MEC 539 Introduction to Finite Element Method
Fall 2016

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Lecture: Thur 1:00PM - 3:50PM at EARTH&SPACE 069
Office Hours: Wed/Thur 9:30AM - 11:00AM, or by appointment

Course Learning Objectives: This course will introduce the mathematical and physical formulation of finite element methods (FEM). An introduction to the theory of finite element methods and their application to structural analysis problems. Matrix operations, force and displacement methods. Derivation of matrices for bars, beams, shear panels, membranes, plates, and solids. Use of these elements to model actual structural problems. Weighted residual techniques and extension of the finite element method into other areas such as heat flow and fluid flow. A computer project consisting of the solution and evaluation of a structural problem is required. Physical problems will be taken from a variety of fields.

Pre-requisite:
Mechanics of Materials, Materials Science and Engineering, Strength of Materials, Theory of Elasticity.

Textbook: A first course in finite element method (5th Edition). Daryl L. Logan. ISBN 978-0-495-66825-1.

Suggest References

- The finite element methods: Linear static and dynamic finite element analysis. T.J.R. Hughes. Dover Publications, 1987.
- Finite element procedures. K.J. Bathe. Prentice Hall, 1996.
- An Introduction to the Finite Element Method, J. N. Reddy, McGraw-Hill, 2005.
- A first course in finite elements, Jacob Fish and Ted Belytschko, Wiley, 2007.

Grading: Your grade in this course will be assessed by homework, class participation, in-class-exercises, and exams.
Homework: 20%
In-class Exercises: 20%
Exam 1: 25%

Exam 2: 25%
Lab/project report: 20%
Your final grade will depend on the overall performance of your classmates.

Exams: All exams are open book and closed notes.

Homework:
1. Homework will be assigned weekly and collected every Thursday.
2. Late homework will not be accepted.
3. All homework assignments are individual, unless otherwise specified.
4. Homework problems should be neat, professional and well organized.

Course Content:
1. Introduction
2. Building A FEA Model
3. Spring and Truss Elements
4. Beam element
5. Frames
6. Linear Elasticity and Energy Method
7. Finite Elements for 2D Plane Problem
8. Isoparametric Elements
9. Integration scheme
10. Heat Transfer

Disability Support Services (DSS) Statement:
If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.
Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: http://www.stonybrook.edu/ehs/fire/disabilities

Academic Integrity Statement:
Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are

required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

Critical Incident Management:
Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.