

ARCHITECTURE 314

Structures I

Course Introduction:

Course Syllabus

Course Schedule

Online Resources

Introduction to Structures

Teaching Staff:

Prof.

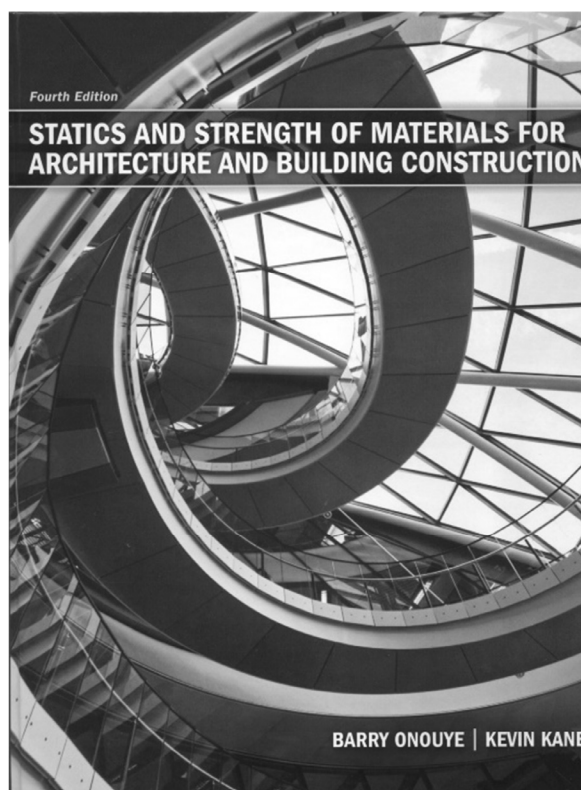
Dr.-Ing. Peter von Bülow pvbuelow@umich.edu

GSI:

Alireza Fazel

arfazel@umich.edu

002



Course Organization

- Lectures – 2 per week
- Recitation – Wednesday
- 26 Lecture Quizzes
- 12 Topic Canvas Quizzes
- 16 HW Problems – on website

• Evaluation –

26 lecture quizzes	250
12 topic quizzes	240
16 HW Problems	875
Bridge Project	250
10 Recitation Labs	200
TOTAL	1815

• Text – (required)

Statics and Strength of Materials for Architecture and Building Construction (any edition)
by B. Onouye & K. Kane

• Example Problems – on website

• Website

<http://www.structures1.tcaup.umich.edu>

ARCHITECTURAL STRUCTURES I Syllabus

Dr.-Ing. Peter von Bülow
pvbuelow@umich.edu
Office 1205c TCAUP
Phone (734) 763-4931

Lectures	MF	001	10:30-11:30 + posted online	
Recitation	W	002	10:30-11:30	Alireza Fazel
		003	9:30-10:30	?

arfazel@umich.edu

Catalog Description

This course covers the basic principles of architectural structures, including the influence of geometric, sectional, and material properties related to flexure and shear in beam and framed systems; vector mechanics with application to analysis of trusses, catenaries, and arches; diagrammatic analysis of beams for bending moment, shear, and deflection as well as the study of structural framing systems for vertical and lateral loads.

Objectives

Students are introduced to the fundamentals of statics and mechanics, as well as the behavior of structural materials and simple elements and systems subjected to gravity and lateral loads. Diagramming of force distribution in beams as well as topics of stress, strain and stability are covered. Through classroom demonstrations as well as physical construction and testing, aspects of strength and stability of structural systems are examined.

Organization

The course is lecture based, and the concepts and procedures are taught in this context with additional homework problems solved by the students. Weekly recitations provide opportunity for small demonstration labs as well as student-instructor interaction. A group design and construction project (load testing of a bridge) offers a chance to test out concepts covered in the class. Computer facilities, including software, are available for supporting computations. A course web site is used to post all lectures, homework problems, as well as other information for the class (<http://www.structures1.tcaup.umich.edu/>). Weekly topic quizzes will also be posted on the course Canvas site.

Evaluation

Evaluation is based on an accumulated total number of points. Points are earned based on performance in all course activities – lecture quizzes, topic quizzes (Canvas), homework problems, recitation labs, and the bridge project. Grades are based on the total number of points achieved during the semester:

26 lecture quizzes, 10pts each	250
12 topic quizzes, 20pts each	240
16 homework problems, 5 pts / question	875
bridge testing project	250
10 recitation labs, 20 pts each	200
TOTAL	1815

The point scale relates to a full range of letter grades assigned as follows:

A	1694	A-	1634
B+	1573	B	1513
C+	1392	C	1331
D+	1210	D	1150
		E	1088 and below

By University policy the minimum passing grade for undergraduates is a D (1150) and for graduate students it is a C (1331).

Course Schedule

Lectures

Monday & Friday – on website

Recitation

Wednesday – 10 Labs

Exercise Problems

on course website

Homework

on course website

Course Website

<http://www.umich.edu/~arch314>

DATES	TOPICS	Reading (Onouye 4 th ed.)	HW PROBLEMS
AUG 28 AUG 30 SEP 1	Course Intro. Overview of Forces Loading and Forces Force Systems: Vector Addition Topic Quiz 1	Ch. 1: pp. 1-14 Ch. 2.1: pp. 15-22 Ch. 2.2 & 2.3: pp. 23-41	Structures video TA 645.S78
SEP 4 SEP 6 SEP 8	LABOR DAY ***** NO CLASS ***** Recitation 1. Adding Forces Force Systems: Moment of a Force Topic Quiz 2	LABOR DAY ***** NO CLASS ***** Ch.2.3: pp.42-60 Ch.3.6: pp.175-184	LABOR DAY ***** NO CLASS ***** 1. Dead Load Calculation (9.3) 2. Vector Components (9.8) 3. Three Vector Addition (9.10)
SEP 11 SEP 13 SEP 15	Force Systems: Equilibrium Recitation 2. Moment of a Force Equilibrium of Rigid Bodies Topic Quiz 3	Ch. 2.4 – 2.6: pp. 61-95 Ch. 3.2: pp. 111-118	4. Moment of a Force (9.15) 5. Parallel Force Systems (9.17)
SEP 18 SEP 20 SEP 22	Cable Systems Recitation 3. Equilibrium Catenary Arches and Shells + Bridge Project Introduction Topic Quiz 4	Ch. 3.1: pp. 96-110	6. Equilibrium of Rigid Bodies (9.24)
SEP 25 SEP 27 SEP 29	Plane Trusses (by Joints) Recitation 4. Truss Stability Plane Trusses (by Sections) Topic Quiz 5	Ch. 3.3: pp. 119-127 Ch. 3.3: pp. 128-152	7. Cable Systems (10.1)
OCT 2 OCT 4 OCT 6	Plane Trusses (by Graphic Statics) Recitation 5. Graphic Statics Pinned Frames Topic Quiz 6	(interim bridge report due - 10.6) Ch. 3.4: pp. 153-163	8. Truss Systems (10.8)
OCT 9 OCT 11 OCT 13	Three Hinged Arches Recitation 6. Three Hinged Arches Load Tracing & Floor Systems Topic Quiz 7	Ch. 3.5: pp. 164-174 Ch. 4.1: pp. 195-230	9. Three Hinged Arches (10.15)
OCT 16 OCT 18 OCT 20	***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** Recitation Lateral Stability Topic Quiz 8	Ch. 4.2: pp. 231-250	10. Floor Systems (10.22)
OCT 23 OCT 25 OCT 27	Stress and Strain Recitation 7. Elasticity Elasticity and Deformation Topic Quiz 9	Ch. 5.1: pp. 251-266 Ch. 5.2-5.4: pp. 267-293	11. Elastic Deformation (10.29)
OCT 30 NOV 1 NOV 3	Cross-Sectional Properties Recitation ***** Bridge Testing ***** Bridge Testing ***** Bridge Testing ***** Bridge Testing ***** Bridge Testing *****	Ch. 6.1 - 6.4: pp. 300-331	
NOV 6 NOV 8 NOV 10	Shear and Bending Forces Recitation 8. Moment of Inertia Shear and Bending Forces Topic Quiz 10	Ch. 7.1-7.3: pp. 332-345 Ch. 7.4-7.5: pp. 346-364	12. Centroid of Area (11.12)
NOV 13 NOV 15 NOV 17	Bending Stresses Recitation Shear Stresses Topic Quiz 11	Ch. 8.1-8.2: pp. 365-381 Ch. 8.1-8.2: pp. 365-381	13. Moment of Inertia (11.19)
NOV 20 NOV 22 NOV 24	video "When Engineering Fails" ***** THANKSGIVING RECESS ***** THANKSGIVING RECESS ***** THANKSGIVING RECESS ***** ***** THANKSGIVING RECESS ***** THANKSGIVING RECESS ***** THANKSGIVING RECESS *****		
NOV 27 NOV 29 DEC 1	Deflection of Beams Recitation 9. Shear Stress Deflection of Beams Topic Quiz 12	Ch. 8.3-8.4: pp. 382-401 (final bridge report due - 11.29) Ch. 8.5: pp. 402-418	14. V & M Diagrams (11.27) 15. Horizontal Shear (12.3)
DEC 4 DEC 6	Combined Stress Recitation 10. Deflection	Ch. 8.5: pp. 402-418	16. Deflection of Beams (12.10)

Course Website

<http://www.structures1.tcaup.umich.edu/>



Structures

Contact

Contact

Schedule

Lectures

Recitation

Bridges1

Bridges2

Problems

Structures I - Arch 314 - Fall 2023

10:30 - 11:30 MF - Rm 2104

Professor Peter von Buelow, Dr.-Ing.

Taubman College of Architecture and Urban Planning
University of Michigan
2000 Bonisteel Blvd.
Ann Arbor, MI 48109
USA

tel. +1 734 763 4931

pvbuelow@umich.edu

Office hours:
by appointment

GSi:

Alireza Fazel arfazel@umich.edu



Lectures


M MICHIGAN
Architecture

Structures





Lectures

ContactScheduleLecturesRecitationBridges1Bridges2Problems

2019 Lectures



Topic Quizzes

Lectures	Date	w/Quiz	Video	Slides	Notes
Course Intro	Aug 31				
Loading and Forces	Sep 2				

Recitation Notes & Labs

M MICHIGAN
Architecture

Structures

Recitation

ContactScheduleLecturesRecitationBridges1Bridges2Problems

Notes & Videos from 2020:

Section Rosters:

Alireza Fazel

002

Recitation Topics: Labs

Notes

Adding Forces

Moments of Forces

Bridge Project

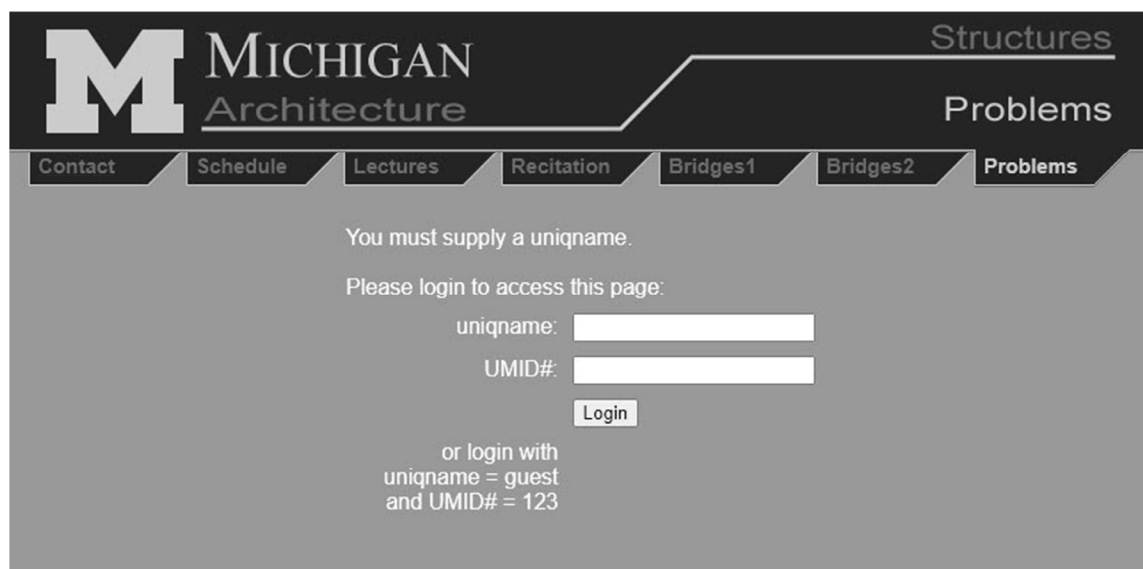


Computer Problems

<http://www.structures1.tcaup.umich.edu/problems/problems.php>

Uniqname

UMID >>**Number**<< (NOT Kerberos)



Computer Problems

Problem Menu

Check Grades

Select Problem

Download Instructions

M

MICHIGAN
Architecture

Structures

Problems

ContactScheduleLecturesRecitationBridges1Bridges2Bridges3Problems

Logged in as: Peter von Buelow

Problems

Check Points

Problem FAQ

#	Description	Due Date	Current Scores
- 1 -	Dead Load Calculation	9-04-2022	(1) 0/20 not completed (2) 0/20 not completed (3) 0/20 not completed
- 2 -	Vector Components	9-08-2022	(1) 0/15 not completed (2) 0/15 not completed (3) 0/15 not completed
- 3 -	Three Vector Addition	9-11-2022	(1) 0/50 not completed (2) 0/50 not completed (3) 0/50 not completed
- 4 -	Moment of a Force	9-15-2022	(1) 0/30 not completed (2) 0/30 not completed (3) 0/30 not completed
- 5 -	Parallel Force Systems	9-20-2022	(1) 0/25 not completed (2) 0/25 not completed (3) 0/25 not completed

Computer Problems

M

MICHIGAN
Architecture

Structures

Problems

ContactScheduleLecturesRecitationBridges1Bridges2Problems

Logged in as: Peter von Buelow

1. Dead Load Calculation

For the given member cross section and length, find the DL in PLF of the joist member, total pounds of the member and PSF DL of the joist on the floor.

DATASET: 3

-1-

-2-

Width, b1.5 IN

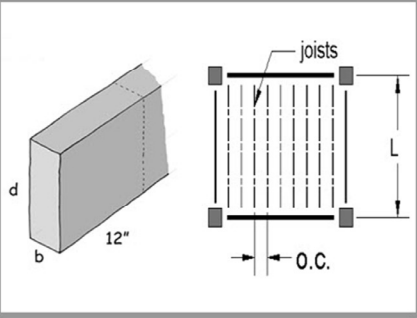
Depth, d7.25 IN

Length, L6 FT

On center spacing16 IN

Species classWestern Cedars

Density25 PCF



#	Question	Your Response	Correct Answer	Score
1	The cross-sectional area: A	<input type="text"/> IN^2	<input type="button" value="SUBMIT"/>	
2	Dead load of joist section	<input type="text"/> PLF	<input type="button" value="SUBMIT"/>	
3	Dead load of whole joist member	<input type="text"/> LBS	<input type="button" value="SUBMIT"/>	
4	Dead load of joists on floor	<input type="text"/> PSF	<input type="button" value="SUBMIT"/>	

Current Score: 0 / 20

Problem Menu

Logout

Structures

