CSCE/Math 441/841 - Approximation of Functions

Fall Semester, 2007

Prerequisites: Differential Equations (Math 221 or equivalent), Linear Algebra (Math 314 or equivalent), and a programming language

Instructor: Allan Donsig (adonsig1@unl.edu; 472-8128; Avery 307)

Meeting time: 10:30 MWF in Avery 111

The central idea of approximation theory is the approximation of some data or function by an element from a family of 'nice' functions. The course goals are 1) to introduce the fundamental ideas of approximation theory and 2) to show how they are applied in practice.

The subject involves both mathematical questions (How do we measure the error in an approximation? Is there a best approximation? Can we find a natural basis for approximating functions?) and computer science questions (Is there an efficient algorithm to find an approximation? How robust is the algorithm? How to implement the algorithm in practice?). The course will consider both kinds of questions, showing participants important and interesting ideas from each side of the subject and preparing them to use these ideas in different contexts.

The major themes, after a review of background material from both math and computer science, are interpolation and approximation. Specific topics to be covered include polynomial interpolation, splines, approximation in inner product and normed spaces, polynomial approximation, and orthogonal polynomials. Variation in topics is possible, depending on the background and interests of participants.

CSCE/Math 340/840 (Numerical Analysis I) is not a prerequisite. MATLAB is the supported programming language for assignments, but other languages, with approval in advance, are acceptable.

If you have any questions, feel free to contact the instructor.