



Course Announcement for Spring 2015

***MATHEMATICAL AND
NUMERICAL PROBLEM
SOLVING SKILLS FOR
SCIENTISTS AND ENGINEERS***

MSE 510

Instructor: David J. Keffer
T&Th 3:40 - 4:55 pm in Ferris Hall 502

Whether one pursues the path of an experimentalist, theoretician or modeler, scientists and engineers increasingly are called upon to work in interdisciplinary teams in which one is exposed to models that are composed of a relatively few types of equations—algebraic equations, ordinary and partial differential equations and integral equations. Today, there are a wide variety of commonly available algorithms and software, which solve these equations in a routine manner. What is required of the individual scientist and engineer is the ability to correctly identify the type of equation (for example, linear vs. nonlinear or parabolic vs. hyperbolic vs. elliptic) and then extract from our repertoire of techniques the appropriate tool to solve it.

The goal of this course is to shift the emphasis in evaluating problems from the numerical solution to the more interesting challenge of model formulation. Thus, the course seeks to empower graduate students with the ability to say, “If I can formulate the model, I can solve the problem.” The course is designed to serve both experimentalists who seek to develop a broad understanding of the strengths and weaknesses of these tools as well as modelers who are curious about the nuts and bolts of the underlying algorithms.

This course will satisfy a “domain science” requirement of the Interdisciplinary Graduate Minor in Computational Science. The course will be structured to accommodate the skills and backgrounds of graduate students from all participating IGMCS departments. The course project will likely require programming in a language of the student’s choice or the use of publically available software.

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Course website: <http://utkstair.org/clausius/docs/mse510/index.html>