M344 - ADV. ENGINEERING MATHEMATICS, FALL 2010

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Prerequisites: M240 and M242.

Text: All text material and practice 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 & Participation	10%
3 Labs	20%
2 Hour Exams	45%
Final Exam	25%

Homework: The homework problems assigned in class must be turned in by the specified due date, and will be graded. Reading the lecture material ahead of class will be very helpful. The Hour Exams will contain questions similar to the practice problems at the end of each lecture.

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 can be used for the Labs and some of the homework problems. A list of MAPLE commands that you need will be handed out. You should either get a copy of the Student Edition of MAPLE, or else have available some good software for drawing graphs.

Date		Material to be Covered
Sep.	1	Lecture 1. Review of o.d.e.s
	6	**Labor Day**, no class
	8	Lectures 2, 3. Series review and solution of $x'' + p(t)x' + q(t)x = f(t)$
	13	Lecture 4: General solution at an ordinary point
	15	Lecture 5. Method of Frobenius
	20	Lecture 6. Bessel's equation and Bessel functions
	22	Lecture 7. General solution at a singular point
	27	review
	29	**EXAM 1 (Lectures 1-7)**
Oct.	4	Lecture 9. Orthogonal functions and Fourier Series
	6	Lecture 10. Sine and Cosine Series
	11	Lecture 11. Sturm-Liouville boundary-value problems
	13	Lecture 12. Classification of pdes, Heat equation
	18	Lecture 13. Method of separation of variables
	20	Lecture 14. Variations of the heat equation
	25	Lecture 15. Wave equation, derivation and solution, review
	27	Lecture 16. More on the wave equation
Nov.	1	review
	3	**EXAM 2 (Lectures 9-15)**
	8	Lecture 17. Numerical solutions
	10	Lecture 18. Laplace's equation
	15	Numerical solution of Laplace's equation
	17	Lecture 19. Vibrating drum
	22	Lecture 20. Wave equation on a rectangle
	24	**Thanksgiving vacation**
	29	Lecture 21. The beam equation
Dec.	1	Lecture 22. Growth equation with diffusion
	6	Lecture 23. Sous-vide cooking
	8	more on Sous-vide cooking
	13	review

FINAL EXAM - Wed., December 15, 2010 (in regular classroom)