

# Syllabus

## MATH664/AMSC664 Spring 2008

### Advanced Scientific Computing II (ASC II)

**Instructors:** Aleksey Zimin, Radu Balan

**Office Hours:** Tuesday, 2-3pm; or by appointment otherwise

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This course is a continuation of ASC I. This course focuses on issues of code development and validation relevant to large scientific computing projects on high performance computing systems. In this term the project includes a seminar lecture and a written final report.

Prerequisites : ASC I

- Code Development and Validation
  - round-off sensitivity, performance analysis, tuning to platforms
  - symmetry and stability studies
  - analytical, experimental, and computational benchmark comparisons
  - convergence studies
  - parametric sensitivity studies
  - investigation of asymptotic regimes
- Parallel Computing
  - parallel algorithms for PDE, e.g., adaptive mesh refinement, multigrid, independent time steps, domain decomposition, operator splitting
  - parallel algorithms for nonlinear systems and optimization
- Computational Science Seminars
  - Local and visiting computational scientists representing a broad selection of scientific disciplines will explain the computational aspects of their work. These aspects should be reflected in the choice of topics covered above. Each student is expected to listen to these seminars critically.
- Project Final Report
  - Each student must give a 30 minute seminar and a complete written report on his or her project, explain how the software has been developed, tested and validated, document the software and how it is used, show results of its use, detail how his or her vision of the finished product has evolved over the course of the project. The student's advisor's presence is required.