

**Department:** Mathematics and Computer Sciences

**Division:** Applied Mathematics

**Level and Major:** Graduate

**Course Title:** Finite Element Method

**Number of Credits:** 3

**Prerequisite:** Advanced numerical analysis, Real analysis

**Lecturer:**

**Course Description:**

**Course Goals and Objectives:**

**Course Topics:**

- Sobolev space
- Inner product and norm
- Important inequalities
- Existence and uniqueness of solutions of nonlinear equations
- Lax-Milgram theorem
- Weak form of elliptic problems
- Weak form of elliptic problems with Neumann boundary condition
- Weak form of elliptic problem with Mixed boundary condition
- Investigation of nonlinear problem
- Galerkin, Collocation, Sub-domain, least squares, generalized Galerkin methods
- Introduction to one-dimensional problems
- Investigation of second-order PDEs in one-dimensional case
- Triangles elements
- Quadratic elements
- Finite element method for parabolic equations
- Spectral element method
- Least squares finite element method
- Discontinuous Galerkin finite element method

**Reading Resources:**

**Evaluation:**