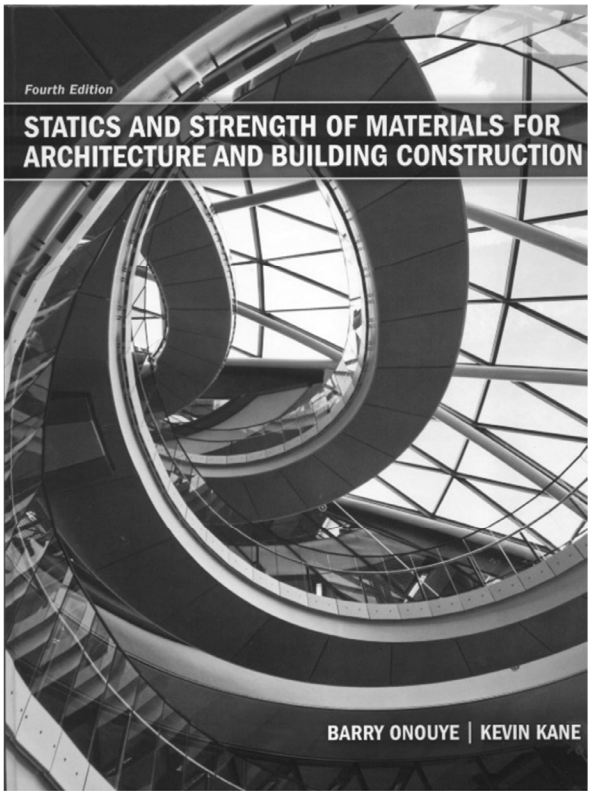
ARCHITECTURE 314

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's:

Mitch Hodiono	mhodiono@umich.edu	002
Qilmeg Doudatcz	qilemg@umich.edu	003
Tam Nguyen	tamtrong@umich.edu	004
Merhdad Shahraeen	mehrdad@umich.edu	005
Bangyu Xu	bangyuxu@umich.edu	006

Course Organization

Lectures – posted on website
2 per week

- Recitation – Wednesday
- 16 HW Problems – on website
- 12 Topic Canvas Quizzes
  (ca. each week)
- Evaluation –

12 quizzes 20 pts	240
16 HW Problems	875
Bridge Project	250
10 Recitation Labs	200
TOTAL	1565

- Text – (required)
  Statics and Strength of Materials for Architecture and Building Construction (any edition)
  by B. Onouye & K. Kane
- Example Problems – on website
- Web Site
  http://www.structures1.tcaup.umich.edu

Architecture 314
3 credit hours

http://www.umich.edu/~arch314
Fall 2022

ARCHITECTURAL STRUCTURES I
Syllabus

Dr.-Ing. Peter von Buelow
pvbuelow@umich.edu
Office 1205c TCAUP
Phone (734) 763-4931
office hours – by appointment

Lectures	MF	001	10:30-11:30 + posted online		
Recitation	W:	002	9:30-10:30	Mitch Hodiono	mhodiono@umich.edu
		003	10:30-11:30	Qi Lemuge	qilemg@umich.edu
		004	9:30-10:30	Tam Nguyen	tamtrong@umich.edu
		005	10:30-11:30	Merhdad Shahraeen	mehrdad@umich.edu
		006	10:30-11:30	Bangyu Xu	bangyuxu@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 in smaller groups. 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 – topic quizzes (Canvas), homework problems, recitation labs, quizzes in lectures and the bridge project. Grades are based on the total number of points achieved during the semester:

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	1565

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

		A	1461	A-	1409
B+	1356	B	1304	B-	1252
C+	1199	C	1147	C-	1096
D+	1043	D	991	D-	939
		E	938 and below		

By University policy the minimum passing grade for undergraduates is a D (991) and for graduate students it is a C (1147).

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

ARCHITECTURAL STRUCTURES I (3)
Lecture and Homework Schedule

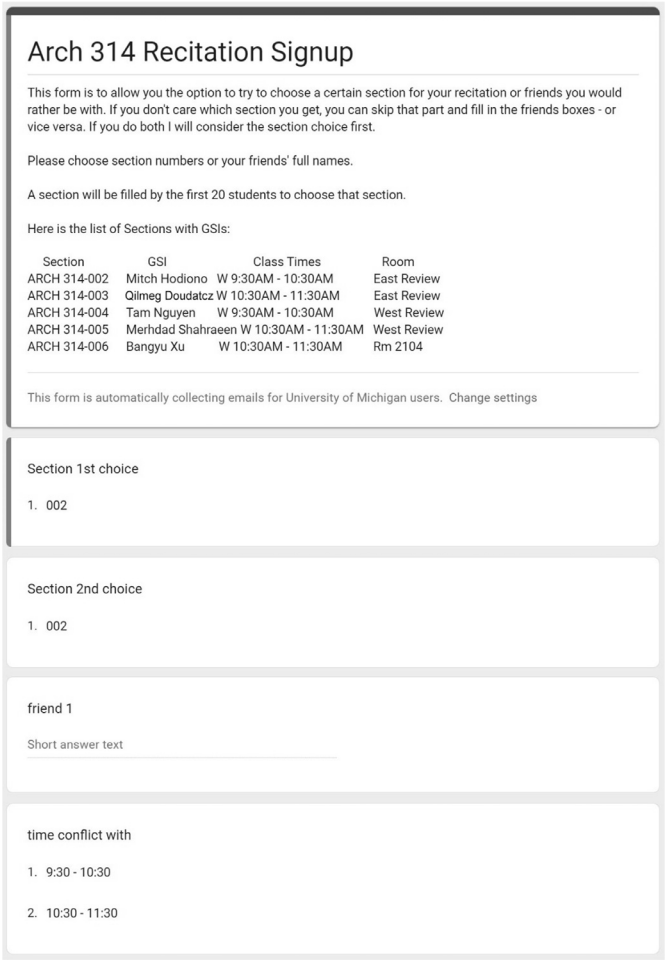
DATES	TOPICS	Reading (Onouye 4th ed.)	HW PROBLEMS
AUG 29	Course Intro. Overview of Forces	Ch. 1: pp. 1-14	*Structures* video TA 645.S78
AUG 31	Loading and Forces	Ch. 2.1: pp. 15-22	
SEP 2	Force Systems: Vector Addition	Ch. 2.2 & 2.3: pp. 23-41	
	Topic Quiz 1		1. Dead Load Calculation (9.4)
SEP 5	**LABOR DAY ***** NO CLASS ***** LABOR DAY ***** NO CLASS ***** LABOR DAY ***** NO CLASS *******		
SEP 7	Recitation **1. Adding Forces**		2. Vector Components (9.8)
SEP 9	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 (9.11)
SEP 12	Force Systems: Equilibrium	Ch. 2.4 – 2.6: pp. 61-95	
SEP 14	Recitation **2. Moment of a Force**		4. Moment of a Force (9.15)
SEP 16	Equilibrium of Rigid Bodies	Ch. 3.2: pp. 111-118	
	Topic Quiz 3		5. Parallel Force Systems (9.20)
SEP 19	Cable Systems	Ch. 3.1: pp. 96-110	
SEP 21	Recitation **3. Equilibrium**		
SEP 23	Catenary Arches and Shells + Bridge Project Introduction		
	Topic Quiz 4		6. Equilibrium of Rigid Bodies (9.25)
SEP 26	Plane Trusses (by Joints)	Ch. 3.3: pp. 119-127	
SEP 28	Recitation **4. Truss Stability**		
SEP 30	Plane Trusses (by Sections)	Ch. 3.3: pp. 128-152	
	Topic Quiz 5		7. Cable Systems (10.3)
OCT 3	Plane Trusses (by Graphic Statics)		
OCT 5	Recitation **5. Graphic Statics**	**(interim bridge report due - 10.6)**	
OCT 7	Pinned Frames	Ch. 3.4: pp. 153-163	
	Topic Quiz 6		8. Truss Systems (10.9)
OCT 10	Three Hinged Arches	Ch. 3.5: pp. 164-174	
OCT 12	Recitation **6. Three Hinged Arches**		
OCT 14	Load Tracing & Floor Systems	Ch. 4.1: pp. 195-230	
	Topic Quiz 7		9. Three Hinged Arches (10.16)
OCT 17	******* FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK *****		
OCT 19	Recitation		
OCT 21	Lateral Stability	Ch. 4.2: pp. 231-250	
	Topic Quiz 8		10. Floor Systems (10.23)
OCT 24	Stress and Strain	Ch. 5.1: pp. 251-266	
OCT 26	Recitation		
OCT 28	Elasticity and Deformation	Ch. 5.2-5.4: pp. 267-293	
	Topic Quiz 9		
OCT 31	Cross-Sectional Properties	Ch. 6.1 - 6.4: pp. 300-331	
NOV 2	Recitation **7. Elasticity**		
NOV 4	****** Bridge Testing ****** Bridge Testing ****** Bridge Testing ****** Bridge Testing ****** Bridge Testing ******		
			11. Elastic Deformation (11.6)
NOV 7	Shear and Bending Forces	Ch. 7.1-7.3: pp. 332-345	
NOV 9	Recitation **8. Moment of Inertia**		
NOV 11	Shear and Bending Forces	Ch. 7.4-7.5: pp. 346-364	
	Topic Quiz 10		12. Centroid of Area (11.13)
NOV 14	Bending Stresses	Ch. 8.1-8.2: pp. 365-381	
NOV 16	Recitation		
NOV 18	Shear Stresses	Ch. 8.1-8.2: pp. 365-381	
	Topic Quiz11		13. Moment of Inertia (11.20)
NOV 21	video "When Engineering Fails"		
NOV 23	****** THANKSGIVING RECESS ****** THANKSGIVING RECESS ****** THANKSGIVING RECESS ******		
NOV 25	****** THANKSGIVING RECESS ****** THANKSGIVING RECESS ****** THANKSGIVING RECESS ******		
NOV 28	Deflection of Beams	Ch. 8.3-8.4: pp. 382-401	14. V & M Diagrams (11.28)
NOV 30	Recitation **9. Shear Stress**	**(final bridge report due – 12.2)**	
DEC 2	Deflection of Beams	Ch. 8.5: pp. 402-418	
	Topic Quiz 12		15. Horizontal Shear (12.4)
DEC 5	Combined Stress	Ch. 8.5: pp. 402-418	
DEC 7	Recitation **10. Deflection**		
DEC 9	Combined Stress		
			16. Deflection of Beams (12.11)

Recitation – Sections

Use this link or from class email:
https://forms.gle/2u2MyM5bKWVDkmMAA

Choose a recitation section. The first 20 entries will fill the section. Then you get your second choice, etc.

Fill this out as soon as possible – Friday at latest.



Arch 314 Recitation Signup

This form is to allow you the option to try to choose a certain section for your recitation or friends you would rather be with. If you don't care which section you get, you can skip that part and fill in the friends boxes - or vice versa. If you do both I will consider the section choice first.

Please choose section numbers or your friends' full names.

A section will be filled by the first 20 students to choose that section.

Here is the list of Sections with GSIs:

Section	GSI	Class Times	Room
ARCH 314-002	Mitch Hodiono	W 9:30AM - 10:30AM	East Review
ARCH 314-003	Qilmeg Doudatcz	W 10:30AM - 11:30AM	East Review
ARCH 314-004	Tam Nguyen	W 9:30AM - 10:30AM	West Review
ARCH 314-005	Merhdad Shahraeen	W 10:30AM - 11:30AM	West Review
ARCH 314-006	Bangyu Xu	W 10:30AM - 11:30AM	Rm 2104

This form is automatically collecting emails for University of Michigan users. Change settings

Section 1st choice

1. 002

Section 2nd choice

1. 002

friend 1

Short answer text

time conflict with

1. 9:30 - 10:30

2. 10:30 - 11:30

Course Website

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

Lectures

Recitation Notes & Labs

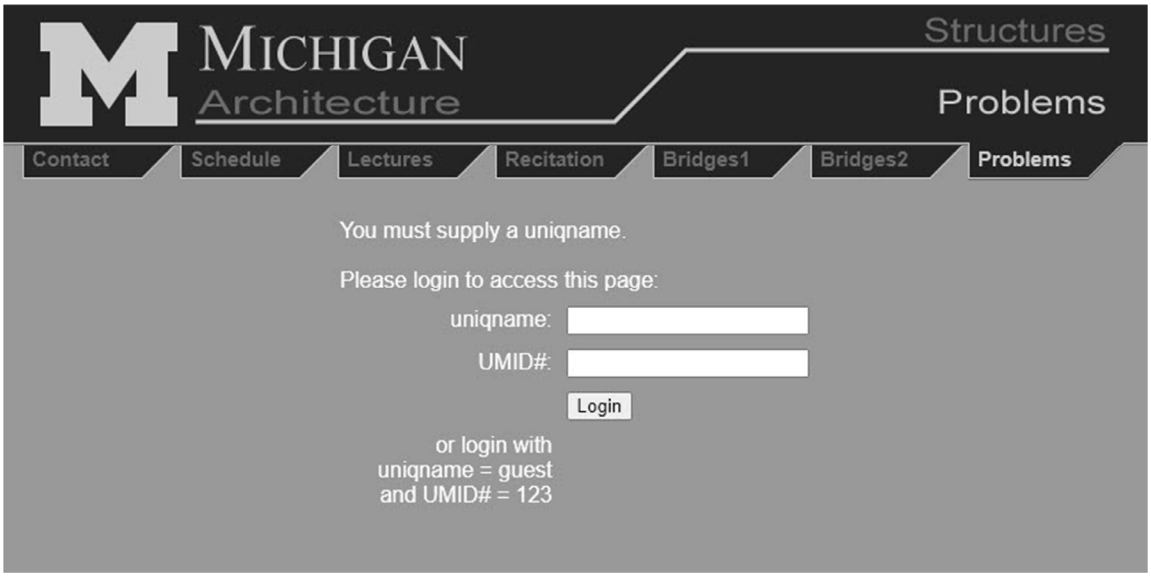
Bridge Project

Computer Problems

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

Uniqname

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



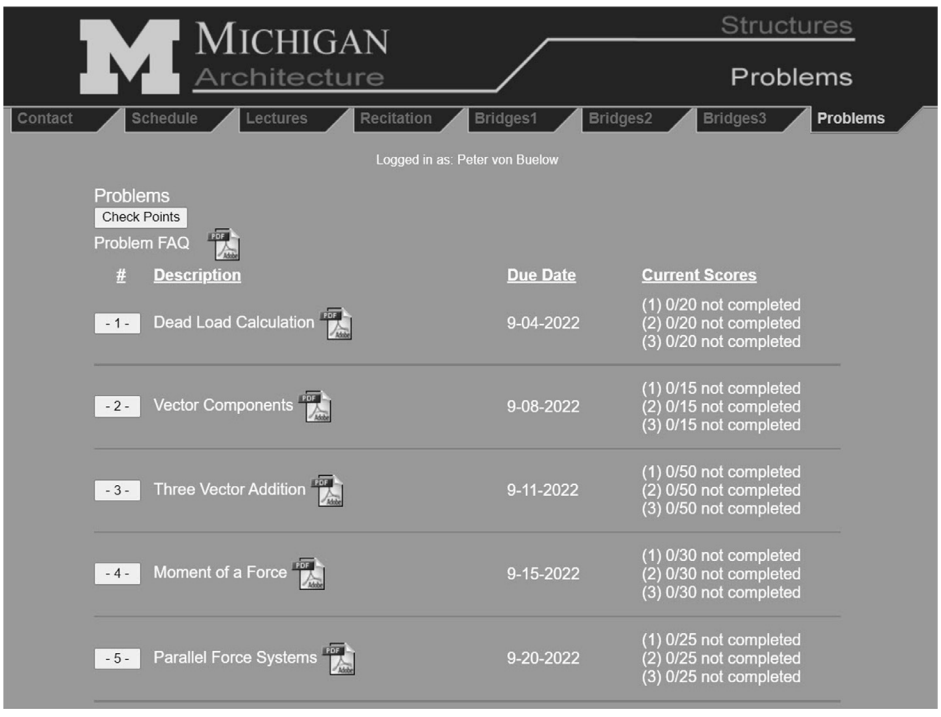
Computer Problems

Problem Menu

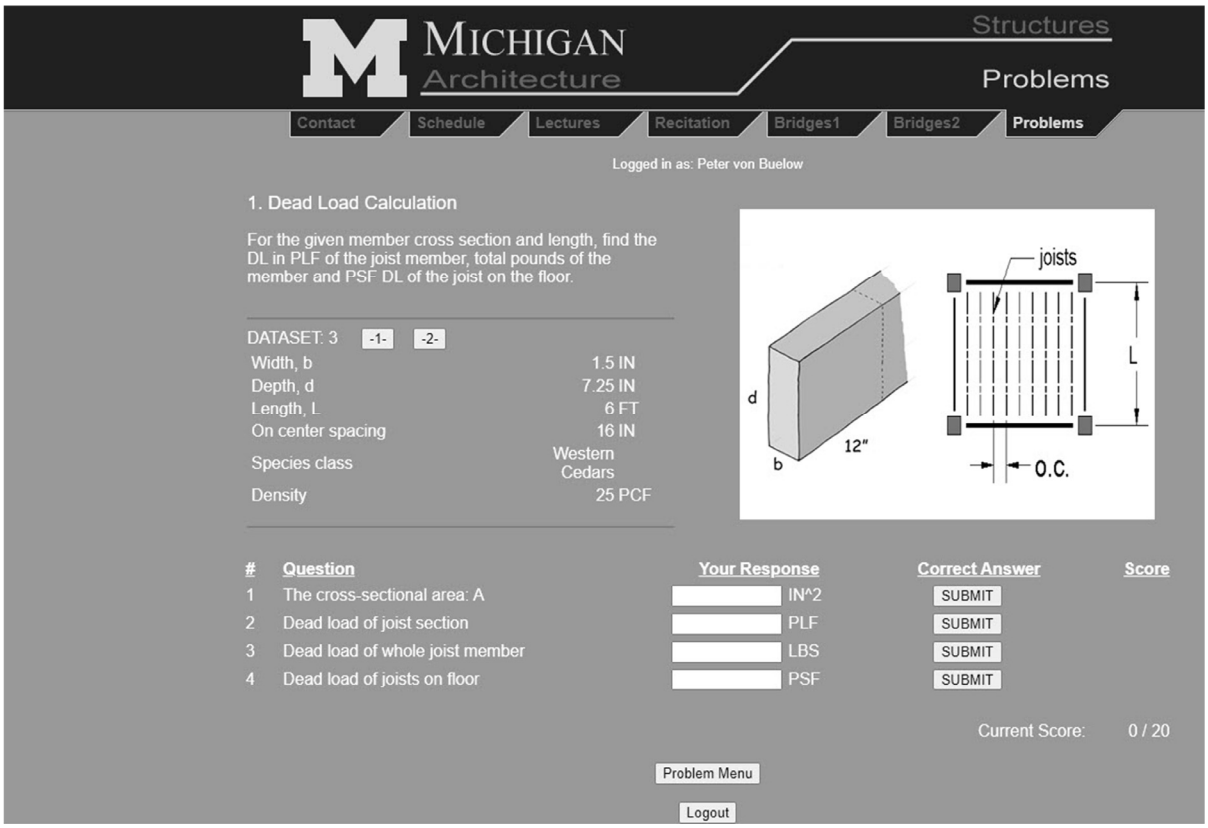
Check Grades

Select Problem

Download Instructions



Computer Problems



Structures