VM412: Advanced Strength of Materials
Summer 2015

Course Pre/Co-requisites: VM 311

Textbook: J.R. Barber, Intermediate Mechanics of Materials, 2nd ed., Springer 2011

Lecture Time and Locations:
Monday: 18:20-20:00, E1-202 (东中院)
Wednesday: 18:20-20:00, E1-202 (东中院)

Instructor:
Prof. Roberto Dugnani
E-mail: Roberto.Dugnani@sjtu.edu.cn
Office: E203, JI building
Office Hours: available upon appointment. Best days are Monday and Wednesday. Make sure that you explain in your email what concerns/questions you have before coming to the office.

Teaching Assistant:
Stella (Lv Mei)
stellalvmei@hotmail.com

Homework problems:
Students must complete all assignments. Late assignments will be graded with a **20% reduction in grade for each day** after the due date. Homework should show evidence of work, homework problems with only an answer will not be accepted. Partial credit will be given only for homework and calculations meeting acceptable standards.

Grading Scheme
Attendance and Quizzes: 5%
Homework & Projects: 25%
Midterm Examination: 35%
Final Examination: 35%

Academic Integrity:
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.

Course Objectives
Encourage independent thinking
Develop a deeper understanding of the basic principles in mechanics of materials
Promote economic thinking to obtain first-order solutions of complex problems
Among the specific topic covered:

- Elastic, thermoelastic, and elastoplastic analysis of axisymmetric thick cylinders and rotating discs;
- Bending of rectangular and circular plates, including asymmetric problems;
- Beams on elastic foundations;
- Axisymmetric bending of cylindrical shells;
- Torsion of prismatic bars.

Class	Date	Topic	Reading
1	Mo	Introduction, notation for stress, strain, and displacement, strain-displacement relations. 3D Hooke's law, equilibrium equations.	**1:5,** W1:1, W1:2
2	We		W1:3, W1:4
3	Mo	Thick walled cylinders and disks, equilibrium conditions, displacement formulation, compatibility.	**10:1-10:3**
4	We	Elastic solutions for disks and cylinders, including thermal stresses and inertia forces	
5	Mo	Composite cylinders, fits.	**10:4**
6	We	10:2, 10:5 Elastic-plastic problems	**10:5**
7	Mo	Residual stress, examples	
8	We	Beams on elastic foundations	**7:1-7:3**
9	Mo	Concentrated loads and discontinuities	**7:4, 7:5**
10	We	Finite and short beams, examples	**7:6**
11	Mo	Shell bending equations	**9:1-9:4**
12	We	Localized loading and discontinuities	**9:5, 9:6**
13	Mo	Thermal stresses, examples	**9:7**
14	We	Pure bending of plates, coordinate transformation	W2:1, W2:2.6
15	Mo	Review	
16	We	**Mid-Term exam – Chapters 10, 7, 9**	
17	Mo	Governing equation and boundary conditions	W2:2.6-W2:2.8
18	We	Solution methods for rectangular plates	W2:2.9
19	Mo	Circular Plates	
20	We	Examples	
21	Mo	Torsion, Prandtl's stress function	W3:1
22	We	Thin-walled open sections	W3:2, 23:3
23	Mo	Rectangular bar	W3:4
24	We	Review	
		Final Exam – all material	

Note: Highlighted in **bold** are reading from Barber's textbook.
'W' refers to reading/assignments from notes posted on the class's website.