M344 - ADV. ENGINEERING MATHEMATICS, Spring 2010

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Prerequisites: M240 and M242.

Text: All text material and homework problems for the class are contained in a set of lectures which are available at my web site:

uhaweb.hartford.edu/noonburg

The following book is a good supplementary reference (since no problems will be assigned from it, the Edition number does not matter):

FUNDAMENTALS OF DIFFERENTIAL EQUATIONS AND BOUNDARY VALUE PROBLEMS by Nagle, Saff and Snider, Addison Wesley.

Course Summary: This is a second course in differential equations for engineering students and other interested math and science majors. Topics covered include solution of ordinary differential equations by power series, special functions (Gamma function, Bessel functions, etc.), Fourier Series, Sturm-Liouville boundary-value problems, and partial differential equations. In particular, the heat equation, wave equation and Laplace's equation will be covered both analytically and numerically.

Grading:

Homework	10%
3 Labs	15%
2 Hour Exams	50%
Final Exam	25%

Homework: Assigned homework problems must be turned in, and will be graded. The due dates will be posted in the **M344 Homework Due Dates** file at the top of my website. If you read the lecture ahead of class, you can ask questions about the homework on that material before it is due. The Hour Exams will contain questions similar to the homework problems.

Labs: There will be three Labs which involve putting together some of the concepts studied in the course. You will definitely need a graphing calculator, such as the TI-89. The computer software MAPLE will be needed for the Labs and some of the homework problems. A list of MAPLE commands that you need will be handed out.
Make sure you set up your computer so that MAPLE is available to you when you need it.

Date		Material to be Covered
Jan.	20	Lecture 1. Review of o.d.e.s
	25	Lecture 2. Review of power series
	27	Lecture 3. Series solution of $x'' + p(t)x' + q(t)x = f(t)$
Feb.	1	Lecture 4: General solution at an ordinary point
	3	Lecture 5. Method of Frobenius
	8	Lecture 6. Bessel's equation and Bessel functions
	10	Lecture 7. General solution at a singular point
	15	Lecture 8. Conversion of d.e.s to Bessel's equation
	17	Review
	22	**EXAM 1 (Lectures 1-7)**
	24	Lecture 9. Orthogonal functions and Fourier Series
Mar.	1	Lecture 10. Sine and Cosine Series
	3	Lecture 11. Sturm-Liouville boundary-value problems
	8	Lecture 12. Classification of pdes, Heat equation
	11	Lecture 13. Method of separation of variables
SPRING VACATION		
	22	Lecture 14. Variations of the heat equation
	24	Lecture 15. Wave equation, derivation and solution
	29	Lecture 16. More on the wave equation
	31	Lecture 17. Numerical solutions
Apr.	5	Review
	7	**EXAM 2 (Lectures 9-16)**
	12	Lecture 18. Laplace's equation
	14	Lecture 19. Vibrating drum
	19	Lecture 20. Wave equation on a rectangle
	21	Lecture 21. The beam equation
	26	Lecture 22. Growth equation with diffusion
	28	Lecture 23. Sous-vide cooking
May	3	Review
May 5		**FINAL EXAM - Wed., May 5 (8-10am) or Mon., May 10 (2-4pm)**