheets, or formula sheets unless specifically allowed by your instructor for a particular test.

The following is a list of the homework assignments by section. I reserve the right to add to or subtract from this list.

I Nature of Differential Equations and Separable Equations

Page	Problems
9	1adefo, 2abcegior, 3cd, 4af, 6
16	1a, 2
24	1, 5, 6, 7, 9, 12, 26, 27
33	1, 2, 3, 4, 5, 6, 7

II First Order Equations

49	1adeh, 3, 6
53	1, 3, 5, 7, 9, 11, 13, 15
59	2abdeghi, 5
61	1, 2acf, 3, 4ac, 7
65	1dfg, 2bc, 3b

III Second and Higher Order Linear Equations

86	1, 3, 5acd, 6ae, 8
91	3, 5, 6a, 7
94	1, 3, 5, 7c
97	1abcg, 2acd, 4, 5ace
103	1abdfghij, 3a
106	1, 2, 3abd, 4bf, 6a
113	2, 6
127	1, 3, 5, 7, 9, 11, 13, 15, 19, 20, 21, 22ab
135	1, 8, 10, 11, 14, 15, 17, 19, 20, 21, 23

V Power Series Solutions and Special Functions

171	1, 2, 4, 5, 6, 7
175	1a, 2a
182	1, 2, 3, 5bc
191	1ab, 2cde, 3b, 4ab, 5, 6
198	1, 2, 3bc, 4, 5

VIII Bessel Functions and the Gamma Function

356	1, 3, 4, 5, 6

IX Laplace Transforms

384	1, 3, 4, 5bce
388	2
394	1, 2, 3abe, 5
397	1, 2, 5, 7a
410	2, 3, 4ab