Initial and Boundary Value Problems and Partial Differential Equations

Lecture MWF 9:00AM – 9:50AM, Aug 27 – Dec 7, 2012. Science Center 346.

Textbook *A First Course in Partial Differential Equations with Complex Variables and Transform Methods*, H. F. Weinberger, DOVER.

References The following is a partial list of supplemental reading:

1. *Applied Partial Differential Equations with Fourier Series and Boundary Value Problems*, Richard Haberman, PEARSON..
2. *Applied Partial Differential Equations*, Paul Duchateau and David Zachmann, DOVER.
3. *Applied Mathematical Sciences Partial Differential Equations*, Fritz John, Springer.

Lecturer Guangming Yao, gyao@clarkson.edu, SC363, 315-268-6496. Office hour: MWF 10:00AM–11:00AM, 2:00PM–3:00PM or any time my door is open.

Goals To provide a background in initial and boundary value problems and partial differential equations. The emphasis is on developing fundamental mathematical concepts and demonstrating their application to applied problems. The objective is to develop an ability to work with: 1. solution techniques for ordinary differential equations. 2. series solutions. 3. boundary value problems and special functions. 4. classification of partial differential equations. 5. basic linear and nonlinear equations 6. separation of variables and boundary value problems. 7. method of characteristics.
Theory and analysis complement applications and problem solving, and the course requires that the student develop proficiency in working through a wide variety of typical problems.

Topics The course is designed to cover chapters I–VI in Weinberger, and chapter XII and chapter VII if time permits. Areas of emphasis include: I. The one-dimensional wave equation, II. Linear second-order partial differential equations in two variables, III. Some properties of elliptic and parabolic equations, IV. Separation of variables and Fourier series, V. Nonhomogeneous problems, VI. Problems in higher dimensions and multiple Fourier series. While the material is broadly based, attention is given to developing a unified curriculum emphasizing the analytical framework, and a problem solving methodology. The material and problems are framed so as to require a background in calculus III (CU MA 231) and elementary differential equations (CU MA 232).

Assessment Student assessment is based largely on performance on examination papers consisting of a midterm and final exam with each exam worth 30% of the final grade. Homework and course project, which each worth 15% of the final grade, will be assigned in each lecture and collected weekly. Typically, homework from Monday, Wednesday, and Friday lectures will be due the following Monday. Class lectures along with problem solving and computational studies form of the students participation, and constitute the remaining 10%. Attendance and active class participation is required.

Academic Integrity From the student handbook: *"The Clarkson student will not present, as his or her own, the work of another, or any work that has not been honestly performed, will not take any examination by improper means, and will not aid and abet another in any dishonesty"* Any student violating this regulation will receive a failing grade.

Academic Accommodations If you require any kind of special accommodation please see your professor. Students must register with the Office of Accommodative Services, located in the Student Success Center, 110 ERC, to verify their eligibility for appropriate accommodations.

Makeup Policy The right to miss a scheduled exam and take a make up exam can be awarded only by your professor, and will be awarded rarely and only for a serious cause. If for some reason you must miss an exam, you must apply in writing **before** the exam. If you are unable to attend the exam due to an emergency that day you must contact the professor as soon as possible and provide documentation to confirm why you cannot take part in the exam. An unexcused absence will result in a grade of zero on the exam.