ENGR 323: Structural Analysis

Bulletin Description

ENGR 323: Structural Analysis (3 units)
Prerequisite: ENGR 309.

Structural engineering, including standards and codes. Determination of loads, discussion of load path. Analysis of statically determinate structures. Forces within statically indeterminate structures. Structural analysis software.

Spring Semester, 2017

Instructor: Dr. Cheng Chen
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Textbook:

Hibbeler, R.C., Structural Analysis, SFSU Edition, Person Prentice Hall, NJ

ISBN: 1323572287; 9781323572283

Coordinator:

Dr. Chen, Professor of Civil Engineering

Prerequisites by Topic:

1. Differential and integral calculus
2. Mechanics of rigid and deformable bodies
3. Basic experience in use of computers

Course Objectives:

1. Introduce students to structural engineering, including common standards and codes used in the field. [A.2, B.4, C.3]
2. Enable students to determine common loads on structures and recognize paths of load to ground. [A.2, B.1]
3. Develop student’s understanding of stability and determinacy. [A.2, B.1]
4. Enable students to determine internal forces and deformation for statically determinate structures using classical methods. [A.2, B.1, B.4]
5. Enable students to determine internal forces for statically indeterminate structures using classical methods. [A.2, B.1, B.4]
6. Develop student’s ability to correctly sketch structural deformations. [B.1]
7. Introduce students to structural analysis software. [A.2, B.1, B.3, B.4]
8. Develop student’s ability to work effectively in multi-disciplinary teams through use of cooperative learning techniques. [A.4]

Topics:

1. Introduction to structures and loads.
2. Analysis of statically determinate structure
3. Reactions for planar structures
4. Forces in statically determinate trusses
5. Forces in statically determinate beams and frames

1 Numbers in brackets refer to the educational objectives and outcomes of the School of Engineering.
6. Deflections by classical methods
8. Forces and deflections using computer software SAP2000
9. Introduction to statically indeterminate structures

Performance Criteria

Objective 1
1.1 Student is aware of the major phases of the structural engineering project. [2]
1.2 Student is aware of ASCE Standard 7 and the IBC. [1]

Objective 2
2.1 Student can obtain loads on structures using ASCE Standard 7. [1, 2, 3]
2.2 Student can determine the load path through common structures. [1, 2, 3]

Objective 3
3.1 Student recognizes when a structure is unstable and how to make it stable. [1, 2, 3, 4]
3.2 Student recognizes when a structure is indeterminate and the number of degrees. [1, 2, 3, 4]

Objective 4
4.1 Student is able to compute internal forces in beams and readily construct shear and moment diagrams. [1, 2, 3, 4]
4.2 Student is able to compute bar forces in trusses. [1, 2, 3, 4]
4.3 Student can use classical methods for computing deflections, such as, moment-area method and virtual work. [1, 2, 4]

Objective 5
5.1 Student can apply the method of consistent deformations for solving statically indeterminate trusses, beam and frames. [1, 2, 4]
5.2 Student can apply the method of moment distribution to solve statically indeterminate beams and frames. [1, 2, 4]

Objective 6
6.1 Student can make qualitatively correct sketches of deflections and moment diagrams for statically determinate beams and frames. [1, 2, 4]
6.2 Student can make qualitatively correct sketches of deflections and moment

Objective 7
7.1 Student is able to use a computer program (selected by instructor) to model and to solve problems similar to problems done “by hand.” [1]

Objective 8
8.1 Students are able to work effectively in teams. [1, 2]

Class Schedule

Lectures: Tuesday and Thursday: 12:35PM – 1:50PM
Location: HH 113
Office Hours: Tuesday: 2:00PM – 3:30PM
Friday: 11:00AM – 12:00PM

Evaluation:

1. Homework and Projects ................. 15 %
2. Two midterm exams ................. 20 % + 20%
3. Quizzes ...................................... 5 %
4. Final Exam ............................... 30 %
5. Attendance .............................. 10 %

Notes on Evaluation:

First midterm: Feb. 23, 2017
Second midterm: Apr. 06, 2017
Final exam: May 23, 2017, 10:45AM to 1:15PM

2 Numbers in brackets refer to the evaluation methods used to assess student performance
Grading Policy:

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<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>100 to 94</td>
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<td>A-</td>
<td>93 to 90</td>
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<td>B+</td>
<td>89 to 87</td>
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<td>B</td>
<td>86 to 84</td>
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<td>B-</td>
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Attendance Policy:

- **Attendance is mandatory.** Students missing six lectures or more need to withdraw from the class. You must come to class if you plan to pass the course. The information covered in class is essential for you to prepare for exams and quizzes.
- **No cell phone calls. No food.** Allowances for special circumstances or emergencies will be made on a case-by-case basis.
- Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. The DPRC is located in the student service building and can be reached by telephone (voice/TTY 415-338-2472) or by email (dprc@sfsu.edu). If you have a disability for which you are or may be requesting academic accommodations, please contact Dr. Chen as early as possible in the semester. You must have documentation before accommodations can be granted.

Student disclosures of sexual violence

SF State fosters a campus free of sexual violence including sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. If you disclose a personal experience as an SF State student, the course instructor is required to notify the Dean of Students. To disclose any such violence confidentially, contact: The SAFE Place - (415) 338-2208; http://www.sfsu.edu/~safe_plc/
Counseling and Psychological Services Center - (415) 338-2208; http://psychserv.sfsu.edu/
For more information on your rights and available resources: http://titleix.sfsu.edu

Homework and Exams:

- Homework will typically be due at the beginning of the lecture on the specified day. ZERO points will be given to late homework without justified excuses.
- Name, date, course number, and homework problem number should be placed at the top of each page.
- Homework and exams should be done on one side of the 8.5x11-in paper only; Neatness is of essence; each problem should be clearly labeled; multiple pages should be stapled in order at the top left corner; A straight edge should be used for all sketches, diagrams, and graphs; Units must be included in solution.
- Exams will be closed book and closed notes; Name, date and course number should be placed at the top of each page.
- No make-up midterm or final exams will be given except for emergency situations.

Policy on Add, Drop and Withdrawal:

Students are responsible for their class enrollments. Students should check their enrollment records periodically throughout the semester to ensure that the enrollment record is correct. Particularly, all students should check their enrollment record a day or two after any enrollment changes are made and take immediate action if the university record does not reflect the changes. Also make sure to maintain a record of any adds, drops, or withdrawals. First week through fourth week of instruction is the open add/drop period. No late add will be allowed after the deadline.

Policy on Observance of Religious Holidays:

If a student wishes to observe religious holidays and such observances require the student to be absent from class activities, it is the responsibility of the student to inform the instructor, in writing, about such holidays during the first two weeks of the class each semester. If such holidays occur during the first two weeks of the semester, the student must notify the instructor, in writing, at least three days before the date that he/she will be absent.

Policies on Academic Dishonesty:
You are expected to be honest and ethical in your academic work. Cheating and plagiarism are serious violations of the academic code of conduct. Students who have been found to be cheating will be notified by the professor. Furthermore, their act will be reported to the Office of Student Conduct (OSC). There is a “zero tolerance” policy in effect for cheating in this class. Any assignment or exam that is the product of cheating will be assigning a zero or “F” for that assignment.

**No excuses will be accepted if plagiarism is discovered.** Plagiarism is defined as using someone else’s ideas or work as one’s own without giving proper credit to the source. The sources include public (books, journals, magazines, newspapers, internet, etc.) as well as private (unpublished reports, internal documents, personal work, etc.) materials. The instructor will not accept excuses such as “I forgot to give credit to ....,” “It’s an oversight,” or “It’s a clerical error.” Students are solely responsible for materials submitted for the course so “My roommate must have done that without my knowledge” is not an acceptable excuse either. If a submitted work is found to contain plagiarized material, the work will receive zero credit and the student may be reported to the Student Judiciary Affairs for disciplinary actions. Disciplinary actions may include disqualification from the university.

**Disclaimer:**

All information on this syllabus is tentative, and the instructor reserves the right to make revisions as necessary.