Course Syllabus

VM512

Theory of Elasticity

Fall 2018

Course Description:

The topics covered are chosen with a view to modern research applications in fracture mechanics, composite materials, tribology and numerical methods. Thus, significant attention is given to crack and contact problems, problems involving interfaces between dissimilar media, thermoelasticity, singular asymptotic stress fields and three-dimensional problems. The main topics students will learn about are:
Stress, strain and displacement, equilibrium and compatibility. Use of airy stress function in rectangular and polar coordinates, asymptotic fields at discontinuities, forces and dislocations, contact and crack problems, rotating and accelerating bodies. Galerkin and Papcovich-Neuber solutions, singular solutions, spherical harmonics. Thermoelasticity. Axisymmetric contact and crack problem. Axisymmetric torsion

Instructor:

Instructor: Prof. Roberto Dugnani
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Office Hours: available upon appointment on Wednesdays (email for an appointment at least 24hrs in advance)

Textbook: "Elasticity" by J.R. Barber, Springer Netherlands, DOI 10.1007/978-90-481-3809-8

Course Pre/Co-requisites: *vm311 or vm412, or vm511 or vm 513 (or equivalent).*

Grading Scheme:

Attendance and Quizzes: 5%
Homework: 25%
Final Project: 10%
Midterm Examination: 30%
Final Examination: 30%

Honor Code Policy:

The learning derived from a course is based on student integrity and faculty support of a just learning environment. The faculties strive to enforce the policy and are open to any questions and discussion from the students. In this course you may consult fellow students for discussion, but you are responsible for the originality of all your submitted work.

Teaching Schedule:

Week	Lectures and Exams
Week 1 – Sept	Introduction, class policy. Equilibrium and compatibility
Week 2 – Sept	Plane strain and plane stress Stress function formulation
Week 3 – Sept	Problems in rectangular coordinates End effects
Week 4 – Oct.	Body forces. Problems in polar coordinates Calculation of displacements
Week 5 – Oct.	Curved beam problems Wedge problems
Week 6 – Oct.	Plane contact problems Forces distribution and cracks
Week 7 – Nov.	Review for Midterm **MIDTERM**
Week 8 – Nov.	Displacement function solutions The Boussineesq potentials
Week 9 – Nov.	Thermoelastic displacement potentials Singular solutions
Week 10 –Nov.	Spherical harmonics. Cylinders and circular plates Problems in spherical coordinates
Week 11 –Nov.	Frictionaless contact The boundary-value problem
Week 12 – Dec.	The penny-shaped crack. The interface crack. Review for final exam
Week 13 –Dec.	**FINAL EXAM**