



CE 432/532 - ADVANCED STRUCTURAL DESIGN IN STEEL

C E Chavez Bldg, Rm 103, TuTh 12:30PM - 1:45PM

Description of Course

Advanced Structural Design in Steel (3) I Advanced problems in the analysis and design of steel structures including beam-columns, plate girders, composite construction, multi-story buildings; static and dynamic vertical and lateral loads; connections; computer applications. May be convened with 532.

Course Prerequisites or Co-requisites

CE 334 or consent of the instructor.

Instructor and Contact Information

Instructor: Achintya Haldar

Office: 220E, CE Bldg.

Phone: 621-2142

Email: haldar@u.arizona.edu

Office Hours/"Open Door Policy"

Instructor home page – haldar.faculty.arizona.edu

Course Format and Teaching Methods

Lecture only, in-class discussions with handouts.

Course Objectives and Expected Learning Outcomes

Part 1 - Design of a multi-story building

- Conceptual design
- Load analysis
- Design of all structural elements
- Detail of all connections
- Estimate of weight of steel
- Discussion
- A detailed project report

Exam #1

Part 2 - Beam-Column design

- Braced frames
- Unbraced frames

Exam #2

Part 3 - Design of plate girders

Modes of failure

Elastic buckling

Bending in the plane of web

Local buckling

Buckling in the plane of web

Vertical buckling of the compression flange

Shear buckling

Inelastic buckling under pure shear

Tension field action

Design of stiffeners

Bearing stiffeners

Intermediate stiffeners

Preliminary design of a plate girder

A detailed design project

Part 4 - Composite steel-concrete construction

An ABET Course Classification Form is attached. For further information see

http://assessment.arizona.edu/academic_degree_programs)

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their health-care provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

Course Communications

Students will be communicated by emails in most cases.

Required Texts or Readings

- (1) Steel Construction Manual, AISC, 14th Ed. If you do not have the manual, please talk to me after class to buy it at a discounted price. (required)
- (2) Class handouts (I will email to you) (required)
- (3) Steel Structures Design and Behavior by Salmon and Johnson, 4th Ed. (**not required**)

Required or Special Materials

Must bring the handouts every day in the first phase of the class.

Required Extracurricular Activities (if any)

None.

Assignments and Examinations: Schedule/Due Dates

Weekly homework	10%
2- One Hour Exams	40%
1- Final Exam	30%
Project	20%
	100%

Final Examination or Project

The date and time of the final exam or project, along with links to the Final Exam Regulations, <https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information>, and Final Exam Schedule, <http://www.registrar.arizona.edu/schedules/finals.htm>

December 8, 2017 (Friday); 1:00 to 3:00 pm

Grading Scale and Policies

University policy regarding grades and grading systems is available at <http://catalog.arizona.edu/policy/grades-and-grading-system>

Late HWs without proper justification will not be accepted.

Composite grades will be calculated using the weight factors mentioned earlier. Students will then be grouped in to several sub-groups for the overall grading purpose.

Since it is a 400/500 course: Undergraduate and graduate students will be graded separately. Levels of sophistication used in the solution strategy of a problem will be used as one of the parameters in grading undergraduate and graduate students. Graduate students will be expected to do more work on the required project than the undergraduate students. Bonus questions, if assigned, will also be graded differently for undergraduate and graduate students.

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

Dispute of Grade Policy: Contact me immediately if you have any question or comment on the grade you receive following an exam.

Scheduled Topics/Activities

HWs will be due in one week period. Two Hour Exam dates will be announced at least 2 weeks in advanced.

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Some learning styles are best served by using personal electronics, such as laptops and iPads. These devices can be distracting to other learners. Therefore, students who prefer to use electronic devices for note-taking during lecture should use one side of the classroom.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Accessibility and Accommodations

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit <http://drc.arizona.edu>.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism, available at <http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

Student Assistance and Advocacy information is available at <http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Attachment

ABET 2010 Criteria Course Classification Form

Course Number CE 432 Course Name Advanced Structural Design in Steel
 Required? Circle: YES / NO Semester/Instructor Fall 2015/Haldar
 Homework Frequency? weekly Exam Frequency? Two (2) midterms & one (1) final
 Course Project? Circle: YES / NO Labs or Case Studies? Circle: YES / NO

For each of the following ABET outcome criteria, please list the level (**High, Medium, Low**, or blank if not applicable) contained in this course. The criteria descriptions that will be used by the College in the ABET evaluation are attached. Please describe the relevant course activities that you can use to justify why you think your course meets the criteria. **No course is expected to address all of these criteria and it would be rare to have more than 2 or 3 criteria at a high level (except a capstone course)** Be conservative in your judgment. For the ABET evaluation, we will assess student performance for criteria that are judged High. If you judge your course as High in a criteria, then the course should include a large percentage of effort (class time, homework, projects) devoted to the criteria. Note that 2 extra table entries are available for departments to specify their own criteria.

Outcome criteria	Level H M L	Relevant Activities
A. Apply mathematics, science and engineering principles	M	Advanced analysis of structures and application of principles of math/mechanics
B. Ability to design and conduct experiments and interpret data		
C. Ability to design a system, component, or process to meet desired needs	H	Design of a multi-story building and a plate girder
D. Ability to function on multidisciplinary teams	M	Work in a group to complete the building design project
E. Ability to identify, formulate, and solve engineering problems	H	Develop the building project from the conceptual stage to final product
F. Understanding of professional and ethical responsibility	L	Ethics in complicated engineering designs
G. Ability to communicate effectively	M	Develop a detailed engineering report
H. The broad education necessary to understand the impact of engineering solutions in a global context	L	Discussion of design of complicated structural systems around the world
I. Recognition of the need for and an ability to engage in life-long learning	L	Since design codes change frequently, how to stay up to date on design guidelines
J. Knowledge of contemporary issues		
K. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	M	Analysis of different types of structures and use of modern software for the analysis of structures.
L. Pass the FE exam as the first step towards professional registration	L	The course contents relate directly to the design of steel structures that is covered in the afternoon section of the FE exam
M. Be proficient in the major areas of civil engineering	M	Analysis and design of complicated steel structural systems – multi-story buildings, bridges

Optional: Comment on the overall strengths and shortcomings of the courses that are prerequisites to this course: