ME 570: Machine Design
Fall 2015

Lecture: MWF 2:30 – 3:20 p.m – Room: Wang Hall 2555

Professor: F. Sadeghi
Office Hours: MWF 2:30 – 3:30 p.m.
Purdue University, 585 Purdue Mall, Room ME 3003C, West Lafayette, IN 47907-2088
Telephone: (765) 494-5719, e-mail: Sadeghi@purdue.edu

Teaching Assistanst:

Mr. Sina Mobasher Moghadam
Office Hours: MTWTHF TBD
Email: smobashe@purdue.edu
Phone: 765-494-0308

Text Required for the Course:

Title: Advanced mechanics of materials and applied elasticity (Fifth Edition)
Author: A.C. Ugural and S.K. Fenster
Publisher: Prentice Hall
ISBN: 0137079206

Additional References:

Advanced Strength and Applied Stress Analysis	Theory of Elasticity (3rd Edition)
R.G. Budynas	S.P. Timoshenko and J.N. Goodier
McGraw Hill	McGraw-Hill

Grading Policy:

Homeworks	15%
Project	25%
Three Exams	60%

Examination & Project Dates:

Exam 1	September 23, 2015 – in class
Exam 2	October 28, 2015 – in class
Exam 3	November 23, 2015 – in class
Comprehensive Final Exam	TBA

General Information:

- The homework, exam and project solutions will/may require the use and knowledge of Maple and/or Mathematica softwares.
- All relevant material (i.e. course syllabus, homework assignement etc.) will be on blackboard.

Project:

The project is an assigned or proposed individual work relevant to the course objective. You will need to conduct a literature search in the library on the subject matter. You will need to develop computer software or use available software (i.e. ABAQUS, ANSYS, Algor, etc.) to complete the project assignment. You are required to provide a typed, well-written document on your findings and give a presentation of your findings.

You are also required to read and develop a three page single space essay on a scientist of your choice. The essay need to describe his life and work.

Policy:

Homeworks, projects, exams, etc. handed in after the specified deadlines will receive *no credit*. Exams will be administered on the dates indicated, no exceptions will be allowed.

Date	Lecture #	Topic
8/24/15	1	Introduction, Scope, Force Diagram and Distribution – Stress Analysis
8/26/15	2	Stress at a Point – Stress Tensor – Stress Strain Relationship, Normal Stress, Shear
8/28/15	3	Strain, Thermal Strain, Strain Displacement, Cartesian and Cylindrical Coordinates
8/31/15	4	Stress Transformation, Three dimensional
9/2/15	5	Plane Stress Transformation, Mohr's Circle
9/4/15	6	Principal Stresses, Mohr's Circle (3D)
9/7/15		**Labor Day – No Class**
9/9/15	7	Max Shear Stress, Strain Transformation, Principal Strains
9/11/15	8	Generalized Stress-Strain Relationship, Equilibrium Equation, Compatibility Relationship
9/16/15	9	2-D Strain Transformation, Strain Measurement, Strain Energy
9/18/15	10	Dilational Stress, Deviator or Distortional Stress, Saint Venant Principle
9/21/15	11	Plane stress and plane strain problems
9/23/15	**12**	**In Class Exam I**
9/25/15	13	Review of Elementary Theory of Elasticity Assumptions, Limitations
9/28/15	14	Stress function, example
9/30/15	15	Equilibrium Equation in Polar Coordinate system
10/2/15	16	Compatibility Relationship in Polar Coordinates, Solution techniques, Examples
10/5/15	17	Stress Concentration and Internal Stresses in Semi-Infinite Domain
10/7/15	18	Internal Stresses in Semi-Infinite Domain
10/9/15	19	Internal Stresses in Semi-Infinite Domain
10/12/15		**October Break**
10/14/15	20	Examples and Review
10/16/15	21	Contact Stress, Flamant Solution I
10/19/15	22	Contact Stresses
10/21/15	23	Failure Criterias – Static
10/23/15	24	Failure Criterias, Examples
10/26/15	25	Failure Criterias – Dynamic (Fatigue)
10/28/15	**26**	**In Class Exam II**
10/30/15	27	Failure Criterias – Examples
11/2/15	28	Fracture Mechanics
11/4/15	29	Fracture Mechanics – Examples
11/6/15	30	Example, Impact loading
11/9/15	31	Strain Energy, Castigliano's Theorem
11/11/15	32	Castigliano's First Theorem. Indeterminate Problems, Examples
11/13/15	33	Castigliano's Second Theorem. Indeterminate Problems
11/16/15	34	Raleigh's Method, Rayleigh Ritz Method
11/18/15	35	Examples of Strain Energy
11/20/15	36	Numerical Methods
11/23/15	**38**	**In Class Exam III**
11/25/15	39	**Thanksgiving**
11/27/15		**Thanksgiving**
11/30/15	40	Numerical Methods Examples, Axisymetrically Loaded Members
12/2/15	41	Shrink fits
12/4/15	42	Annular Disks
12/7/15	43	Rotating Disks of Uniform and variable thickness
12/9/15	44	Presentation of projects