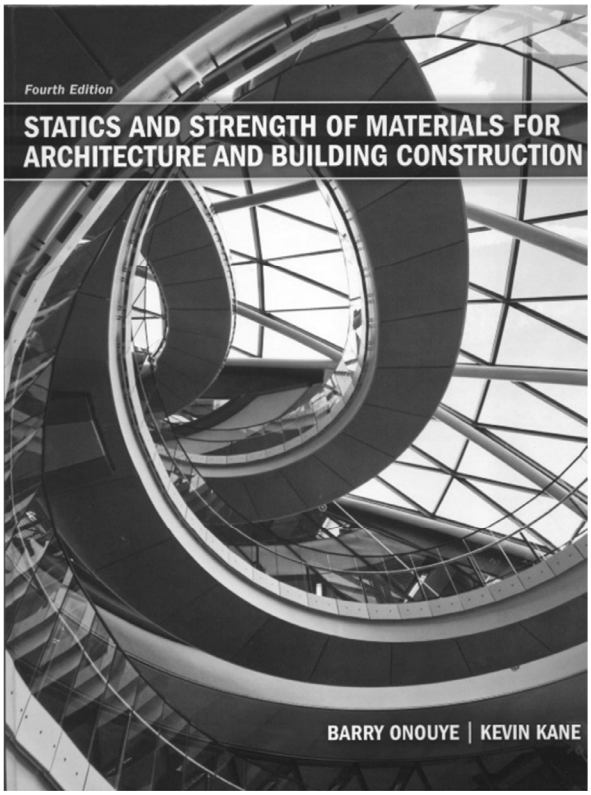
ARCHITECTURE 314

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 Buelow
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	arfazel@umich.edu
		003	9:30-10:30	?	

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	B-	1452
C+	1392	C	1331	C-	1271
D+	1210	D	1150	D-	1089
		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

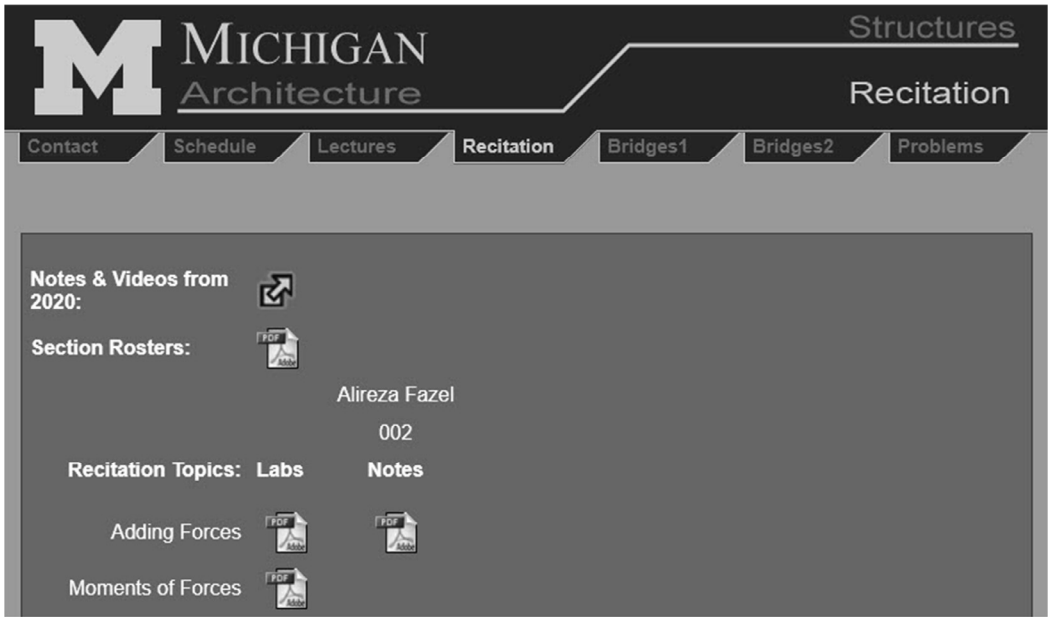
DATES	TOPICS	Reading (Onouye 4th ed.)	HW PROBLEMS
AUG 28	Course Intro. Overview of Forces	Ch. 1: pp. 1-14	*Structures* video TA 645.S78
AUG 30	Loading and Forces	Ch. 2.1: pp. 15-22	
SEP 1	Force Systems: Vector Addition	Ch. 2.2 & 2.3: pp. 23-41	
	Topic Quiz 1		1. Dead Load Calculation (9.3)
SEP 4	**LABOR DAY ***** NO CLASS ***** LABOR DAY ***** NO CLASS ***** LABOR DAY ***** NO CLASS *******		
SEP 6	Recitation **1. Adding Forces**		2. Vector Components (9.8)
SEP 8	Force Systems: Moment of a Force	Ch.2.3: pp.42-60 Ch.3.6: pp.175-184	
	Topic Quiz 2		3. Three Vector Addition (9.10)
SEP 11	Force Systems: Equilibrium	Ch. 2.4 – 2.6: pp. 61-95	
SEP 13	Recitation **2. Moment of a Force**		4. Moment of a Force (9.15)
SEP 15	Equilibrium of Rigid Bodies	Ch. 3.2: pp. 111-118	
	Topic Quiz 3		5. Parallel Force Systems (9.17)
SEP 18	Cable Systems	Ch. 3.1: pp. 96-110	
SEP 20	Recitation **3. Equilibrium**		
SEP 22	Catenary Arches and Shells + Bridge Project Introduction		
	Topic Quiz 4		6. Equilibrium of Rigid Bodies (9.24)
SEP 25	Plane Trusses (by Joints)	Ch. 3.3: pp. 119-127	
SEP 27	Recitation **4. Truss Stability**		
SEP 29	Plane Trusses (by Sections)	Ch. 3.3: pp. 128-152	
	Topic Quiz 5		7. Cable Systems (10.1)
OCT 2	Plane Trusses (by Graphic Statics)		
OCT 4	Recitation **5. Graphic Statics**	**(interim bridge report due - 10.6)**	
OCT 6	Pinned Frames	Ch. 3.4: pp. 153-163	
	Topic Quiz 6		8. Truss Systems (10.8)
OCT 9	Three Hinged Arches	Ch. 3.5: pp. 164-174	
OCT 11	Recitation **6. Three Hinged Arches**		
OCT 13	Load Tracing & Floor Systems	Ch. 4.1: pp. 195-230	
	Topic Quiz 7		9. Three Hinged Arches (10.15)
OCT 16	******* FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK *******		
OCT 18	Recitation		
OCT 20	Lateral Stability	Ch. 4.2: pp. 231-250	
	Topic Quiz 8		10. Floor Systems (10.22)
OCT 23	Stress and Strain	Ch. 5.1: pp. 251-266	
OCT 25	Recitation **7. Elasticity**		
OCT 27	Elasticity and Deformation	Ch. 5.2-5.4: pp. 267-293	11. Elastic Deformation (10.29)
	Topic Quiz 9		
OCT 30	Cross-Sectional Properties	Ch. 6.1 - 6.4: pp. 300-331	
NOV 1	Recitation		
NOV 3	****** **Bridge Testing ****** Bridge Testing ****** Bridge Testing ****** Bridge Testing ****** Bridge Testing ******		
NOV 6	Shear and Bending Forces	Ch. 7.1-7.3: pp. 332-345	
NOV 8	Recitation **8. Moment of Inertia**		
NOV 10	Shear and Bending Forces	Ch. 7.4-7.5: pp. 346-364	
	Topic Quiz 10		12. Centroid of Area (11.12)
NOV 13	Bending Stresses	Ch. 8.1-8.2: pp. 365-381	
NOV 15	Recitation		
NOV 17	Shear Stresses	Ch. 8.1-8.2: pp. 365-381	
	Topic Quiz11		13. Moment of Inertia (11.19)
NOV 20	video "When Engineering Fails"		
NOV 22	****** **THANKSGIVING RECESS ****** THANKSGIVING RECESS ****** THANKSGIVING RECESS ********		
NOV 24	****** **THANKSGIVING RECESS ****** THANKSGIVING RECESS ****** THANKSGIVING RECESS ********		
NOV 27	Deflection of Beams	Ch. 8.3-8.4: pp. 382-401	14. V & M Diagrams (11.27)
NOV 29	Recitation **9. Shear Stress**	**(final bridge report due – 11.29)**	
DEC 1	Deflection of Beams	Ch. 8.5: pp. 402-418	
	Topic Quiz 12		15. Horizontal Shear (12.3)
DEC 4	Combined Stress	Ch. 8.5: pp. 402-418	
DEC 6	Recitation **10. Deflection**		
			16. Deflection of Beams (12.10)

Course Website

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

Lectures

Recitation Notes & Labs



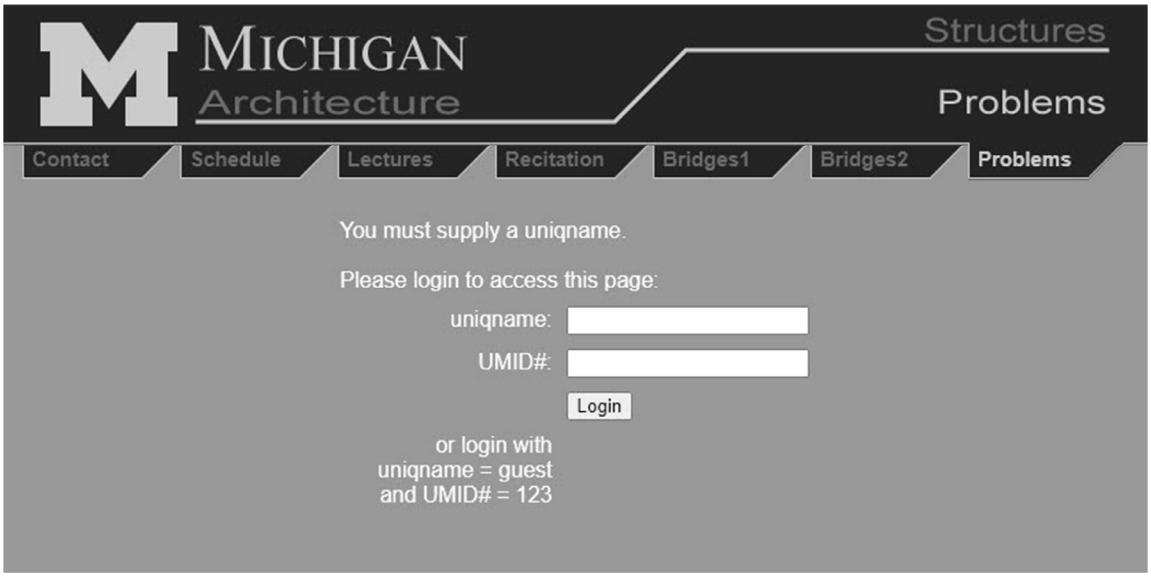
Bridge Project

Computer Problems

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

Uniqname

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



Computer Problems

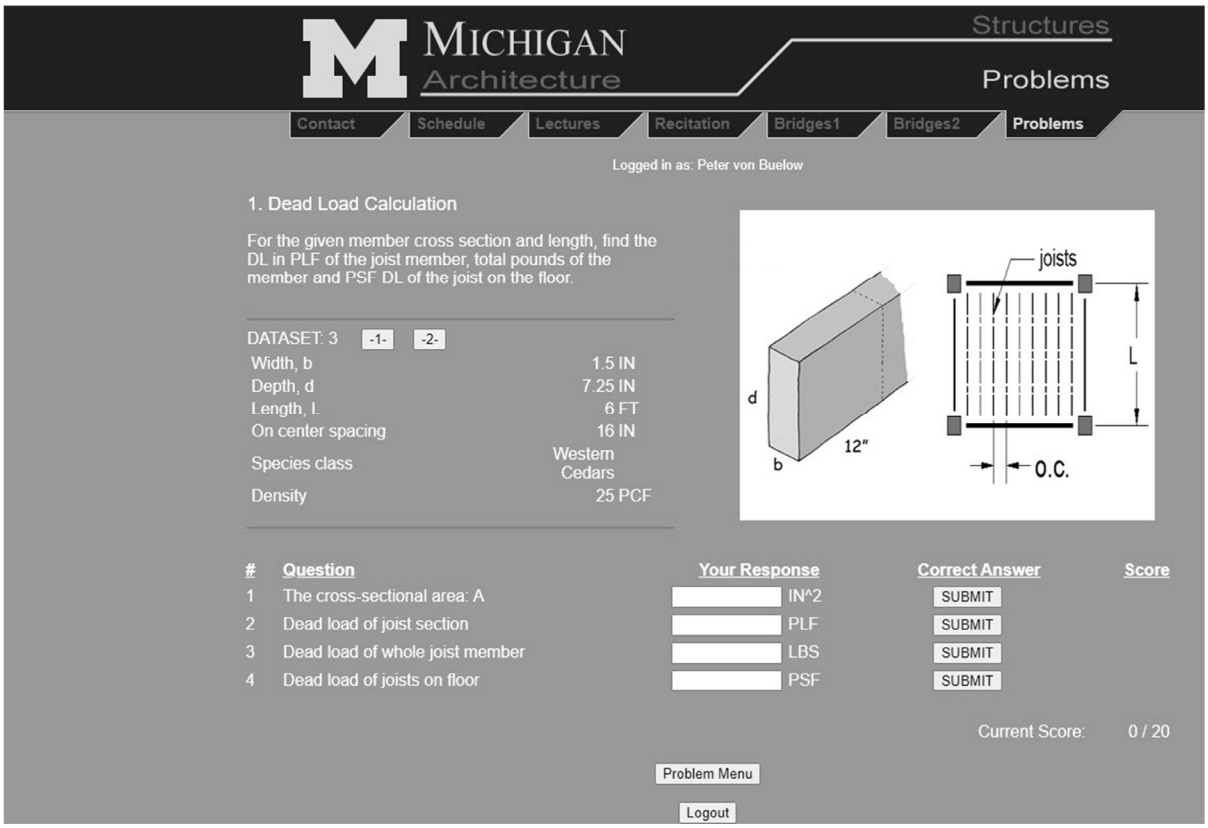
Problem Menu

Check Grades

Select Problem

Download Instructions

Computer Problems



Structures