

ISC 5935 - Special Topics: Computational Tools for Finite Elements
Fall 2014

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Office Hours: MF 2:00-3:00, 445 DSL (Burkardt) or 456 DSL (van Wyk)

Class: MWF 2:00-3:00, 468 DSL

Text: Max Gunzburger, Janet Peterson,
Finite Element Methods.

Anders Logg, Kent-Andre Mardal, Garth Wells,
Automated Solution of Differential Equations by
the Finite Element Method: The FEniCS Book,
Lecture Notes in Computational Science and Engineering,
Springer, 2011,
ISBN13: 978-3642230981

Hans Petter Langtangen,
A primer on scientific programming with Python,
Springer, 2012,
ISBN13: 978-3-642-30293-0.

Course Description: This course will explore the use of sophisticated computational tools that enable the finite element method (FEM) for the definition, solution, and analysis of partial differential equations (PDE's). The course will outline the basic theory of the finite element method, and then rapidly move to an introduction to the Python programming language, the Gmsh, Triangle and Mesh2D meshing programs, and the FEniCS package. Mastery of these tools will be demonstrated by application to standard test problems for elliptic PDE's. Students enrolling in this course are expected to carry out extensive study and independent investigations on their own.

Course Objectives: Students completing the course will be able to:

- outline the FEM approach to standard PDE's;
- write programs in C, Fortran, Matlab or Python to carry out computational tasks;
- use a mesh generation program to create meshes for simple domains;
- use FEniCS to define, solve and analyze various PDE's.

Grading: The student's grade for the course will be based upon a number of assignments and a final project report:

- Assignments 50%

- Project Report - 50%

University Attendance Policy: Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

Academic Honor Policy: The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of student's academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to . . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University. (Florida State University Academic Honor Policy, found at <http://academichonor.fsu.edu/policy/policy.html>.)

Americans with Disabilities Act Students with disabilities needing academic accommodation should:

- register with and provide documentation to the Student Disability Resource Center; and
- bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class.

This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact the Student Disability Resource Center, sdrc@admin.fsu.edu, web page: <http://www.disabilitycenter.fsu.edu/>.

Syllabus Change Policy Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.