53:236 Optimization of Structural Systems

College of Engineering
The University of Iowa
Fall Semester, 2004

Instructor:

Colby C. Swan, Assoc. Prof.
4120 Seamans Center for Engrg. Arts
Phone: 335-5831
email: colby-swan@uiowa.edu
www.engineering.uiowa.edu/~swan

Text:

Topology Optimization with Engineering Applications, C.C. Swan, to be disseminated electronically throughout the semester.

Attendance policy:

- For those taking the course for credit, please check in with the instructor whenever a class period will be missed.

Grading policy:

- 80% of course grade will be determined based on work submitted in fulfillment of course assignments;
- 20% will be determined by an oral examination given during finals week.

Tentative Course Schedule:

Week of:	Topic	Reading Materials
8/23 – 8/27	Overview of Topology optimization and the course; Structural Mechanics Preliminaries: Elasto-statics;	Ch. 1 Ch. 2
8/30 – 9/3	Structural Mechanics Preliminaries: Nonlinear elastic structures;	Ch. 2 (cont.)
9/6 – 9/10	Eigenvalue problems (vibrational eigenvalues, and buckling eigenvalues;	Ch. 2 (cont.)
9/13 – 9/17	Energy principles of computational structural mechanics;	Ch. 3
9/20 – 9/24	Mechanics of heterogeneous media & composites;	Ch. 4
9/27 – 10/1	Homogenization methods for composites; Rule of mixtures approximations;	Ch. 4 (cont.)
10/4 – 10/8	Design sensitivity analysis for linear structural systems;	Ch. 5
10/4 – 10/8	Design of mechanical systems for minimal compliance	Ch. 6
10/11 – 10/15	Issues related to quality of design solutions: Uniqueness, Interpretability, Stability, & Convergence	Ch. 6 (cont.)

10/18 – 10/22	Design of mechanical systems for optimized eigenvalues; Vibrational eigenvalues; Buckling eigenvalues;	Ch. 7
10/25 – 10/29	Issues of structural sparsity in design for optimized eigenvalues;	Ch. 7 (cont.)
11/1 – 11/5	Optimization of structural systems with inelastic behaviours Modeling and analysis issues; Design sensitivity analysis issues;	Ch. 8
11/8 – 11/12	Formulations for design of compliant mechanisms	Ch. 9
11/15 – 11/19	Design of compliant mechanisms (cont.)	Ch. 9 (cont.)
11/22 – 11/26	Thanksgiving Holiday Break (no classes)	
11/29 – 12/3	Microstructural design of composite materials	Ch. 10
12/6 – 12/10	Wrap-up and closure	