ARCHITECTURE 314

Structures I

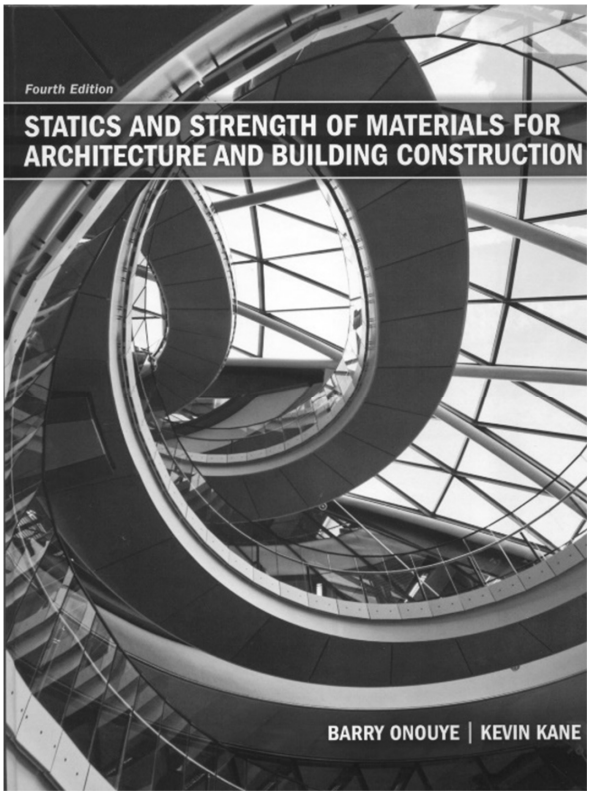
Course Introduction:

Course Syllabus
Course Schedule
Online Resources
Introduction to Structures

Teaching Staff:

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

GSIs:
Mohsen Vatandoost mohsenv@umich.edu 002 & 3
Amely Wackerbauer awackerb@umich.edu 004
Faezeh Choobkar faezehch@umich.edu 005 & 6



Course Organization

- Lectures – 2 per week - MW
- Recitation – Friday
- 24 Lecture Quizzes
- 14 Topic Canvas Quizzes
- 14 HW Problems – on website
- Evaluation –

24 lecture quizzes	240
14 topic quizzes	280
14 HW Problems	800
Bridge Project	250
12 Recitation Labs	240
TOTAL	1820

- 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

Architecture 314
3 credit hours

http://www.structures1.tcaup.umich.edu/
Fall 2025

ARCHITECTURAL STRUCTURES I
Syllabus

Dr.-Ing. Peter von Buelow
pvbuelow@umich.edu
Office 1205c TCAUP
Phone 763-4931

office hours:
by appointment

Lecture 001 MW 9:30 – 10:30
Recitation F (five sections):

Section 002	10:30-11:30	Mohsen Vatandoost	mohsenv@umich.edu
Section 003	9:30-10:30	Mohsen Vatandoost	mohsenv@umich.edu
Section 004	10:30-11:30	Amely Wackerbauer	awackerb@umich.edu
Section 005	9:30-10:30	Faezeh Choobkar	faezehch@umich.edu
Section 006	10:30-11:30	Faezeh Choobkar	faezehch@umich.edu

GSIs:

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 beams and framed systems; vector mechanics with application to analysis of trusses, catenaries, and arches; diagrammatic analysis of beams for bending moment, shear, and deflection; and 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:

25 lecture quizzes, 10pts each	250
14 topic quizzes, 20pts each	280
14 homework problems, 5 pts / question	800
bridge testing project	250
12 recitation labs, 20 pts each	240
TOTAL	1820

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

		A	1698	A-	1638
B+	1577	B	1516	B-	1456
C+	1395	C	1334	C-	1274
D+	1213	D	1152	D-	1092
		E	1091 and below		

By University policy the minimum passing grade for undergraduates is a D (1152) and for graduate students it is a C (1334).

Course Schedule

Lectures
Monday & Wednesday
posted on website w/quiz

Recitation
Friday – 12 Labs

Exercise Problems
on course website

Homework
on course website

Topic Quizzes
weekly on Canvas

Course Website
http://www.umich.edu/~arch314

ARCHITECTURAL STRUCTURES I (3)
Lecture and Homework Schedule

DATES	TOPICS	Reading (Onouye 4th ed.)	HW PROBLEMS
AUG 25	Course Intro. Overview of Forces	Ch. 1: pp. 1-14	*Structures* video TA 645.S78
AUG 27	Vertical Loads	Ch. 2.1: pp. 15-22	
AUG 29	Lateral Loads		
	Topic Quiz 1		1. Dead Load Calculation (8.31)
SEP 1	**LABOR DAY ***** NO CLASS ***** LABOR DAY ***** NO CLASS ***** LABOR DAY ***** NO CLASS *******		
SEP 3	Force Systems: Vector Addition	Ch. 2.2 & 2.3: pp. 23-41	
SEP 5	Recitation **1. Adding Forces**		
	Topic Quiz 2		2. Three Vector Addition (9.7)
SEP 8	Force Systems: Moment of a Force	Ch.2.3: pp.42-60 Ch.3.6: pp.175-184	
SEP 10	Force Systems: Equilibrium	Ch. 2.4 – 2.6: pp. 61-95	
SEP 12	Recitation **2. Moment of a Force**		
	Topic Quiz 3		3. Moment of a Force (9.13) 4. Parallel Force Systems (9.14)
SEP 15	Equilibrium of Rigid Bodies	Ch. 3.2: pp. 111-118	
SEP 17	Cable Systems	Ch. 3.1: pp. 96-110	
SEP 19	Recitation **3. Equilibrium**		
	Topic Quiz 4		5. Equilibrium of Rigid Bodies (9.21)
SEP 22	Catenary Arches and Shells + Bridge Project Introduction		
SEP 24	Plane Trusses (by Joints)	Ch. 3.3: pp. 119-127	
SEP 26	Recitation **4. Truss Stability**		
	Topic Quiz 5		6. Cable Systems (9.28)
SEP 29	*Building Big – Bridges* (video)		
OCT 1	Plane Trusses (by Sections)	Ch. 3.3: pp. 128-152	
OCT 3	Recitation	**(interim bridge report due - 10.4)**	
	Topic Quiz 6		7. Truss Systems (10.5)
OCT 6	Plane Trusses (by Graphic Statics)		
OCT 8	Pinned Frames	Ch. 3.4: pp. 153-163	
OCT 10	Recitation **5. Graphic Statics**		
	Topic Quiz 7		
OCT 13	***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK *****		
OCT 15	Three Hinged Arches	Ch. 3.5: pp. 164-174	
OCT 17	Recitation **6. Three Hinged Arches**		
	Topic Quiz 8		8. Three Hinged Arches (10.19)
OCT 20	Load Tracing & Floor Systems	Ch. 4.1: pp. 195-230	
OCT 22	Lateral Stability	Ch. 4.2: pp. 231-250	
OCT 24	Recitation **7. Lateral Stability**		
	Topic Quiz 9		9. Floor Systems (10.26)
OCT 27	Stress and Strain	Ch. 5.1: pp. 251-266	
OCT 29	Elasticity and Deformation	Ch. 5.2-5.4: pp. 267-293	
OCT 31	Recitation **8. Elasticity**		
	Topic Quiz 10		10. Elastic Deformation (11.2)
NOV 3	****** Bridge Testing ****** Bridge Testing ****** Bridge Testing ****** Bridge Testing ****** Bridge Testing ******		
NOV 5	Cross-Sectional Properties	Ch. 6.1 - 6.4: pp. 300-331	
NOV 7	Recitation **9. Moment of Inertia**		
	Topic Quiz 11		11. Moment of Inertia (11.9)
NOV 10	Shear and Bending Forces pt1	Ch. 7.1-7.3: pp. 332-345	
NOV 12	Shear and Bending Forces pt2	Ch. 7.4-7.5: pp. 346-364	
NOV 14	Recitation **10. Moment Diagrams**		
	Topic Quiz 12		12. V & M Diagrams (11.16)
NOV 17	Bending Stresses	Ch. 8.1-8.2: pp. 365-381	
NOV 19	Shear Stresses	Ch. 8.1-8.2: pp. 365-381	
NOV 21	Recitation **11. Shear Stress**		
	Topic Quiz 13		13. Horizontal Shear (11.23)
NOV 24	Deflection of Beams	Ch. 8.3-8.4: pp. 382-401	
NOV 26	video "When Engineering Fails"	**(final bridge report due – 11.26)**	
NOV 28	****** THANKSGIVING RECESS ****** THANKSGIVING RECESS ****** THANKSGIVING RECESS ******		
	No Quizzes this week		
DEC 1	Deflection of Beams	Ch. 8.3-8.4: pp. 382-401	
DEC 3	Deflection of Beams	Ch. 8.5: pp. 402-418	
DEC 5	Recitation **12. Deflection**		
	Topic Quiz 14		14. Deflection of Beams (12.7)

Course Website

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

Lectures

Recitation Notes & Labs

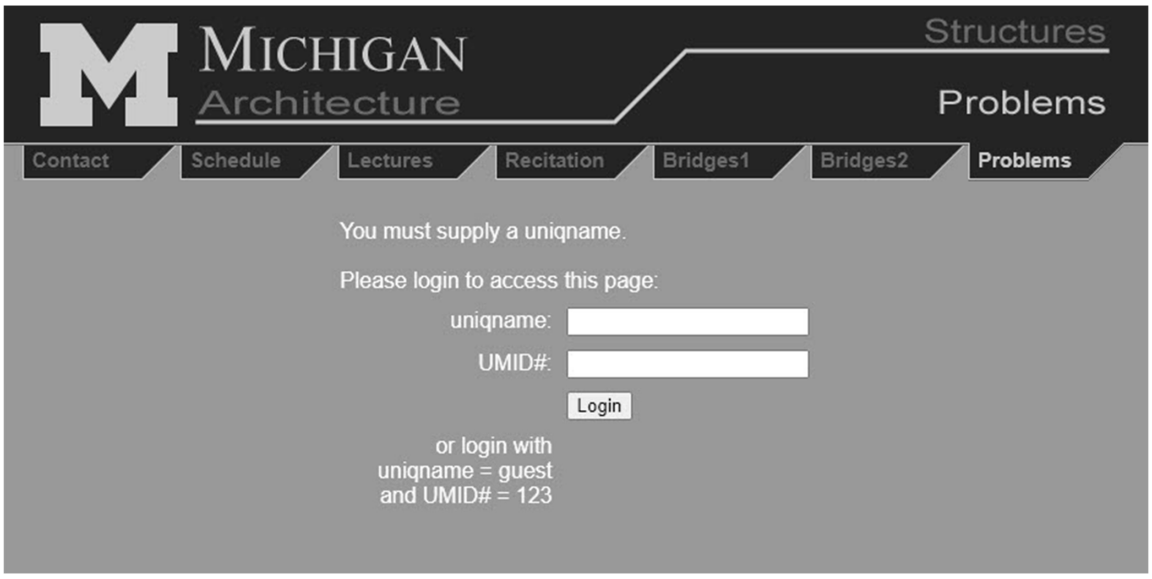
Bridge Project

Computer Problems

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

Uniqname

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



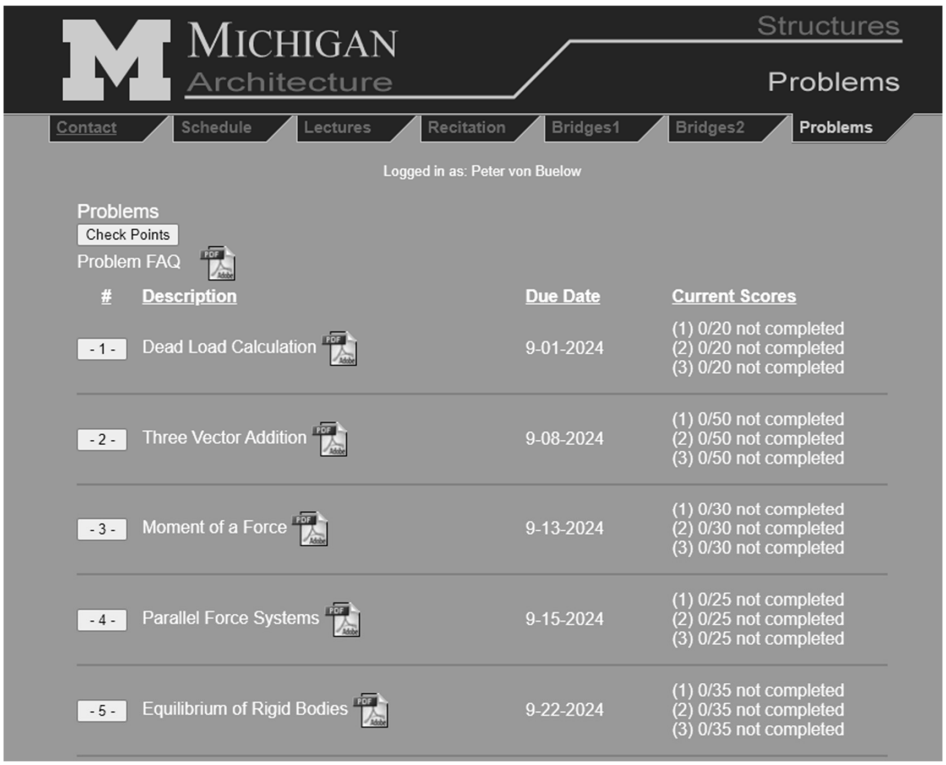
Computer Problems

Problem Menu

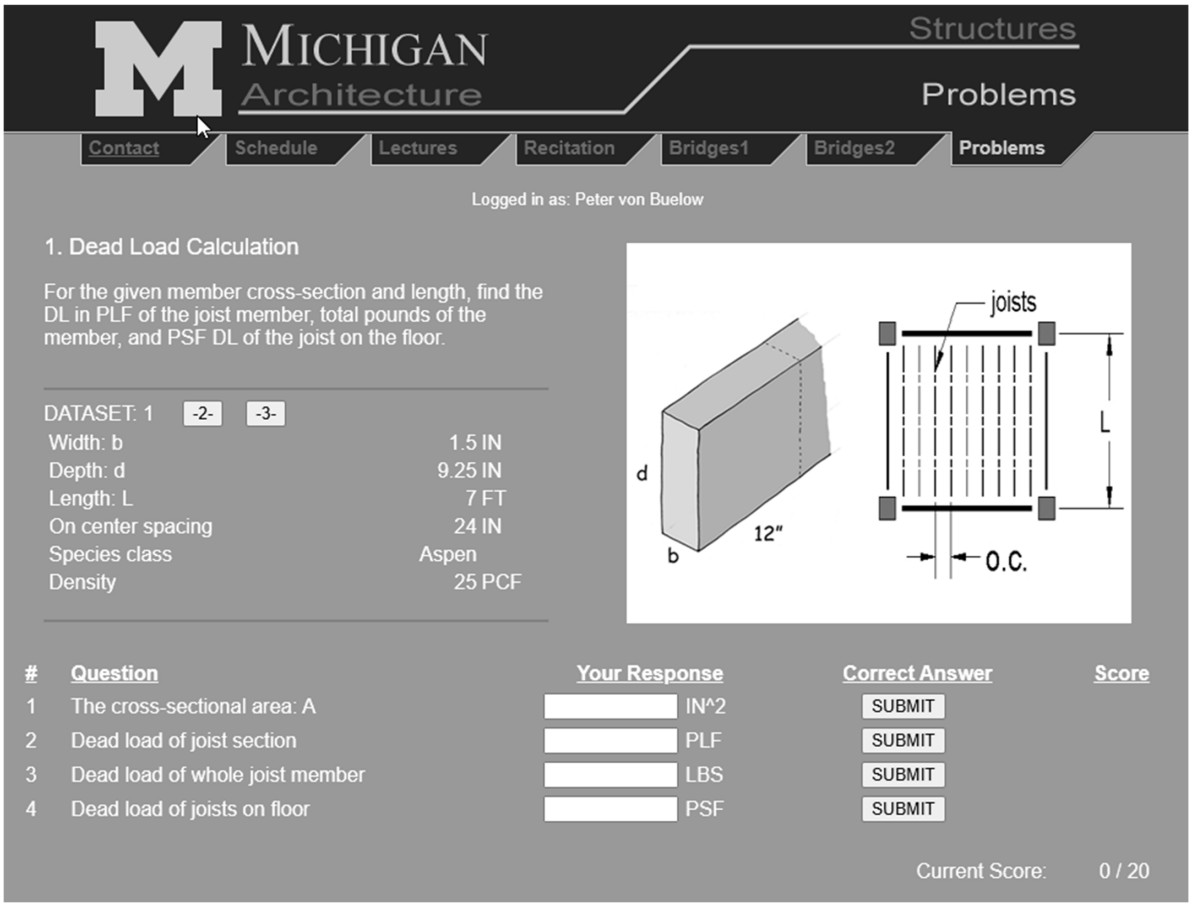
Check Grades

Select Problem

Download Instructions



Computer Problems



Structures