San José State University
Department of Civil and Environmental Engineering
CE 160, Structural Analysis, Section 1, Spring 2019

Course and Contact Information

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Office Hours:	M 1030 – 1100 TR 1130 – 1220
Class Days/Time:	TR 1030 – 1120
Classroom:	Clark 222
Prerequisites:	CE 20, CE 112, ME 101

Course Format

Technology Intensive, Hybrid, and Online Courses

A computer with an internet connection is needed to access material used in this course. Homework problems should be completed on-line using **McGraw-Hill Connect**. Lab preparation will be assessed using on-line Google quizzes that will be emailed to the student. A significant portion of the laboratory work in this course will make use of active learning. The active learning model that will generally be followed:

Before Lab Activities

- Students study lesson content (eg. text reading, learning modules);
- Quiz on lesson content (Google quizzes);

Lab Activities

- Clarification of lesson content (review, questions);
- Practice lesson content (in-class activities);
- New information related to lesson content;

The preparatory material may consist of any or all of the following: reading assignments from the textbook, assigned problems, notes and learning modules made available on the course website at: http://www.sjsu.edu/people/steven.vukazich/Courses/CE160/index.html.

Active learning assignments for studying the preparatory material are indicated on the lab schedule portion of the syllabus. Note that the preparatory material and lab schedule is subject to change by the instructor. Any changes will be announced by the instructor either by in-class announcement or via MySJSU messaging.

Faculty Web Page and MYSJSU Messaging

Course materials such as the syllabus and homework solutions can be found on my faculty web page at www.sjsu.edu/people/steven.vukazich You are responsible for regularly checking with the messaging system through MySJSU to learn of any updates or announcements.

Course Description

Analysis of statically determinate beams, frames, and plane trusses. Force method of analysis of statically indeterminate structures. Applications to building design. Introduction to computer analysis.

Course Objectives and Learning Outcomes

Course Objectives

1. Introduce the student to the fundamentals of analysis of statically determinate planar structures;
2. Introduce the student to the fundamentals of analysis of indeterminate structures using the force methods of analysis;
3. Gain hands-on experience with the use of structural analysis software;
4. Become familiar with building analysis and building codes.

Course Learning Outcomes (CLO)

The learning outcomes listed support course objectives 1 through 4. The course objective and ABET outcome that each learning outcome supports is shown in parenthesis.

Upon successful completion of this course, students will be able to:

a. Identify the stability and determinacy of planar structures (Objective 1, ABET Outcome 1);
b. Apply the equations of static equilibrium to find unknown reactions and internal forces in statically determinate planar structures (Objective 1, ABET Outcome 1);
c. Find internal axial forces in statically determinate truss members using the method of joints and the method of sections (Objective 1, ABET Outcome 1);
d. Draw shear, moment, and axial force diagrams for statically determinate beams and frames (Objective 1, ABET Outcome 1);
e. Construct influence lines for statically determinate beams and simple trusses (Objective 1, ABET Outcome 1);
f. Use influence lines to find maximum load effects in beams (Objective 1, ABET Outcome 1);
g. Calculate deflections for statically determinate beams using direct integration (Objective 1, ABET Outcome 1);
h. Calculate deflections for statically determinate trusses using the method of virtual work (Objective 1, ABET Outcome 1);
i. Calculate deflections for statically determinate beams and frames using the method of virtual work (Objective 1, ABET Outcome 1);
j. Use the force method of analysis to analyze statically indeterminate beams and frames (Objective 2, ABET Outcome 1);

k. Use the structural analysis program SAP 2000 to set up problems and solve for reactions, joint displacements, and internal forces for planar structures subjected to various loads (Objective 3, ABET Outcome 6);

l. Calculate dead, live, and earthquake loads for simple buildings as prescribed by the latest International Building Code (Objective 4, ABET Outcome 4).

Required Texts/Readings

Textbook

Leet, "Fundamentals of Structural Analysis" 5th Edition (Custom text for SJSU CE 160 with Connect package available at SJSU Bookstore). ISBN 9781260207286

Course Requirements and Assignments

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Final Exam

The final exam will be **Closed-Book**, **Closed-Notes**. One standard 3 inch by 5 inch index card (front and back) is allowed for the final exam.

Bring a calculator, pencil, eraser, and SJSU 8.5x11 Green Book (available at the SJSU Bookstore) for the final exam. Please do not use pens on the final exam.

No phones or electronic devices will be allowed to be used during the final exam. All phones and electronic devices must be switched off and put away during the final exam.

Instructor permission is required to leave the classroom for bathroom visits or other reasons during the final exam.

SJSU Final Exam Policy can be found at:

http://info.sjsu.edu/web-dbgen/narr/catalog/rec-16332.16734.html

Any rescheduled final exam, per SJSU final exam policy, will consist of an exam that is different than the regularly scheduled final and will, in most cases, be scheduled on the final exam make-up day published in the SJSU final exam schedule.

The final exam must be completed in order to complete the course.

Quizzes

Three 30-minute **Closed-Book** and **Closed-Notes** quizzes will be held at the end of the class period on the dates indicated on the schedule.

Bring a calculator, pencil, and eraser for quizzes. Please do not use pens on quizzes.

No make-up quizzes will be given: a missed quiz will be excused for valid reasons per SJSU policy (reported in advance if possible). If a quiz is missed for valid reasons, the course grade will be based on the remaining course work.

Homework

Homework problems for the material covered will be assigned approximately weekly and should be completed on-line using **McGraw-Hill Connect**. It is highly recommended that students take advantage of the resources available in Connect to aid in learning the CE 160 material. In addition to the on-line

homework, **some homework problems will be assigned by the instructor to be completed by hand and turned in on the due date given in class.**

Timely completion and understanding of the homework is essential for learning the material and performing well on the quizzes and final exam. It is the responsibility of the individual student to verify, in detail, the correctness of the final results, calculations, diagrams, and solution methodology for each homework problem. For this purpose, homework solutions will be made available via Connect or the course website.

Laboratory

Each laboratory assignment is worth 10 points and the laboratory activity will usually consist of three parts:

1. Preparatory material to study before the lab period usually accompanied by a Google Quiz to be completed before the lab meeting (3 points)
2. Review and questions on preparatory material. More detailed discussion on the laboratory topic (30 – 60 minutes).
3. The remaining time will be spent working on the laboratory assignment that will, in most lab sessions, consist of a problem solving activity. Each student will complete the assignment. When the lab assignment is completed, it will be checked by the instructor. When the lab assignment is complete and correct, the student will receive the remaining credit for the lab (7 points).

Note that the final exam and quizzes may contain questions on the material covered in the laboratory portion of the course.

All laboratory assignments and the final exam must be completed in order to complete the course.

Determination of Grades

Grades are assigned based on class performance on quizzes, lab assignments, homework, and the final exam with the weights listed below:

Quizzes (15% each)	45%
Lab Assignments	10%
Homework	10%
Final Exam	35%

Course grades are assigned based on a total of 100 points possible for the course with standard decimal rounding (i.e. 0.5 and greater rounded up). If the median score on any individual exam or quiz is less than 65%, all scores will be adjusted to bring the median score on that particular exam or quiz to 65%. For example, if the class median score on quiz 2 is 62/100, 3 points will be added to the score of each exam to bring the median to 65/100. The final course grades will be assigned according to the following grading scale:

	A	**B**	**C**	**D**	**F**
Plus	> 98	88-87	76-75	64-62	
	98-91	86-79	74-67	61-54	< 50
Minus	90-89	78-77	66-65	53-50	

No extra credit options will be available in this course.

CEE Policy on Enforcement on Prerequisites for Undergraduate Courses

All **undergraduate** students must hand in the following documents (as appropriate) to the class instructor at the beginning of the **third class meeting**:

1. A transcript (unofficial) showing that the student has the prerequisites and co-requisites for the course with the required grade.
2. A copy of the assist.org document showing the equivalency for any prerequisite or co-requisite if the course was taken at another university or a community college.
3. A signed equivalency form, if the prerequisite was taken at a college for which an assist.org document is not available.
4. For courses that require junior and/or senior standing, the instructor will check the class roster to verify the required standing.

Students who do not meet the prerequisites will be dropped from the course. Students who are enrolled in the class at the beginning of the semester and fail to produce the appropriate documents by the beginning of the third class meeting will be dropped from the course.

Students who were not enrolled in the class at the beginning of the semester will produce the required document(s) by the beginning of the third class meeting after enrolling in the course. Such students, who fail to produce the appropriate document(s) by the beginning of the third class meeting after enrolling in the course, will be dropped from the course.

The package that all undergraduate students must turn in (no emailed packages will be accepted) for CE 160 at or before the third class meeting (August 28, 2018) is:

CE 20

- Taken at SJSU – **copy of SJSU unofficial transcript;**
- Taken at California Community College – **Assist.org printout(s) for the appropriate community college or the articulation page that can be found at http://info.sjsu.edu/web-dbgen/artic/all-school-to-school.html** showing course equivalency to **CE 20** or course equivalency to **both ME 20 and ME 30 and a copy of unofficial transcript(s);**
- Taken at other colleges **- Signed Equivalency form(s) and a copy of unofficial transcript(s).**

CE 112

- Taken at SJSU – **copy of SJSU unofficial transcript;**
- Taken at other colleges **- Signed Equivalency form and copy of unofficial transcript.**

ME 101

- Taken at SJSU – **copy of SJSU unofficial transcript;**
- Taken at other colleges **- Signed Equivalency form and copy of unofficial transcript.**

Please use a highlighter to indicate the equivalent courses on your transcripts

Classroom Protocol

Lecture

Please make every effort to arrive on time: turn off and put away cell phones, laptop computers, and any other electronic devices during lecture (unless you have permission from the instructor). Instructor permission is required for use of laptop computers, tablets, and other electronic devices during class or lab.

If you do happen to arrive to class late, please enter and take your seat quietly.

Laboratory

It is critical that all students arrive on time for all laboratory sessions. **Please contact the instructor if you will be late or must miss a lab**. Turn off and put away cell phones, tablets, laptop computers, and any other electronic devices during lab (unless you have permission from the instructor).

Students using cell phones, laptop computers, or other electronic devices without the consent of the laboratory instructor will be subject to a penalty of 3 points.

Students arriving more than 5 minutes late to lab without prior notification of the instructor will receive a 3-point penalty. Students arriving more than 15 minutes late or miss the entire lab without notifying the instructor in advance (if possible) must complete the lab with a 5-point penalty.

Office Hours

Phone and email communication is most appropriate for administrative matters (notification of illness, scheduling appointments, etc.).

Because of the extensive use of Free Body Diagrams and figures, detailed solution strategy to homework problems or other course material is best discussed in person during scheduled office hours and not via phone or email.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

CE 160 Structural Analysis, Spring 2019, Course Schedules

Note that the schedule is subject to change with fair notice announced in class or via SJSU messaging.

Lecture Schedule

Week	Date	Lecture Topics (tentative), Lecture Modules in < >, and Text Sections in [ ]
1		
	1/24	Introduction, Syllabus
2	1/29	Review of Statics Idealization, F.B.D.; <160.3.1–160.3.7>; [3.1-3.5]
	1/31	Supports, Equations of Equilibrium; <160.3.1–160.3.7>; [3.6-3.7]; **prerequisite documents due**
3	2/5	160.3.8 General Determinacy; <160.3.8>; [3.8–3.10, 5.7]
	2/7	160.3.9 Stability; <160.3.9>; [3.8–3.10, 5.7]
4	2/12	Trusses – Determinacy and Stability; <160.4.1–160.4.3>; [4.7]
	2/14	Trusses - Method of Joints; <160.4.4>; [4.1–4.5]
5	2/19	Zero-Force Members; <160.4.5>; [4.1–4.5]
	2/21	Trusses - Method of Sections, <160.4.6>; [4.6]
6	2/26	Internal Forces – V and M Diagrams for Beams; <160.5.1–160.5.3>; [5.1–5.4]

Week	Date	Lecture Topics (tentative), Lecture Modules in < >, and Text Sections in [ ]
	2/28	**Quiz 1**
7	3/5	Internal Forces – V, M, and Axial Force Diagrams for Frames; <160.5.4>; [5.1–5.4]
	3/7	Constructing Influence Lines for Beams; <160.12.1, 160.12.2>; [12.1–12.3]
8	3/12	Muller-Breslau Principle; <160.12.3>; [12.4]
	3/14	Using Influence Lines for Beams; <160.12.4, 160.12.5>; [12.5]
9	3/19	Using Influence Lines for Beams; <160.12.4, 160.12.5>; [12.5]
	3/21	Influence Lines for Trusses; <160.12.6>; [12.7]
10	3/26	Deflections: Double Integration; <160.7.1–160.7.3>; [7.1-7.2]
	3/28	**Quiz 2**
	4/2	**Spring Recess**
	4/4	**Spring Recess**
11	4/9	Deflections: Double Integration, Tabulated Solutions; <160.7.3>; [7.1–7.2, 7.6]
	4/11	Method of Virtual Work: Trusses; <160.8.1, 160.8.2>; [8.1–8.5]
12	4/16	Deflections: Method of Virtual Work: Trusses; <160.8.3, 160.8.4>; [8.5]
	4/18	Deflections: Method of Virtual Work: Trusses; <160.8.3, 160.8.4>; [8.5]
13	4/23	Deflections: Method of Virtual Work: Beams; <160.8.5, 160.8.6>; [8.6]
	4/25	Deflections: Method of Virtual Work: Support settlement; <160.8.7, 160.8.8>; [8.6]
14	4/30	Deflections: Method of Virtual Work: Frames; <160.8.9>; [8.6]
	5/2	**Quiz 3**
15	5/7	Indeterminate Structures (Flexibility Method); <160.9.1>; [9.1-9.5]
	5/9	Indeterminate Structures (Flexibility Method) ;<160.9.2>; [9.1-9.5], Review
Final Exam	**5/16**	**0945-1200** in the lecture classroom **Final exam time and date per SJSU Spring 2019 Final Exam Schedule**

Laboratory Schedule

Lab Number	Laboratory Topic; <Module Review>; [Text Reading]
1	Statics Review; <160.3.1–160.3.6>; [3.1-3.7]
2	V and M Diagrams for Beams; <160.5.1–160.5.3>; [5.1-5.4]
3	Building Design –Tributary Area; <160.L3.1–160L3.3>; [2.1-2.3]
4	Building Design –Dead Load; <160.L4.1, 160.4.6, 160.5.3>; [2.1-2.3]
5	Building Design – Live Load; <160.L5.1, 160.5.3>; [2.4]
6	SAP2000 – Basics for Analysis, Beam Analysis; <160.L6.1>; [1.7]
7	SAP2000 - Frame Analysis; <160.L7.1>; [1.7]
8	Influence Lines; <160.L8.1, 160.12.1–160.12.3>; [12.1-12.5]
9	Building Design - Earthquake Load I; <160.L9_10.1>; [2.6, 2.9]
10	Building Design - Earthquake Load II; <160.L9_10.1>; [2.9]
11	Stiffness Method: Beam Analysis; <160.L11.1>; [16.1-16.4, 16.7]
12	Deflections using Virtual Work; <160.L12.1>; [8.1-8.6]
13	Indeterminate Analysis; <160.L13.1, 160.8.9>; [9.1-9.5]

Note that the schedule below is subject to change with fair notice given in class or via SJSU messaging.

Monday		**Tuesday**		**Thursday**	
Date	**Lab**	**Date**	**Lab**	**Date**	**Lab**
				1/24	**No Lab**
1/28	1	1/29	1	1/31	1
2/4	2	2/5	2	2/7	2
2/11	3	2/12	3	2/14	3
2/18	4	2/19	4	2/21	4
2/25	5	2/26	5	2/28	5
3/4	6	3/5	6	3/7	6
3/11	7	3/12	7	3/14	7
3/18	8	3/19	8	3/21	8
3/25	9	3/26	9	3/28	9
4/1	**Recess**	4/2	**Recess**	4/4	**Recess**
4/8	10	4/9	10	4/11	10
4/15	conference	4/16	11	4/18	11
4/22	11	4/23	12	4/25	12
4/29	12	4/30	13	5/2	13
5/6	13	5/7	open	5/9	open
5/13	open				