MEC 541 Elasticity

Spring 2019

Instructor: Dr. Lifeng Wang
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Lecture: Thurs 4:00PM - 6:50PM at CHEMISTRY 126
Office Hours: Wed and Thurs 9:30AM – 11:00AM, or by appointment

Course Learning Objectives:
The course will provide a basic treatment of the formulation of linear elasticity theory and its application to problems of stress and displacement analysis. The objective is to provide students the ability to solve linear elasticity problems. The fundamental field equations will be developed including strain energy concepts. Applications will involve the solution to problems of engineering interest including two-dimensional problems of plane strain and plane stress, fracture mechanics, torsion, bending and stress concentration, and three-dimensional solutions.

Pre-requisite:
Mechanics of Materials/Strength of Materials, Mechanics of Solids.

Textbook: Elasticity by J. R. Barber, Springer, 2010 (Third Edition).

Suggest References:

- Mechanics of Solids and Materials, by R.J Asaro and V. A. Lubarda, Cambridge, 2006.
- Elasticity: Theory, Applications & Numerics, by M. H. Sadd, Elsevier, 2014.

Grading:
Your grade in this course will be assessed by homework and exams.
Homework: 30%
Midterm Exam: 30%
Final Exam: 40%
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 in class.
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. Review of stress transformation, strain transformation, tensor algebra, and compatibility.
2. Generalized Hook's law
3. Displacement formulation, force formulation
4. 2D problems by Airy stress function in rectangular coordination
5. 2D problems by Airy stress function in polar coordination
6. Complex variable formulation
7. Wedge problem
8. Contact problem
9. 3D problem
10. Torsion and shear
11. Viscoelasticity
12. Elastodynamics

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.