CE4610: Advanced Structural Analysis

SPRING 2018

Time: MWF 2:30-3:20 pm
Place: CAST #204
Instructor: Prof. Jeongho Kim
Office: F. L. Castlemann #320, **Contact**: 860-486-2746, Jeongho.kim@uconn.edu

Textbook: Structural Analysis, 10th Edition by R.C. Hibbeler, 2014

Office Hours: After each class, 3:20-3:50PM. Email me to make an appointment

Course Description:
This course addresses stiffness matrix analysis of truss, beam, and frame structures using computer programming MATLAB and other graphical finite element software packages such as Staad.Pro. Several computer lab sessions are provided. We also review fundamental concepts of many historical methods such as the force method, the moment distribution method, etc. Introductory sessions on finite element methods are also taught.

Prerequisite: CE 3610

Course Objectives:
- To derive the stiffness matrix of bar and beam elements
- To develop succinct MATLAB programs for truss and beam analyses
- To calculate displacements of truss structures using bar elements
- To calculate generalized displacements of beams and frames using beam elements

Grading: Homework 30%, 2 Quizzes 30%, Pop Questions 10%, Final Exam 30%

Class Guideline:
- Pop questions will be asked at the beginning of each session. Typically several students will be called to answer questions. If your name is called and you participate in pop question session, whether or not your answer is correct, you will get 10% credit for the day. If your name is called but you don't participate the session, you will lose the pop question credit for that day. If you want to make up for it due to your absence, you must submit hand-written 3-page summary based on the lecture of the day.

- All assignments are required to be submitted at 2:30PM at the start of each class. (If submitted between 2:30PM - next day 9AM: 50% credit). No late submission is allowed except for medical or family emergency.

- No collaboration is allowed for all assignments. Sharing and copying either all or part of your MATLAB scripts and other HW with your colleagues is not allowed. If detected, you will get an F on that assignment. If detected multiple times, you will fail this class.

CE4610 Class Schedule

Date	Period	Topics	Chapter to read	Assigned HW date
1/17	1	Introduction (Stability & Determinacy)	2.4 & 2.5	
1/19	2	Approximate Analysis: Truss	7	
1/22	3	Approximate Analysis: Frame (Portal & Cantilever Method)		HW1
1/24	4	**Matlab Session (CAST117- 25 seats)**		MAT#1
1/26	5	Force & Displacement Methods	10 & 11	HW2
1/29	6	Moment Distribution Method	12	HW3
1/31	7	Analysis of Nonprismatic Structural Members	13	
2/2	8	**Truss Matrix Analysis** (Local Stiffness Matrix)		
2/5	9	Properties, Boundary Conditions & Assembly		
2/7	10	Global Stiffness Matrix and Partitioning		HW4
2/9	11	Truss Analysis using MATLAB (id vector, K-assembly)		
2/12	12	**Matlab Session (CAST117- 25 seats)**		
2/14	13	Truss Analysis using MATLAB		MAT#2
2/16	14	Nodal Coordinates/ Thermal Effects/ Fabrication Errors		
2/19	15	Examples (Thermal Loads) / 3D Truss		HW5
2/21	16	Summary & MATLAB Code for Large Problems		MAT#3
2/23	17	Review 1		
2/26	18	**QUIZ 1**		
2/28	19	**The Stiffness Method** (Beam - The Stiffness Matrix)		
3/2	20	Beam Example and Shape Functions	15	
3/5		No Class		
3/7	21	Distributed Loads		MAT #4
3/9	22	Beam Example: Distributed Loads, Thermal Effects		
		Spring Break (3/11-3/17)		
3/19	23	**The Stiffness Method** (Frame)		MAT #5
3/21	24	Frame Example with nodal forces	16	
3/23	25	Intermediate forces & thermal effects, 3D Frame K-matrix		MAT#6
3/26	26	Special Topics for the Stiffness Method		
3/28	27	Special Topics for the Stiffness Method		
3/30	27	**Staad.Pro Session (CAST117 - 25 seats) - Truss**		STA#1
4/2	29	Review 2		
4/4	30	**QUIZ 2**		
4/6	31	**Staad.Pro Session (CAST117 - 25 seats) - Frame**		STA #2
4/9	32	**Finite Element Methods:** Introduction	Handouts	
4/11	33	Plane Elements		
4/13	34	Plane Elements		
4/16	35	K-Matrix for Plane Elements		
4/18	36	**Abaqus Session (CAST117)**		ABA #1
4/20	37	Summary		
4/23	38	Review 1 for Final		
4/25	39	Review 2 for Final		
4/27	40	Review 3 for Final		
		Final Exam: TBD (CAST204)		