

CE 5304: Advanced Design of Structural Systems

Department of Civil Engineering

General Information

Instructor:	Jeffrey Weidner, Ph.D. Office: A-222 Lab: E-214 Office Phone: (915)-747-6913 Cell Phone: (215) 292-4830 Email: jweidner@utep.edu Office Hours: Via poll, we will identify two windows, one hour each, for weekly online office hours through Microsoft Teams. By appointment – Schedule at www.jeffreyweidner.com/schedule
Course Information:	CRNs: CE 5304 – 19504 CE 4375 – 15608 CE 4376 – 16052 CE 4377 – 16554
Meeting Time and Location:	Online
Final Exam:	None
Course Description:	From the university course catalog: Behavior and design concepts for concrete, steel, and composite structural systems. Topics include a detailed review of design specifications, detailing of frames, floor systems, and bracing components. Students will also be exposed to computational design tools. My description: This course will focus on understanding the design and construction process with a specific focus on steel buildings. Topics include general design understanding, developing a building vocabulary, load determination and assignment, and structural design of the primary building components that make up a structural system. Computational design tools will be used.
Class Approach:	The course is in an online-only format as a result of the COVID-19 pandemic. Lecture material and reading will be assigned at the beginning of each week via Blackboard (Monday at 9AM). Lectures will be a series of short videos (10 minutes or less per video) with a total of 45 to 90 minutes per week of lecture content. There will be two scheduled office hour blocks each week, and appointments are available on demand. All face to face conversations (i.e., video chats) will occur via Microsoft Teams. Teams may also be used for chat conversations. If you contact me via chat in Teams, you can expect a reply within

six hours, but do not count on this. Extensions will not be provided because I was not available on-demand to address questions.

Assignments will be focused on each specific module and will be graded based on your demonstration of process and understanding of the subject material. I will not grade your designs for correctness and efficiency. All weekly work is due Monday mornings at 9AM MT.

Resource Library: To help bridge the gap between your existing coursework and the specific design challenges you are facing with this project, we have created a resource library on Blackboard. Here you will find information about design codes and specifications, software resources, and textbooks. There is guidance for citing references and resources of which you may use.

Continuing
Education Units:

This term, as we are working remotely and are in the midst of a pandemic, we are requiring you to complete continuing education units or CEUs. When you are a professional engineer, you will be required to obtain CEUs to keep your license. In practice, you obtain these CEUs by attending conferences, workshops, webinars, lunch and learns, and various other activities through which you are exposed to new research, technologies, and techniques. There are many national and regional conferences that are now online, some of which are free or very affordable for students. A list of potential activities and their associated CEUs is available on Blackboard. If you have another event you would like to suggest, please send it to Dr. Weidner.

Course Objectives: By the end of this course you should be able to:

1. Identify design goals and constraints for engineered systems
2. Understand the individual systems that comprise a building, and how they interact
3. Understand how to use design codes throughout a design effort
4. Understand the structural components that comprise a building structural system
5. Determine design loads and load combinations
6. Design/select structural components including beams, columns, braces, composite decks, and roof trusses
7. Use structural analysis software to aid in design

Class Policies

Honor Code: Civil Engineering students are expected to adhere to the Honor Code of the Department of Civil Engineering, which can be found here (<http://ce.utep.edu/honorcode.htm>). This statement is consistent with the [UTEP Handbook of Operating Procedures](#). Academic dishonesty includes but is not limited to plagiarism, cheating, and collusion. Under no circumstances should any design work be completed by anyone outside of your team. Additionally,

under no circumstances should a practicing mentor be compensated for their time or assistance. All suspected violations must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action.

Attendance Policy:

I will not take attendance during office hours for the purposes of a grade.

Participation Policy:

I do not evaluate based on lecture views or activity tracking. Occasionally, I will assign discussion topics on Blackboard and you are expected to participate according to the instructions for the individual discussions. You are also expected to adhere to the following rules for online interaction:

- Always consider audience. Remember that members of the class and the instructor will be reading any postings.
- Respect and courtesy must be provided to classmates and to instructor at all times. No harassment or inappropriate postings will be tolerated.
- When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a face to face situation.
- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).

Neatness Policy:

By this stage in your educational career, you should be submitting work that is neat and professional. I reserve the right to return work unreviewed if we deem it unprofessional. Resubmitted work will be considered late.

Accommodations:

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#).

Technology Requirements:

The course material will be delivered through and stored on Blackboard. Discussions will occur on Blackboard, and assignments will be assigned, submitted, and graded within Blackboard. [Microsoft Teams](#) will be used for communication. This software is provided for free by UTEP. Please download and install Teams. I will invite you to join the course using your UTEP email. Be sure to check that notifications are set up properly in Blackboard and Teams so

that you do not miss any important communications. We will not use a personal email address in this course.

You will need access to a computer for this course. To interact in Office Hours, you will need access to video chat capabilities (webcam, microphone). To submit handwritten homework, you will need a scanner, or a scanning app on your phone. To make use of many UTEP software off campus, you will need [VPN access](#) set up on your computer. The [ETC Helpdesk](#) can support you in terms of technology requirements and [VPN access](#).

UTEP can provide support or technology assistance as required. Please see [Technology Services](#) for access to computer, internet connectivity, and other technology-related support issues to facilitate remote learning during the Pandemic.

Textbooks and
Resources:

Required:

None

Highly Recommended:

- ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures – Online Access will be provided after Census Day <https://www.asce7.online/>
- International Building Code 2018 – Online access will be provided after Census Day
- AISC Steel Manual – 15th edition – You should have this from your Steel Design course
- Structural Steel Design 6th Edition – Jack McCormac and Stephen Csernak – This is the steel design book I like, but you can use any steel design textbook.

Useful Resources (Not online):

Fundamentals of Building Construction – 6th Edition – Edward Allen and Joseph Iano

Useful Online Resources (from [UTEP Library](#)):

- The Architect’s Studio Handbook – Edward Allen and Joseph Iano
- Building Structures Illustrated: Patterns, Systems and Design – Francis Ching
- Building Construction Illustrated – Francis Ching
- 2018 International Building Code Illustrated Handbook – Thornburg, Douglas
- Structural Load Determination: 2018 IBC and ASCE/SEI 7-16 – Fanella, David
- Building Design for Wind Forces: Overview of the Wind Load Provision of the ASCE 7-16 Standard – Taher, Rima

Access to all online resources will be linked on Blackboard in the “Course Resources” section, and available at the UTEP library through Course Reserves.

Term Project: An anonymous, private donor has funded the creation of a Mexican American Museum of Art (MAMA) to be located in Downtown El Paso. Your firm, an architectural engineering firm, is responsible for the development of the building program, the general layout of the spaces, and the structural design. The site for the building is the full block located between N. Campbell and N. Kansas, and Mills and Main. The site is currently occupied by a parking lot for City Hall. The owner has requested a multi-story building of approximately 48,000 sf. In the space, she is looking for several specific design elements. She wants an open lobby, a theater space holding up to 200 people for events and lectures, a restaurant, an educational area for field trips and summer camp, an event venue, and of course, both fixed and rotating gallery space.

Your deliverable is a report. It will include at minimum:

1. Overall summary
2. Building Program
3. Drawings
4. Load determination calculations
5. Load combinations
6. Preliminary member sizes and approximate structural analysis
7. Documentation of a finite element model
8. Final design
9. Sample hand calculations to validate design

Consider a multi-stakeholder viewpoint. Put yourself in the shoes of the owner of the building. What does she care about? Now put yourself in the architect's shoes. What do they need to account for in the building, and how does that affect structural design? Finally, approach the problem from a structural engineering standpoint. Your report should reflect these viewpoints.

You will have the entire term to work on this project. This is individual work and I expect everyone to turn in their own final report. If you do not make progress on this throughout the term, you will not be able to complete the entire project in the last few weeks of class so plan accordingly. We will have scheduled check-in points throughout the term where we will have a one-on-one video chat to discuss your project.

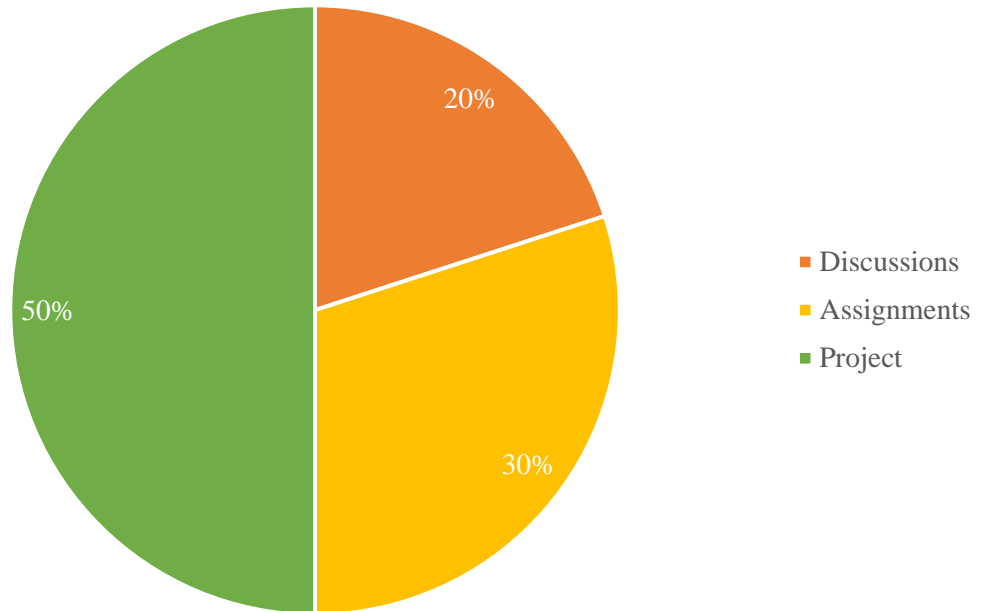
I have no requirements for software. The university has access to STAAD. Your report should be constructed professionally. It should be written well, with figures, labels, and references (if needed). I can provide feedback throughout the term whenever needed, but I will not answer the question "Is this right?"

Term Project Rubric Grading is based on the Term Project Description. I do not suggest or mean to imply your report should use this rubric as an organizational outline. Make the report your own and be sure these components are included.

Deliverable Item:	Possible Points
Overall Summary (Owner View)	10
Building Program (Architect View)	10
Drawings: Floor Plans	20
Drawings: Sections	10
Drawings: Live Load Maps	10
Drawings: Typical Floor Section	10
Drawings: Typical Exterior Wall Section	10
Load Determination: Dead Load	10
Load Determination: Live Load	20
Load Determination: Snow Load	5
Load Determination: Wind Load (MWFRS)	20
Load Determination: Wind Load (C&C)	5
Load Determination: Earthquake	10
Load Combinations	10
Preliminary Member Sizing	10
Model Documentation	10
Final Design	10
Sample Hand Calculation	10
Total	200

Coursework and Grading Expectations

Grading: Grade Breakdown:



Final Grade $A \geq 89.5$
Thresholds: $89.5 > B \geq 79.5$
 $79.5 > C \geq 69.5$
 $69.5 > D \geq 59.5$
 $59.5 > F$

Exams: There are no exams in this course.

Homework: All your work is homework.