MATH 4581 - Classical Mathematical Methods in Engineering

MWF 11:05-11:55am, Skiles 270

Instructor: Plamen Iliev
Office Hours: MWF 10 - 11:00, Skiles 227

Online Course/Instructor Opinion Survey

Textbook: *Boundary value problems and partial differential equations,* by David L. Powers, fifth edition

Suggested additional references:
Separation of Variables for Partial Differential Equations: An Eigenfunction Approach, by George Cain and Gunter Meyer
Applied Partial Differential Equations, by Richard Haberman

Syllabus

Grading: Grades will be based on homework (20%), two tests (20%+20%) and final exam (40%).

Homework: Homework will be assigned periodically. A proper subset of each assignment will be graded. You may consult with each other on the homework assignments, but you must write up and submit your own work.

Homework assignments

Reviews:

- Review 1, Wednesday, February 13, 2008
- Review 2, Wednesday, March 26, 2008
- Review 3, Friday, April 25, 2008

Exams:

- Test 1, Friday, February 15, 2008
- Test 2, Friday, March 28, 2008
- Final exam, Thursday, May 1, 2008, 2:50 - 5:40pm

Official school calendar

MATH 4581, CLASSICAL MATHEMATICAL METHODS IN ENGINEERING
COURSE SYLLABUS
FALL 2006

INSTRUCTOR: ANDRZEJ SWIECH
LECTURES: MWF 11:05-11:55, SKILES 270
OFFICE: SKILES 235B
OFFICE HOURS: MWF 1-2 PM.
PHONE: 404-894-2705
E-MAIL: swiech@math.gatech.edu
COURSE WEB PAGE: http://www.math.gatech.edu/ swiech/4581.html

TEXTBOOK: D. L. Powers, *Boundary Value Problems and Partial Differential Equations*, 5th edition, Elsevier Academic Press, 2006.

MATERIAL TO BE COVERED AND COURSE OBJECTIVES: The primary objective of the course is to introduce the student to certain analytic methods for solving partial differential equations. The main tools we will focus on are Fourier series and the Laplace transform. We plan to cover the following material:

(1) Vector spaces, norms, inner products, orthogonal projections, the space $L^2(a, b)$, Fourier series.
(2) The Stourm-Liouville theorem.
(3) Heat equation: derivation and the method of separation of variables.
(4) Wave equation: D'Alembert's solution, separation of variables.
(5) Laplace and Poisson equations: separation of variables in polar and cylindrical coordinates, method of eigenfunction expansion.
(6) Laplace transform: basic properties, applications to ordinary differential equations.
(7) Further applications af the Laplace transform: heat flow problems in half spaces, motion of semi-infinite string.
(8) Fourier transform and applications.

As the course progresses I will be assigning homework problems. They will not be collected. I will assign enough problems so that you can determine what part of the material you have mastered and what you still need to work on. However, they will not constitute a complete set of exercises sufficient for getting an A in the course.

GRADING: There will be three tests (September 15, October 13, and November 15), one homework assignment (due on November 22) and the final exam. Each test and the homework assignment will count for 15% of the final grade, and the final exam will count for 40%. Your grade will be based on how well you can solve problems and compute using the theory. You will not be asked to reproduce proofs.

Please be aware of the Georgia Tech Honor Code and follow it carefully. In particular please make sure that all the work you submit is your own.

Math 4581 (BU& BG) Classical Mathematical Methods in Engineering, Fall 2010

Schedule: 4:35 pm - 5:55 pm MW	Classroom: Skiles 169
Office: Skiles 102A	Phone: 404-894-4750
Email: zengch@math.gatech.edu	Webpage: **www.math.gatech.edu/~zengch**
Office hours: 10:05 -- 10:55 M & 1:35 pm - 2:25 pm W	Tentative final exam schedule: 3:05--5:55 Mon. 12/13 (subject to possible change)

Syllabus

Instructor: Chongchun Zeng

Prerequisites: **MATH 2403** or **MATH 2413** or MATH 24X3

Overview: This course is designed to meet the mathematical needs of engineering majors. A familiarity with these subjects is not assumed before the course. Coming out of this course, you should have the required mathematics background for upper level and graduate courses in these fields.

Participation: Attendence in classes is mandatory. Students are expected to read the material before each lecture. It is suggested that you start to work on homework problems right after they are assigned.

Textbook: Boundary Value Problems, 6th edition, by David L Powers, Elsevier Academic Press.

Material: In this semester, the topics we will cover include: a very biref review of ordinary differential equations, Fourier series and Fourier Transforms, heat equations, wave equations, potential equations, Laplace Transforms. In the textbook, after we go through Chapter 0 quickly, we will cover most parts of Chapter 1, 2, 3, 4, 6 and some of Chapter 5 if time allows.

***Grades:* 1 final exam 40%, 2 midterm 18% each, 6 homework assignments 4% each.**

- *Exams:* The final will be 2 hours and 50 minutes. Each of the two 80-minute midterms will be given during a lecture in the late Sept. and in early Nov., respectively, which will be announced at least a week in advance. All the exams are "closed book" and "closed notes". You will be allowed to bring with you a one page (8.5 X 11, both sides) "cheat sheet" with anything you want written on it. Please write your exam solutions in **ink** and **circle** the final answer of each problem in a box with no corrections inside. Writing exams in pencil would automatically forfeit your right to argue for credits after the exam is given back to you. There will be **no** make-up for a missed exam, except under provable impossibility to attend the exam.
- *Homework:* Homework will be assigned at the end of each lecture and then put on this webpage in the below, where you will also find the due dates of the problems included in each assignment. You may discuss the homework problems with other students *in this class*, but you should write down the solutions and complete the homework independently. The homework will be collected roughly every 2 weeks as one assignment. On each collecting day, the homework is due in the classroom at the beginning of the lecture. Some selected problems from each assignment will be graded and the score will be given based on both the graded problems and the completion of the whole assignment. Due to the holiday schedules, the specific homework collecting dates are:

  9/8 (Wed.), 9/22(Wed.), 10/11(Mon.), 10/27(Wed.), 11/15(Mon.), 11/29(Mon.)

- *Letter grade:* in general, the letter grade will be given based on the total score (homework + midterm + final) in a curved fashion with the following exceptions:

- *Letter grade:* in general, the letter grade will be given based on the total score (homework + midterm + final) in a curved fashion with the following exceptions:

1. Total score 90/100 or above will always be an **A**
2. Total score 60/100 or above will always be a **C** or higher.

Homework assignments:

- Homework Assignment #1 (due Wed., 9/8):
  - Assigned on Mon. 8/23: Sec. 0.1 6, 11, 13, 17, 20; Sec. 0.2 4, 5, 19, 20; Sec. 0.3 6, 9 Sec. 0.4 4, 8
  - Assigned on Wed. 8/25: Sec. 1.1 1bc, 2ac, 5, 7
  - Assigned on Wed. 8/30: Sec. 1.2 1c, 2, 3, 5, 6, 7c, 8, 10ac, 11ac
  - Assigned on Mon. 9/1: Sec. 1.3 2, 3, 4, 7; Sec. 1.4 1acdf, 2, 3bce
  - **Solution(Part a)**, **Solution (Part b)**
- Homework Assignment #2 (due Wed., 9/22):
  - Assigned on Mon. 9/8: Sec. 1.5 5, 6, 7, 9; Sec. 1.6 1, 2, 3
  - Assigned on Mon. 9/13: Sec. 1.9 1ac, 3, 5b, 6a
  - Assigned on Mon. 9/15: Sec. 1.10 1, 2, 3
  - **Solution**
- Homework Assignment #3 (due Mon., 10/11):
  - Assigned on Mon. 9/20: Sec. 1. 11 3, 5; Page 125. 68, 69
  - Assigned on Wed. 9/22: Sec. 2.1 1, 2, 3; Sec. 2.2 1, 2, 3, 6b
  - Assigned on Wed. 9/29: Sec. 2.3 1, 2, 5, 6;
  - Assigned on Mon. 10/4: Sec. 2.4 4, 5; Sec. 2.5 6, 7
  - Assigned on Wed. 10/6: Sec. 2.6 3, 7
  - **Solution 3a**
  - **Solution 3b**
  - **Solution 3c**
  - **Solution 3d**
- Homework Assignment #4 (due Wed., 10/27):
  - Assigned on Mon. 10/11: Sec. 2.7 1, 3e, 4, 5c, 8, 11; Sec. 2.8 3, 4
  - Assigned on Wed. 10/13: Sec. 2.9 1, 2
  - Assigned on Wed. 10/20: Sec. 2.10 1, 4, 7; Sec. 2.11 1
- Homework Assignment #5 (due Mon., 11/15):
  - Assigned on Mon. 10/25: Sec. 3.1 1, 3, 4; Sec. 3.2 2, 3, 7;
  - Assigned on Wed. 10/27: Sec. 3.4 5, 7; Sec. 3.5 2, 4, 5
  - Assigned on Wed. 11/3: Sec. 3.3 1, 5, 6, 7; Sec. 3.6 3, 8
  - Assigned on Wed. 11/10: Sec. 4.1 1, 5, 8
- Homework Assignment #6 (due on Mon. 11/29):

- Homework Assignment #6 (due on Mon. 11/29):
    - Assigned on Mon. 11/15: Sec. 4.2 2, 3, 7bc ; Sec 4.3 1b, 2b, 3;
    - Assigned on Wed. 11/17: Sec. 4.4 5c, 21, 26, 27
    - Assigned on Mon. 11/22: Sec. 4.5 1, 6, 9, 10, 12;
    - Assigned on Wed. 11/24: Sec. 4.6 1, 2
- Homework not to be collected:
    - Assigned on Mon. 11/29: Sec. 6.1 1, 2, 3c, 4, 5b, 7c
    - Assigned on Wed. 12/1: Sec. 6.2 1ac, 3bf, 5c, 7b, 8
    - Assigned on Mon. 12/6: Sec. 6.3 1be, 2b, 3a, 5a; Sec. 6.4 1, 3, 4