

ARCHITECTURE 314

Structures I

Course Introduction:

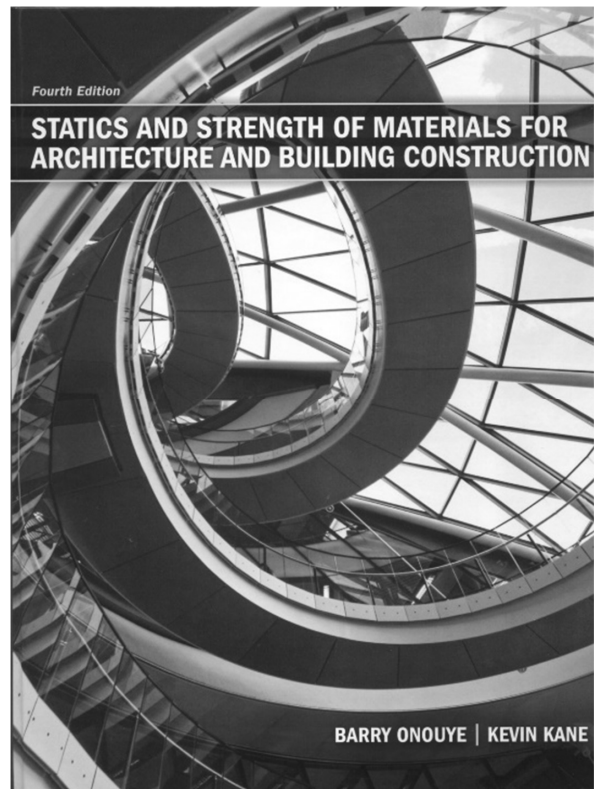
- Course Syllabus
- Course Schedule
- Online Resources
- Introduction to Structures

Teaching Staff:

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

GSI:

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Vishakha Bagarao	vishakab@umich.edu	006



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	805
Bridge Project	250
12 Recitation Labs	240
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

Lecture MW 10:30 – 11:30
Recitation F (five sections)
(by appointment)

GSI:
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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:

24 lecture quizzes, 10pts each	240
14 topic quizzes, 20pts each	280
14 homework problems, 5 pts / question	805
bridge testing project	250
12 recitation labs, 20 pts each	240
TOTAL	1815

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

B+	1573	A	1694	A-	1634
C+	1392	B	1513	B-	1452
D+	1210	C	1331	C-	1271
		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 & 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>

DATES	TOPICS	Reading (Onouye 4 th ed.)	HW PROBLEMS
AUG 26	Course Intro. Overview of Forces	Ch. 1: pp. 1-14	Structures video TA 645.S78
AUG 28	Vertical Loads	Ch. 2.1: pp. 15-22	
AUG 30	Lateral Loads Topic Quiz 1		
SEP 2	LABOR DAY ***** NO CLASS *****	LABOR DAY ***** NO CLASS *****	1. Dead Load Calculation (9.1)
SEP 4	Force Systems: Vector Addition	Ch. 2.2 & 2.3: pp. 23-41	LABOR DAY ***** NO CLASS *****
SEP 6	Recitation 1. Adding Forces Topic Quiz 2		
SEP 9	Force Systems: Moment of a Force	Ch.2.3: pp.42-60 Ch.3.6: pp.175-184	2. Three Vector Addition (9.8)
SEP 11	Force Systems: Equilibrium	Ch. 2.4 – 2.6: pp. 61-95	3. Moment of a Force (9.13)
SEP 13	Recitation 2. Moment of a Force Topic Quiz 3		
SEP 16	Equilibrium of Rigid Bodies	Ch. 3.2: pp. 111-118	4. Parallel Force Systems (9.15)
SEP 18	Cable Systems	Ch. 3.1: pp. 96-110	
SEP 20	Topic Quiz 4		5. Equilibrium of Rigid Bodies (9.22)
SEP 23	Catenary/Arches and Shells + Bridge Project Introduction	Ch. 3.3: pp. 119-127	
SEP 25	Plane Trusses (by Joints)		6. Cable Systems (9.29)
SEP 27	Recitation 4. Truss Stability Topic Quiz 5		
SEP 30	Building Big – Bridges (video)		7. Truss Systems (10.6)
OCT 2	Plane Trusses (by Sections)	Ch. 3.3: pp. 128-152 (interim bridge report due - 10.4)	
OCT 4	Recitation Topic Quiz 6		8. Three Hinged Arches (10.20)
OCT 7	Plane Trusses (by Graphic Statics)	Ch. 3.4: pp. 153-163	
OCT 9	Pinned Frames		9. Floor Systems (10.27)
OCT 11	Recitation 5. Graphic Statics Topic Quiz 7		
OCT 14	***** FALL STUDY BREAK ***** FALL STUDY BREAK ***** FALL STUDY BREAK *****		10. Elastic Deformation (11.3)
OCT 16	Three Hinged Arches	Ch. 3.5: pp. 164-174	
OCT 18	Recitation 6. Three Hinged Arches Topic Quiz 8		11. Moment of Inertia (11.10)
OCT 21	Load Tracing & Floor Systems	Ch. 4.1: pp. 195-230	
OCT 23	Lateral Stability	Ch. 4.2: pp. 231-250	12. V & M Diagrams (11.17)
OCT 25	Recitation 7. Lateral Stability Topic Quiz 9		
OCT 28	Stress and Strain	Ch. 5.1: pp. 251-266	13. Horizontal Shear (11.24)
OCT 30	Elasticity and Deformation	Ch. 5.2-5.4: pp. 267-293	
NOV 1	Recitation 8. Elasticity Topic Quiz 10		14. Deflection of Beams (12.8)
NOV 4	***** Bridge Testing ***** Bridge Testing ***** Bridge Testing ***** Bridge Testing ***** Bridge Testing *****		
NOV 6	Cross-Sectional Properties	Ch. 6.1 - 6.4: pp. 300-331	
NOV 8	Recitation 9. Moment of Inertia Topic Quiz 11		
NOV 11	Shear and Bending Forces pt1	Ch. 7.1-7.3: pp. 332-345	
NOV 13	Shear and Bending Forces pt2	Ch. 7.4-7.5: pp. 346-364	
NOV 15	Recitation 10. Moment Diagrams Topic Quiz 12		
NOV 18	Bending Stresses	Ch. 8.1-8.2: pp. 365-381	
NOV 20	Shear Stresses	Ch. 8.1-8.2: pp. 365-381	
NOV 22	Recitation 11. Shear Stress Topic Quiz 13		
NOV 25	video "When Engineering Fails"	(final bridge report due – 11.25)	
NOV 27	***** THANKSGIVING RECESS ***** THANKSGIVING RECESS ***** THANKSGIVING RECESS *****		
NOV 29	***** THANKSGIVING RECESS ***** THANKSGIVING RECESS ***** THANKSGIVING RECESS *****		
	No Quizzes this week		
DEC 2	Deflection of Beams	Ch. 8.3-8.4: pp. 382-401	
DEC 4	Deflection of Beams	Ch. 8.5: pp. 402-418	
DEC 6	Recitation 12. Deflection Topic Quiz 14		

Course Website

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



Structures

Contact

Contact
Schedule
Lectures
Recitation
Bridges1
Bridges2
Problems

Structures I - Arch 314 - Fall 2024

10:30 - 11:30 MW - Rm 2104

Professor Peter von Buelow, Dr.-Ing.

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Recitation Sections



Lectures

M
MICHIGAN
Architecture
Structures
Lectures

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2022 Lectures 


Topic Quizzes 


Lectures	Date	w/Quiz	Video	Slides	Notes
Course Intro	Aug 26		 	 	 
Vertical Loads on Structures	Aug 28			 	  
Lateral Loads on Structures	Aug 30				








Recitation Notes & Labs

M
MICHIGAN
Architecture
Structures
Recitation

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Lectures
Recitation
Bridges1
Bridges2
Problems

Notes & Videos from 2020: 

Section Rosters: 

	Mohsen Vatandoost 002+003	Aaron Comstock 004	Amir Lahouti 005	Vishakha Bagarao 006
Recitation Topics: Labs	Notes/Video	Notes	Notes	Notes
Adding Forces	  			
Moments of Forces				

Bridge Project

M MICHIGAN Architecture

Structures Project

Contact Schedule Lectures Recitation **Bridges 1** Bridges2 Bridges3 Problems

Bridge Project Brief 2022
Prelim Report Guidelines 2022
Scoring Rubric 2022
Examples of Bridge Types
Example Reports
Dr. Frame Software (download)
Dr. Frame Tutorial
West Point Bridge Designer
Videos of Bridge Testing

Computer Problems

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

Uniqname

UMID >>Number<< (NOT Kerberos)

M MICHIGAN Architecture

Structures Problems

Contact Schedule Lectures Recitation Bridges1 Bridges2 **Problems**

You must supply a uniqname.
Please login to access this page:

uniqname:
UMID#:

Login

or login with
uniqname = guest
and UMID# = 123

Computer Problems

Problem Menu

Check Grades

Select Problem

Download Instructions

M MICHIGAN Architecture Structures I Problems

Contact Schedule Lectures Recitation Bridges1 Bridges2 Problems

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 MICHIGAN Architecture Structures I Problems

Contact Schedule Lectures Recitation Bridges1 Bridges2 Problems

Logged in as: Mohsen Vatandoost

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	3.5 IN
Depth, d	9.25 IN
Length, L	8 FT
On center spacing	12 IN
Species class	Douglas Fir-South
Density	29 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

