San José State University  
Department of Civil and Environmental Engineering  
CE 95, Theory and Application of Statics  
Section 1, Spring 2019

Course and Contact Information

Instructor: Steven Vukazich
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Email: Steven.Vukazich@sjsu.edu
Office Hours: M 1030 – 1100
TR 1130 – 1220
Class Days/Time: TR 0900 – 1015
Classroom: ENG 339
Prerequisites: MATH 31, PHYS 50

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. This course will make use of active learning. The active learning model that we will generally follow in this course:

Before Class Activities
- Students study lesson content (eg. text reading, learning modules);
- Quiz on lesson content (usually Google quizzes);
- Limited Introductory Practice (eg. assigned problems);

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

After Class Activities
- Reflection on lesson content;
- In-depth Practice (eg. homework problems on Connect).

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/ce_95/index.html. Active learning assignments for studying the preparatory material will be made 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

Detailed study of bodies in equilibrium to provide background for advanced study of engineering mechanics. Applications to general three-dimensional bodies and structural systems. Topics include free body diagrams, centroids, internal forces, distributed loads, moments of inertia and friction.

Course Objectives and Student Course Objectives and Learning Outcomes

Course Objectives

1. Introduce the student to the fundamentals of analysis of bodies and structures in static equilibrium;
2. Introduce the student to the concepts of centroid and center of gravity and the mathematical calculations involved in finding the centroid of a two-dimensional area;
3. Introduce the student to the concept of moment of inertia and the mathematical calculations involved in finding moments of inertia of two-dimensional areas.

Course Learning Outcomes (CLO)

The learning outcomes listed support course objectives 1 through 3. 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. Express a vector in terms of components (Objective 1, ABET Outcome A);
b. Find the vector and scalar product of vectors (Objective 1, ABET Outcome A);
c. Draw Free Body diagrams (F.B.D.) of two and three-dimensional structures, or their components, with all loads and reactions correctly applied (Objective 1, ABET Outcome A);
d. Express forces on two- and three-dimensional bodies in terms of an equivalent force and couple system (Objective 1, ABET Outcome A);
e. Analyze truss structures using the method of joints and method of sections; (Objective 1, ABET Outcome A);
f. Analyze frames and machines (Objective 1, ABET Outcome A);
g. Find shear and bending moment forces in beams (Objective 1, ABET Outcome A);
h. Analyze simple structures acted on by friction (Objective 1, ABET Outcome A);
i. Find centroids and centers of gravity of two-dimensional bodies by integration (Objective 2, ABET Outcomes A);
j. Find centroids and centers of gravity of two-dimensional composite bodies (Objective 2, ABET Outcome A);
k. Calculate moments of inertia of various shapes by integration (Objective 3, ABET Outcome A);
l. Calculate moments of inertia of composite shapes using the parallel axis theorem (Objective 3, ABET Outcome A);
Required Texts/Readings

Textbook


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 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 quizzes are 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 95 material. In addition to the on-line homework, some homework problems may 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.

Active Learning Assignments

Each active learning activity will usually consist of three parts:

1. Preparatory material to study before the lecture period usually accompanied by a Google Quiz to that must be completed before the beginning of the lecture period for credit (5 points);
2. Review and questions on preparatory material. More detailed discussion on the topic;
3. In-class activity. The objective of the in-class activity is for each student to practice lesson content (10 points).

Determination of Grades

Grades are assigned based on class performance on exams and labs with the weights listed below:

- Three in-class Quizzes (15% each) 45%
- Active Learning Assignments 10%
- Homework Assignments 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:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plus</td>
<td>&gt; 98</td>
<td>88-87</td>
<td>76-75</td>
<td>64-62</td>
<td>&lt; 50</td>
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<tr>
<td></td>
<td>98-91</td>
<td>86-79</td>
<td>74-67</td>
<td>61-54</td>
<td></td>
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<td>Minus</td>
<td>90-89</td>
<td>78-77</td>
<td>66-65</td>
<td>53-50</td>
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</tbody>
</table>

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 95 at or before the third class meeting (August 28, 2018) is:

**Math 31**
- Taken at SJSU: [SJSU unofficial transcript](#);
- Taken at California Community College: [http://info.sjsu.edu/web-dbgen/artic/all-school-to-school.html](http://info.sjsu.edu/web-dbgen/artic/all-school-to-school.html) or Assist.org printout(s) and unofficial transcript(s) showing course equivalency to Math 31;
- Taken at other colleges: **Signed Equivalency form and unofficial transcript.**

**Phys 50**
- Taken at SJSU: [SJSU unofficial transcript](#);
- Taken at California Community College: [http://info.sjsu.edu/web-dbgen/artic/all-school-to-school.html](http://info.sjsu.edu/web-dbgen/artic/all-school-to-school.html) or Assist.org printout(s) and unofficial transcript(s) showing course equivalency to Phys 50;
- Taken at other colleges: **Signed Equivalency form and 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 as we will be making use of the classroom time to perform active learning exercises: 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 and other electronic devices during class.

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

**Office Hours**

Phone and email communication is most appropriate for administrative matters (notification of illness, scheduling appointments, clarification of homework problems, 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](http://www.sjsu.edu/gup/syllabusinfo/) at http://www.sjsu.edu/gup/syllabusinfo/
CE 95, Theory and Application of Statics, Spring 2019, Course Schedule

Note that the schedule below is subject to change with advance notice given in class.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture Topics (tentative), Lecture Modules in &lt; &gt;, and Text Sections in [ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/24</td>
<td>Introduction, Vector Operations, Force Vectors; &lt;95.2.1&gt;; [2.1-2.2]</td>
</tr>
<tr>
<td>2</td>
<td>1/29</td>
<td>Force Systems, Vector Addition, Scalar Components; &lt;95.2.2, 95.2.3&gt;; [2.2–2.3]</td>
</tr>
<tr>
<td></td>
<td>1/31</td>
<td>2-D Equilibrium of a Particle, Free Body Diagram (F.B.D.); &lt;95.2.4, 95.2.5&gt;; [2.3] <strong>Prerequisite documents due</strong></td>
</tr>
<tr>
<td>3</td>
<td>2/5</td>
<td>2-D Equilibrium of a Particle, Free Body Diagram (F.B.D.); &lt;95.2.4, 95.2.5&gt;; [2.3]</td>
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<tr>
<td></td>
<td>2/7</td>
<td>Forces in 3-D space, Scalar Components; &lt;95.2.6 –95.2.8&gt;; [2.4]</td>
</tr>
<tr>
<td>4</td>
<td>2/12</td>
<td>Forces in 3-D space, Scalar Components; &lt;95.2.6 –95.2.8&gt;; [2.4]</td>
</tr>
<tr>
<td></td>
<td>2/14</td>
<td>Equilibrium of a Particle in Space; &lt;95.2.9&gt;; [2.5]</td>
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<tr>
<td>5</td>
<td>2/19</td>
<td>Forces on Rigid Bodies, 95.3.2 Vector (Cross) Product; &lt;95.3.1&gt;; [3.1]</td>
</tr>
<tr>
<td></td>
<td>2/21</td>
<td>Forces on Rigid Bodies, 95.3.2 Vector (Cross) Product; &lt;95.3.1&gt;; [3.1]</td>
</tr>
<tr>
<td>6</td>
<td>2/26</td>
<td>Moment of a Force about a Point; &lt;95.3.3– 95.3.5&gt;; [3.1]</td>
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<tr>
<td></td>
<td>2/28</td>
<td>Moment of a Force about a Point; &lt;95.3.3– 95.3.5&gt;; [3.1] <strong>Quiz 1</strong></td>
</tr>
<tr>
<td>7</td>
<td>3/5</td>
<td>Scalar (Dot) Product, Moment of a Force about an axis; &lt;95.3.6, 95.3.7&gt;; [3.2A and C]</td>
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<tr>
<td></td>
<td>3/7</td>
<td>Moment of a Couple, Reduction of Force Systems; Equivalent Force Systems; &lt;95.3.8–95.3.10&gt;; [3.3]</td>
</tr>
<tr>
<td>8</td>
<td>3/12</td>
<td>2-D Supports, Free Body Diagram (F.B.D.); &lt;95.4.1, 95.4.2&gt;; [4.1A]</td>
</tr>
<tr>
<td></td>
<td>3/14</td>
<td>2-D Equilibrium; &lt;95.4.3&gt;; [4.1A]</td>
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<tr>
<td>9</td>
<td>3/19</td>
<td>Solution of Equations of Equilibrium for 2-D Rigid Bodies; &lt;95.4.4&gt;; [4.1B]</td>
</tr>
<tr>
<td></td>
<td>3/21</td>
<td>Equilibrium of 2 and 3 Force Bodies; &lt;95.4.5–95.4.7&gt;; [4.2]</td>
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<tr>
<td>10</td>
<td>3/26</td>
<td>Equilibrium of 2 and 3 Force Bodies; &lt;95.4.5–95.4.7&gt;; [4.2]</td>
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<td></td>
<td>3/28</td>
<td>Trusses - Method of Joints; &lt;95.6.1, 95.6.2&gt;; [6.1A and B] <strong>Quiz 2</strong></td>
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<tr>
<td>11</td>
<td>4/2</td>
<td><strong>Spring Recess</strong></td>
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<td></td>
<td>4/4</td>
<td><strong>Spring Recess</strong></td>
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<tr>
<td></td>
<td>4/9</td>
<td>Trusses - Method of Joints; &lt;95.6.1, 95.6.2&gt;; [6.1A and B], Trusses - Method of Sections; &lt;95.6.3&gt;; [6.2A]</td>
</tr>
<tr>
<td></td>
<td>4/11</td>
<td>Frames, Machines; &lt;95.6.4, 95.6.5&gt;; [6.3A and B, 6.4]</td>
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<tr>
<td>Week</td>
<td>Date</td>
<td>Lecture Topics (tentative), Lecture Modules in &lt; &gt;, and Text Sections in [ ]</td>
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<td>--------------------------------------------------------------------------</td>
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<tr>
<td>12</td>
<td>4/16</td>
<td>Dry Friction; &lt;95.8.1&gt;; [8.1]</td>
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<tr>
<td></td>
<td>4/18</td>
<td>Dry Friction Problems; &lt;95.8.2, 95.8.3&gt;; [8.1C]</td>
</tr>
<tr>
<td>13</td>
<td>4/23</td>
<td>Centroids, Center of Gravity of a 2-D Body, Centroids of Composite Areas, Centeroids by Integration &lt;95.5.1–95.5.3&gt;; [5.1, 5.2A]</td>
</tr>
<tr>
<td></td>
<td>4/25</td>
<td>Centroids of Composite Areas; &lt;95.5.2–95.5.3&gt;; [5.2A]</td>
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<tr>
<td>14</td>
<td>4/30</td>
<td>Distributed Loads; &lt;95.5.4, 95.5.5&gt;; [5.3A]</td>
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<td></td>
<td>5/2</td>
<td>Parallel-Axis Theorem, Moment of Inertia (MOI), Radius of Gyration; &lt;95.9.1, 95.9.2&gt;; [9.1] <strong>Quiz 3</strong></td>
</tr>
<tr>
<td>15</td>
<td>5/7</td>
<td>Parallel-Axis Theorem, MOI of Composite Areas; &lt;95.9.3, 95.9.4&gt;; [9.1-9.2]</td>
</tr>
<tr>
<td></td>
<td>5/9</td>
<td>Internal Forces V and M diagrams for beams; &lt;95.7.1, 95.7.2&gt;; [7.1, 7.2]</td>
</tr>
<tr>
<td>Final Exam</td>
<td>5/17</td>
<td><strong>0715-0930 in the lecture classroom</strong>&lt;br&gt;<strong>Final exam time and date per SJSU Spring 2019 Final Exam Schedule</strong></td>
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</tbody>
</table>