

# ARCHITECTURE 314

## Structures I

### Course Introduction:

Course Syllabus

Course Schedule

Online Resources

Introduction to Structures

### Teaching Staff:

Prof.

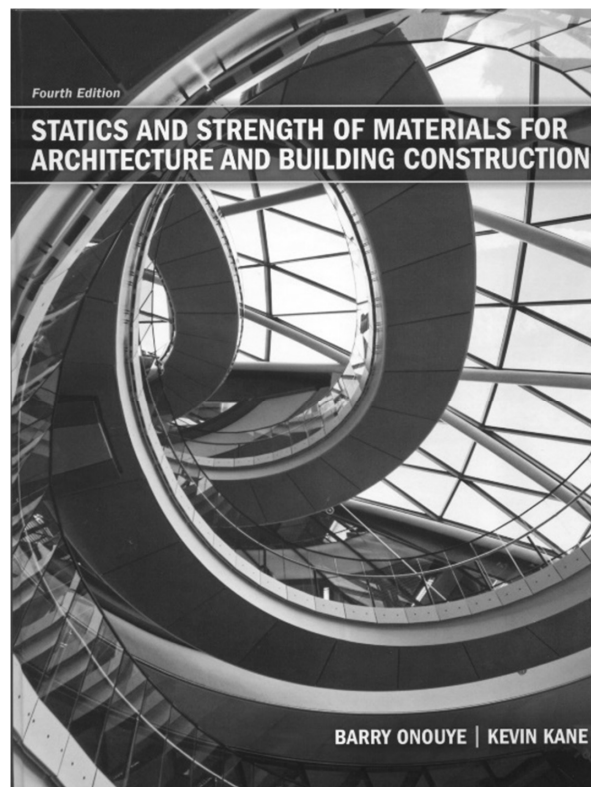
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GSIs:

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## 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
<b>TOTAL</b>	<b>1820</b>
- 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 Bülow  
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Phone 763-4931

office hours:  
by appointment

#### 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
<b>TOTAL</b>	<b>1820</b>

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

B+	1577	A	1698	A-	1638
C+	1395	B	1516	B-	1456
D+	1213	C	1334	C-	1274
		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 4 <sup>th</sup> 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		
SEP 1	Topic Quiz 1		
SEP 3	LABOR DAY ***** NO CLASS *****	LABOR DAY ***** NO CLASS *****	LABOR DAY ***** NO CLASS *****
SEP 5	Force Systems: Vector Addition Recitation 1: Adding Forces	Ch. 2.2 & 2.3: pp. 23-41	1. Dead Load Calculation (8.31)
SEP 8	Topic Quiz 2		
SEP 10	Force Systems: Moment of a Force	Ch. 2.3: pp. 42-60 Ch. 3.6: pp. 175-184	2. Three Vector Addition (9.7)
SEP 12	Force Systems: Equilibrium Recitation 2: Moment of a Force	Ch. 2.4 – 2.6: pp. 61-95	3. Moment of a Force (9.13)
SEP 15	Equilibrium of Rigid Bodies	Ch. 3.2: pp. 111-118	4. Parallel Force Systems (9.14)
SEP 17	Cable Systems	Ch. 3.1: pp. 96-110	
SEP 19	Recitation 3: Equilibrium		
SEP 22	Topic Quiz 4		
SEP 24	Catenary Arches and Shells + Bridge Project Introduction	Ch. 3.3: pp. 119-127	5. Equilibrium of Rigid Bodies (9.21)
SEP 26	Recitation 4: Truss Stability		
SEP 29	Topic Quiz 5		
OCT 1	Building Big – Bridges (video)		
OCT 3	Plane Trusses (by Sections)	Ch. 3.3: pp. 128-152 (interim bridge report due - 10.4)	6. Cable Systems (9.28)
OCT 6	Recitation		
OCT 8	Topic Quiz 6		
OCT 10	Plane Trusses (by Graphic Statics)	Ch. 3.4: pp. 153-163	7. Truss Systems (10.5)
OCT 13	Pinned Frames		
OCT 15	Recitation 5: Graphic Statics		
OCT 17	Topic Quiz 7		
OCT 20	***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK *****		
OCT 22	Three Hinged Arches	Ch. 3.5: pp. 164-174	
OCT 24	Recitation 6: Three Hinged Arches		
OCT 27	Topic Quiz 8		
OCT 29	Load Tracing & Floor Systems	Ch. 4.1: pp. 195-230	8. Three Hinged Arches (10.19)
OCT 31	Lateral Stability	Ch. 4.2: pp. 231-250	
NOV 3	Recitation 7: Lateral Stability		
NOV 5	Topic Quiz 9		
NOV 7	Stress and Strain	Ch. 5.1: pp. 251-266	9. Floor Systems (10.26)
NOV 10	Elasticity and Deformation	Ch. 5.2-5.4: pp. 267-293	
NOV 12	Recitation 8: Elasticity		
NOV 14	Topic Quiz 10		
NOV 17	***** Bridge Testing ***** Bridge Testing ***** Bridge Testing ***** Bridge Testing ***** Bridge Testing *****		
NOV 19	Cross-Sectional Properties	Ch. 6.1 - 6.4: pp. 300-331	
NOV 21	Recitation 9: Moment of Inertia		
NOV 24	Topic Quiz 11		
NOV 26	Shear and Bending Forces pt1	Ch. 7.1-7.3: pp. 332-345	11. Moment of Inertia (11.9)
NOV 28	Shear and Bending Forces pt2	Ch. 7.4-7.5: pp. 346-364	
DEC 1	Recitation 10: Moment Diagrams		
DEC 3	Topic Quiz 12		
DEC 5	Bending Stresses	Ch. 8.1-8.2: pp. 365-381	12. V & M Diagrams (11.16)
DEC 8	Recitation 11: Shear Stress	Ch. 8.1-8.2: pp. 365-381	
DEC 11	Topic Quiz 13		
DEC 14	Deflection of Beams	Ch. 8.3-8.4: pp. 382-401 (final bridge report due - 11.26)	13. Horizontal Shear (11.23)
DEC 17	video "When Engineering Fails"		
DEC 20	***** THANKSGIVING RECESS ***** THANKSGIVING RECESS ***** THANKSGIVING RECESS *****		
DEC 23	No Quizzes this week		
DEC 26	Deflection of Beams	Ch. 8.3-8.4: pp. 382-401	
DEC 29	Recitation 12: Deflection	Ch. 8.5: pp. 402-418	
DEC 31	Topic Quiz 14		
			14. Deflection of Beams (12.7)

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Structures I

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# Course Website

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



MICHIGAN  
Architecture

Structures

Contact

Contact
Schedule
Lectures
Recitation
Bridges1
Bridges2
Problems

Structures I - Arch 314 - Fall 2024  
9:30 - 10:30 MW - Rm 2104  
  
**Professor Peter von Buelow, Dr.-Ing.**  
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Recitation Sections

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Structures I

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Lectures

M

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2022 Lectures



Topic Quizzes

Lectures	Date	w/Quiz	Video	Slides	Notes
Course Intro	Aug 25				
Vertical Loads on Structures	Aug 27				

Recitation Notes & Labs

M

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Recitation

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Recitation

Bridges1

Bridges2

Problems



Notes & Videos from 2024:

Section Rosters:

	Mohsen Vatandoost	Amely Wackerbauer	Faezeh Choobkar
	002+003	004	005+006
Recitation Topics: Labs	Notes/Video	Notes	Notes
Adding Forces			
Moments of Forces			

## Project

## Problems



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## Problems

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# Computer Problems

## Problem Menu

Check Grades

Select Problem

Download Instructions

M

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Architecture

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ContactScheduleLecturesRecitationBridges1Bridges2Problems

Logged in as: Peter von Buelow

Problems

Check Points

Problem FAQ

#	Description	Due Date	Current Scores
- 1 -	Dead Load Calculation	9-01-2024	(1) 0/20 not completed (2) 0/20 not completed (3) 0/20 not completed
- 2 -	Three Vector Addition	9-08-2024	(1) 0/50 not completed (2) 0/50 not completed (3) 0/50 not completed
- 3 -	Moment of a Force	9-13-2024	(1) 0/30 not completed (2) 0/30 not completed (3) 0/30 not completed
- 4 -	Parallel Force Systems	9-15-2024	(1) 0/25 not completed (2) 0/25 not completed (3) 0/25 not completed
- 5 -	Equilibrium of Rigid Bodies	9-22-2024	(1) 0/35 not completed (2) 0/35 not completed (3) 0/35 not completed

# Computer Problems

M

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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: 1

-2-

-3-

Width: b

1.5 IN

Depth: d

9.25 IN

Length: L

7 FT

On center spacing

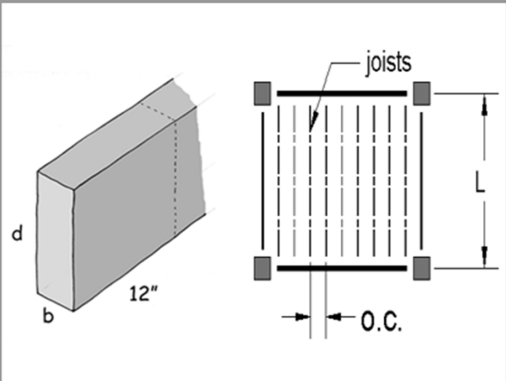
24 IN

Species class

Aspen

Density

25 PCF



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

Current Score: 0 / 20

# Structures

