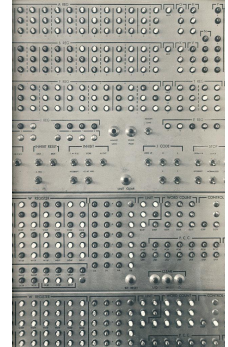*MTH 655/Numerical Analysis*
Winter 2007

Large scale scientific computing methods

INSTRUCTOR: Małgorzata Peszyńska, Department of Mathematics
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CLASS: MWF 9:00-9:50, Gilkey 115, CRN: 27146 (MTH 655) or 27147 (MTH 659)

BACKGROUND: In this class, we develop methods for solving large scale scientific computing problems. Rigorous mathematical background as well as implementation details will be given for topics such as i) solving large nonlinear systems of equations, ii) multigrid method, and iii) domain decomposition methods. Also, a iv) primer on numerical optimization will be developed touching on both the traditional gradient based methods as well as on heuristic approaches such as Simulated Annealing. Other topics may be included as time permits.

The class will include hands-on-lab in which students will learn the basics of scientific and parallel computing.

STUDENTS: The course is intended for graduate students of mathematics and other disciplines but no specific preparation beyond solid undergraduate background in mathematics will be assumed. Knowledge of numerical methods, and familiarity with computer programming are a plus but are not required. Most examples will come from models of real life phenomena but no prior knowledge of the models or their discretizations will be assumed.

ASSIGNMENTS: will be a mixture of theoretical and computational projects.

SEQUENCE MTH 654-656 in 2006-2007: This course is the second in a year-long sequence, and the courses in this sequence can be taken independently.
In the Spring 2007 the course **MTH 656:** *"Numerical image reconstruction and processing"* will be taught by Adel Faridani.