

THEORY OF STRUCTURES I

CIV_ENV 221-0

Fall 2022

Class Hours:	Mon/Wed/Fri 9:00–9:50 am and Thu 9:30–10:50 am
Room Location:	Mon/Wed/Fri - Tech M120 and Thu – Tech L168
Prerequisites:	CIV_ENV 216 Mechanics of Materials: analytical and experimental study of stresses and deformations and their application to the design of machine and structural elements subjected to static, dynamic, and repeated loads.
Instructor:	Madura Pathirage Office: Tech A136 Phone: (847) 440-6506 E-mail: madura-pathirage@northwestern.edu
Instructor Office Hours:	By appointment via e-mail
Course Materials:	R.C. Hibbeler, Structural Analysis, 10 th edition or older (recommended). SAP2000 Structural Analysis software. Student version at csiamerica.com .
Course Webpage:	canvas.northwestern.edu
Catalog Description:	Structural Idealization, Loads, Free body diagrams, Reactions, Determinacy, Plane trusses, Shear and moment diagrams, Beam theory, Virtual work, Stability, Force method, Slope deflection, Matrix analysis, Computer analysis, Moment distribution, SAP2000 software.
Course Outcomes:	At the completion of this course, students will have the necessary skills to: <ol style="list-style-type: none">1. Describe what a limit state is in a structure2. Use tributary area method to determine loads on a structure3. Use load and resistance factors to conduct a conceptual design4. Classify a structure as determinate or indeterminate5. Analyze determinate and indeterminate trusses and frames6. Determine the deflections of structures under load using virtual work7. Analyze an indeterminate structure using various methods: consistent displacement, slope deflection, and matrix methods8. Determine buckling stability of axial compression members9. Use SAP2000 to conduct linear-elastic analyses of planar structures
Grading Policy:	Grades between 0 and 100 are assigned based upon the level of mastery of the subject by the student. Grades will not be curved.
Homework:	Weekly homework assignments. Neatness and presentation will be evaluated.
Final Grade:	0.40 (homework) + 0.30 (2 midterm exams, 0.15 each) + 0.30 (final exam)
Academic Integrity:	Assignments that are turned in must represent the student's own work. Submission of any assignment that is in violation of this policy will result in zero points granted for that specific assignment.

TENTATIVE CLASS SCHEDULE

#	Date	Day	Week	Topic	Reading
1	09-21	Wed	1	Introduction, Structural Idealization	Ch. 1 & 2
2	09-22	Thu		Loads, Free Body Diagrams	Ch. 1 & 2
3	09-23	Fri		Reactions, Determinacy	Ch. 1 & 2
4	09-26	Mon	2	Design Philosophy (Safety, LRFD)	Ch. 1 & 2
5	09-28	Wed		Planar trusses	Ch. 3
6	09-29	Thu		SAP2000 tutorial	
7	09-30	Fri	3	Planar trusses	Ch. 4
8	10-03	Mon		Shear & Moment Diagrams	
9	10-05	Wed		Beam Theory, Deflections	Ch. 7
10	10-06	Thu		Review Midterm	Ch. 8
11	10-07	Fri	4	MIDTERM EXAM 1	
12	10-10	Mon		Review Midterm	
13	10-12	Wed		Review Midterm	
14	10-13	Thu	5		
15	10-14	Fri		Virtual Work	Ch. 8
16	10-17	Mon			
17	10-19	Wed			
18	10-20	Thu	6	Force Method	Ch. 9
19	10-21	Fri			
20	10-24	Mon			
21	10-26	Wed			
22	10-27	Thu	7	Force Method	Ch. 9
23	10-28	Fri		Review Midterm	
24	10-31	Mon		MIDTERM EXAM 2	
25	11-02	Wed		Review Midterm	
26	11-03	Thu	8		
27	11-04	Fri		Slope-Deflection Analysis	Ch. 10
28	11-07	Mon			
29	11-09	Wed			
30	11-10	Thu	9	Stiffness Method	Ch. 14
31	11-14	Mon		Matrix Analysis	Ch. 15
32	11-16	Wed			
33	11-17	Thu			
34	11-18	Fri	10	Matrix and Computer Analysis	
35	11-21	Mon		THANKSGIVING BREAK	
36	11-23	Wed			
37	11-24	Thu			
38	11-25	Fri	11	Stability	
39	11-28	Mon		Review Final	
40	11-30	Wed			
41	12-01	Thu			
42	12-02	Fri			
43	12-08	Thu		FINAL EXAM 3pm-5pm	