

# ARCHITECTURE 324

## STRUCTURES II

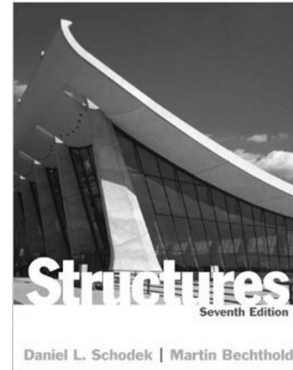
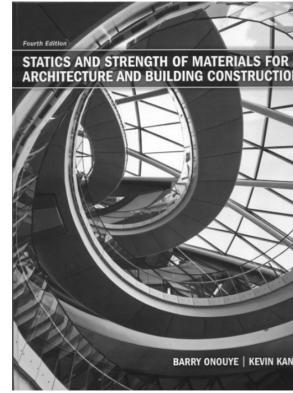
### Course Introduction:

- Course Syllabus
- Course Format
- Online Resources

### Teaching Staff:

Prof.  
Dr.-Ing. Peter von Bülow [pvbuelow@umich.edu](mailto:pvbuelow@umich.edu)

- GSI's:
- |     |                   |  |
|-----|-------------------|--|
| 002 | Faezeh Choobkar   | <a href="mailto:faezehch@umich.edu">faezehch@umich.edu</a> |
| 003 | Faezeh Choobkar   | <a href="mailto:faezehch@umich.edu">faezehch@umich.edu</a> |
| 004 | Alireza Fazel     | <a href="mailto:arfazel@umich.edu">arfazel@umich.edu</a>   |
| 005 | Alireza Fazel     | <a href="mailto:arfazel@umich.edu">arfazel@umich.edu</a>   |
| 006 | Mohsen Vatandoost | <a href="mailto:mohsenv@umich.edu">mohsenv@umich.edu</a>   |



## Course Syllabus

### Organization

- Lecture – Monday & Wednesday
- Recitation – Friday
- HW Problems – on web
- Topic Quiz - weekly

### Evaluation

- |                      |     |
|----------------------|-----|
| • 24 Lecture Quizzes | 240 |
| • 12 Topic Quizzes   | 240 |
| • 11 HW Problems     | 790 |
| • Tower Project      | 250 |
| • 9 Recitation Labs  | 180 |

### Text

- Structures* by Schodek
- Statics and Strength of Materials* by Onouye
- Code material on Canvas
- Web site

<https://structures.tcaup.umich.edu/>

Architecture 324  
3 credit hours

<http://www.structures.tcaup.umich.edu/>  
Winter 2025

### ARCHITECTURAL STRUCTURES II Syllabus

Prof. Peter von Buelow  
[pvbuelow@umich.edu](mailto:pvbuelow@umich.edu)  
Office 1205c TCAUP  
Phone 763-4931

office hours:  
by appointment

Section 001	9:30-10:30 MW
Recitation Sections	F
Section 002	9:30-10:30
Section 003	10:30-11:30
Section 004	9:30-10:30
Section 005	10:30-11:30
Section 006	9:30-10:30

GSI's		
Faezeh Choobkar	<a href="mailto:faezehch@umich.edu">faezehch@umich.edu</a>	
Faezeh Choobkar	<a href="mailto:faezehch@umich.edu">faezehch@umich.edu</a>	
Alireza Fazel	<a href="mailto:arfazel@umich.edu">arfazel@umich.edu</a>	
Alireza Fazel	<a href="mailto:arfazel@umich.edu">arfazel@umich.edu</a>	
Mohsen Vatandoost	<a href="mailto:mohsenv@umich.edu">mohsenv@umich.edu</a>	

#### CATALOG DESCRIPTION

This course covers the basic principles of elastic behavior for different materials such as wood, steel, concrete and composite materials, and compares the properties and applications of materials generally. It investigates cross sectional stress and strain behavior in flexure and in shear, and torsion as well as the stability of beams and columns. The qualitative behavior of combined stresses and fracture in materials is also covered. Prerequisite: ARCH 314

#### OBJECTIVES

Students are introduced to the fundamentals of analysis and design of simple structural members in wood, steel, concrete and masonry. Basic code requirements of strength, stability and serviceability are discussed. Both vertical and lateral loads based on ASCE-7 are considered. Principles of composite materials design, and structural continuity are covered.

#### ORGANIZATION

The course is comprised of lectures (Monday & Wednesday) and a recitation (Friday). The lectures will be posted on the course website and may be watched asynchronously if you cannot attend in person. Lecture attendance is not required, however there is a quiz with each lecture. The lectures cover structural concepts and procedures of design using the primary building materials of wood, steel, concrete and masonry. Each Friday the class is broken into smaller recitation sections in which the GSIs review analysis procedures of the various structural elements discussed in the lectures. Recitations may also include an in-class lab assignment. Solutions to homework problems are entered online through the course website. Topics are summarized weekly through Canvas Topic Quizzes. In addition, a construction/testing project gives students an opportunity to apply concepts to a physical design. Computer facilities, including software, are available on machines in the building, for supporting computations.

#### EVALUATION

Evaluation is based on an accumulated total number of points. Points are earned based on performance in all course activities – 24 lecture quizzes, 12 Canvas topic quizzes, 11 homework problems, 9 recitation labs, and the tower project. Grades are assigned according to the number of points achieved during the semester:

24 lecture quizzes 10 pts each	240
12 topic quizzes 20 pts each	240
11 homework problems, 5pts/ question	790
tower testing project	250
9 recitation labs, 20 pts each	180
<b>TOTAL</b>	<b>1700</b>

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

A+	1643	A	1587	A-	1530
B+	1473	B	1417	B-	1360
C+	1303	C	1247	C-	1190
D+	1133	D	1077	D-	1020
		E	1019 and below		

By University policy the minimum passing grade is a D (1077). The highest recorded grade in Architecture is an A. For graduate students C- (1190) is required to pass.

# Course Schedule

## Lectures

Monday & Wednesday  
video recorded and posted

## Recitation

Friday with GSI  
online signup – see emailed link

## Homework

On course website “Problems”

## Quizzes

Lecture Quizzes – in class or in Canvas video  
Canvas (weekly Topic Quiz)

## Project

tower  
weight and load

DATE	TOPIC	Text Reading	PROBLEMS (due dates online)
JAN 8	Course Intro	Onouye, Schodek	
JAN 13	1 - Wood Properties	NDS	
JAN 15	2 - Wood Beam Analysis	Schodek 6.4.2	
JAN 17	Recitation [1-Wood Beams]	Topic Quiz 1	1. Wood Beam Analysis
JAN 20	<b>Martin Luther King Day **** No Class **** Martin Luther King Day **** No Class</b>		
JAN 22	3 - Wood Beam Design	Onouye 8	
JAN 24	Recitation	Topic Quiz 2	2. Wood Beam Design
JAN 27	4 - Wood Column Analysis	Onouye 9.1-9.2 & 9.4, Schodek 7.4.3	
JAN 29	5 - Wood Column Design	NDS	Tower Intro
JAN 31	Recitation [2-Wood Columns]	Topic Quiz 3	3. Wood Column Analysis
FEB 3	6 - Cross Laminated Timbers	CLT Handbook	
FEB 5	7 - Steel Properties	AISC, Onouye 8.7	
FEB 7	Recitation – Tower Project	Topic Quiz 4	
FEB 10	8 - Steel Beam Analysis	Schodek 6.4.3	
FEB 12	9 - Steel Beam Analysis	Schodek 6.4.3	
FEB 14	Recitation [3-Steel Beams]	Topic Quiz 5	<b>Prelim. Tower Report Due</b> 4 Steel Beam Analysis
FEB 17	10 - Steel Beam Design	Schodek 6.4.3	
FEB 19	11 - Steel Column Analysis	Onouye 9.3, Schodek 7.4.4	
FEB 21	Recitation [4-Steel Columns]	Topic Quiz 6	5. Steel Beam Design
FEB 24	12 - Steel Column Design	Onouye 9.3, Schodek 7.4.4	
FEB 26	"Skyscrapers" David Macaulay video		
FEB 28	Recitation		6. Steel Column Analysis
MAR 3	<b>WINTER RECESS **** NO CLASS **** WINTER RECESS **** NO CLASS ****</b>		
MAR 5	<b>WINTER RECESS **** NO CLASS **** WINTER RECESS **** NO CLASS ****</b>		
MAR 7	<b>WINTER RECESS **** NO CLASS **** WINTER RECESS **** NO CLASS ****</b>		
MAR 10	13 - Continuous Beams	I. Engel Ch. 17, Schodek 8	
MAR 12	14 - Gerber Beams	Schodek 8.4.4	
MAR 14	Recitation [5-Continuous Beams]	Topic Quiz 7	7. Three Moment Theorem
MAR 17	15 - Intro to Concrete – PCA video.		
MAR 19	16 - Concrete Beams	Schodek 6.4.4 – 6.4.6	
MAR 21	Recitation [6-Stress vs Strain]	Topic Quiz 8	
MAR 24	<b>Tower Testing **** Tower Testing **** Tower Testing **** Tower Testing ****</b>		
MAR 26	17 - Concrete Beams	I. Engel Ch.15	
MAR 28	Recitation	Topic Quiz 9	8. Concrete Beam Analysis
MAR 31	18 - Concrete Beam Design		
APR 2	19 - Concrete Columns	Schodek 7.4.5	
APR 4	Recitation [7-Concrete Reinforcing]	Topic Quiz 10	9. Concrete Beam Design
APR 7	20 - Composite Sections		
APR 9	21 - Composite Sections		
APR 11	Recitation [8-Composite Sections]	Topic Quiz 11	10. Composite Sections
APR 14	22 - Masonry Intro.	TMS 402	
APR 16	23 - Masonry Walls	TMS 402	
APR 18	Recitation [9-Lateral Stability]	Topic Quiz 12	<b>Final Tower Report Due</b> 11. Masonry Walls
APR 21	24 - Masonry Walls	TMS 402	

## Course Web Site

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



Structures

Contact

Contact
Schedule
Lectures
Recitation
Towers1
Towers2
Problems

Structures II Website - ARCH 324

**Professor Peter von Buelow, Dr.-Ing.**

Taubman College of Architecture and Urban Planning  
University of Michigan  
2000 Bonisteel Blvd.  
Ann Arbor, MI 48109  
USA

tel. +1 734 763 4931

[pvbuelow@umich.edu](mailto:pvbuelow@umich.edu)

Office hours:  
by appointment

GSI's:

Faezeh Choobkar  
Alireza Fazel  
Mohsen Vatandoost

[faezehch@umich.edu](mailto:faezehch@umich.edu)  
[arfazel@umich.edu](mailto:arfazel@umich.edu)  
[mohsensv@umich.edu](mailto:mohsensv@umich.edu)



Recitation Sections



Where is your GSI



# Lectures

Structures

Lectures

Contact
Schedule
Lectures
Recitation
Towers1
Towers2
Problems

2024 Lectures

Canvas

Date	Lectures	Video w/Quiz	Video	Slides	Notes
Jan 8	Course Intro				

# Recitation

Structures

Recitation

Contact
Schedule
Lectures
Recitation
Towers1
Towers2
Problems

GSIs2025 width=

More Example Problems

Recitation Sections

		Faezeh Choobkar 002 / 003	Alireza Fazel 004 / 005	Mohsen Vatandoost 006	old1	old2
Recitation Topics	Labs	Notes	Notes	Notes	Video	Notes
Wood Beam Analysis 1/19						
Wood Beam Design 1/26	none					
Wood Columns 2/2						

# Recitation Sign Up

## Arch 324 Recitation Sign Up

This form is to allow you the option to try to choose a certain section for your recitation. If you have a course conflict with certain times, be sure to list it

A section will be filled by the first 20 students to choose that section. Or if you have a time conflict that requires a certain section (like 10:30 - 11:30) the last one in will get bumped out. So if you have a time conflict you must enter the section(s) you can attend even if they are full.

Here is the list of Sections with GSIs:

002 Faezeh Choobkar	Friday	9:30-10:30	rm TBD
003 Faezeh Choobkar	Friday	10:30-11:30	rm TBD
004 Alireza Fazel	Friday	9:30-10:30	rm TBD
005 Alireza Fazel	Friday	10:30-11:30	rm TBD
006 Mohsen Vatandoost	Friday	9:30-10:30	rm 2104

pvbuelow@umich.edu Switch account



\* Indicates required question

Email \*

Record pvbuelow@umich.edu as the email to be included with my response

Section 1st choice

Choose

Section 2nd choice

Choose

# Tower Test

## M MICHIGAN Architecture

Structures Project

Contact Schedule Lectures Recitation Towers 1 Towers2 Problems



- Testing Signup Sheet
- Tower Project Brief 2024
- Prelim Report Guidelines 2024
- Final Report Guidelines 2024
- Score Sheet 2024
- Study of Tower Types
- Example Reports
- Dr. Frame Software (download)
- Dr. Frame Tutorials
- STAAD example
- Videos of Old Tower Tests

# Tower Test

M MICHIGAN Architecture

Structures Project

Contact Schedule Lectures Recitation Towers 1 Towers 2 Problems

Test Score Formula:  $(4 \times \text{weight OZ}) + (\text{load LBS}/50) + (\text{load LBS}/\text{weight OZ}) \times 1.5$

2024 Tower Test Video Photos from testing

Click on a team to view details.

Sort by Views Descending

Team Name	Score	Load (lbs)	Load/Weight	Views
Borum Bridge Co.	127.7	320	80.2	61
Beam Team	112.1	290	70.22	21
Group1	87.9	220	55	26
tower patch kids	89.17	220	55.84	31
Skibidi Tower	95.6	210	60.17	17
PVB Fan Club	78.28	190	48.97	23
Tower Power	73.72	160	46.24	21
Group3	64.2	160	40	9
Power Tower	57.95	140	36.08	22

# Computer Problems

Uniqname

UM ID Number

M MICHIGAN Architecture

Structures Problems

Contact Schedule Lectures Recitation Project Problems

You must supply a uniqname.

Please login to access this page:

uniqname: pvbuelow

ID#: .....

Login

or login with  
uniqname = guest  
and  
UMID# = 123

# Computer Problems

## Problem Menu

Check Grades

Problem FAQ

Select Problem

Download Instructions

Work Problem (best of 3 versions)

# Computer Problems

## Problem Page

Choose Data Set

Enter Answers

Submit

Read Score

Correct if Necessary

## Tips on how engineering students study for exams

