METHODS OF APPLIED MATHEMATICS
FALL 2010

Instructor: Professor Eugene Speer
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Office hours: Tuesday and Friday 9:00–9:40 AM, Murray 114
Tuesday 3:20–4:40 PM, Hill Center 520
Or by appointment or chance in Hill 520


General: This is a first semester graduate course appropriate for students in mechanical and aerospace engineering, biomedical engineering, other engineering, and physics. The topics to be covered are: solution of ordinary differential equations by power series methods (in particular, the method of Frobenius), Laplace transform methods, and phase plane methods; vector spaces of functions, Hilbert spaces, and orthonormal bases; Fourier series, Fourier transforms, and Sturm-Liouville theory; solution of the linear differential equations of physics— the heat, wave, and Laplace equations—by separation of variables.

Prerequisites: We assume familiarity with

- Single and multivariable calculus;
- Ordinary differential equations (as in Greenberg, Chapters 1, 2, and 3 and Sections 4.1–2, although some of the material in chapter 4 will be reviewed);
- Linear algebra (roughly Greenberg Chapter 8 and Sections 9.1–5, 10.1–5, and 11.1–2, although not all of this material will be used in detail).

Homework: Homework problems will be assigned weekly through postings on the web page. The first assignment will be due Thursday, 9/9; after that assignments will normally be due on Tuesdays.

Academic integrity: You are strongly encouraged to discuss homework problems with me or with other students. On the other hand, after you have finished discussing a problem, you must write your solution independently, not in concert with others. If you consult any source (such as a web page, solutions from a previous semester, etc.) in the preparation of homework, you must acknowledge this by citing that source; moreover, the work you turn in must be written up in your own words, not copied from a source. Failure to observe these restrictions will be treated as a violation of the Rutgers Academic Integrity Policy.

Exams: There will be two in-class exams, tentatively scheduled for Thursday, October 7 and Tuesday, November 16. The final exam will be held Wednesday, December 22, from 12:00 PM to 3:00 PM. Make-up exams will be given only in the case of well-documented illness or major emergency or (only with permission in advance) of a major outside commitment.

Grading: Grading will be based on a weighted average of homework and exams:

- Homework .................................................. 20%
- Class exams .............................................. 20% each .......................... 40%
- Final exam .................................................. 40%