**CE225**

Course Syllabus

1/1/2018

Part I Course Organization

**CE225 Mechanics of Deformable Bodies(3units)**

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| Lecture: KAP145 | Mon 9:00-9:50am | | | Wed 9:00-9:50am | | Fri 9:00-9:50am | |
| Discussion (1of 1) | Fri 10-10:50am KAP147 | | |  | |  | |
| Professor | Vincent Lee | | | | | | |
| Office | KAP230B | | | | | | |
| Phone | 213-7400568 | | | | | | |
| Email | Through https://blackboard.usc.edu and https://piazza.com | | | | | | |
| Office Hours | MW 10:00-11:00am other times through Piazza | | | | | | |
| Teaching Assistant | tbd | | | | | | |
| Office | Meeting at KAP239 | | | | | | |
| Email | Through https://blackboard.usc.edu and https://piazza.com | | | | | | |
| Office Hours | tbd | | | | | | |
| Prerequisites | CE205, Statics | | | | | | |
| Textbook(s) | **F. P. Beer, E. R. Johnston, J. T. DeWolf & D. F. Mazurek**  **Mechanics of Materials 7th ed McGraw-Hill ISBN10: 9814595241** | | | | | | |
| References |  | | | | | | |
| Course Descriptions | **Analysis of stress and strain; axial, flexural, and torsional behavior of slender bars; elastic deflections; combined stresses; introduction to elastic stability and energy methods.** | | | | | | |
| Course Objectives | **Students will understand the design process and learn approaches used to solve various engineering problems that are representative of those found in a professional environment. They will practice decision-making skills as they apply their knowledge of basic sciences, mathematics, and the engineering sciences to convert resources optimally to meet the stated needs of a project.** | | | | | | |
| Learning Objectives | **This course will cover the design of beams subjected to vertical, horizontal and moment loads.** | | | | | | |
| Policies on: |  | | | | | | |
| Late work | Partial Credit | | | | | | |
| Make-up work | Partial Credit | | | | | | |
| Incomplete work | Partial Credit | | | | | | |
| Extra credit | Case by case | | | | | | |
| Finalgrade schema isbasedon the following percentagesof gradedcoursework : | | | | | | | |
| Homework | 7 | % |  | |  | |  |
| Best 11Quizzes | 33 | % |  | |  | |  |
| Midterms& Final | 60 | % |  | |  | |  |
| Total | 100 | % |  | |  | |  |

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| **CE225 Mechanics of Deformable Bodies Spring 2018 Class Schedule** | | | | | |  |
| **Week** | **Date** | **Topics** | **Assignments** | **Problem**  **Set** | **Quiz** | |
| **1** | **Jan**  **8-12** | **Review CE205, Statics; Axially Loaded Bars** | **2/5-8** | **#1** |  | |
| **2** | **Jan**  **15-19** | **Jan15 M.L.King Holiday; Axially Loaded Bars** | **2/9** | **#2** | **Mon #1** | |
| **3** | **Jan**  **22-26** | **Poisson’s Ratio, 3D Hooke’s Law**  **Normal & Shear Stresses** | **2/11**  **1/1-6** | **#3** | **Mon#2** | |
| **4** | **Jan29**  **-Feb2** | **Torsion of Circular Bars** | **3/1-5** | **#4** | **Mon#3** | |
| **5** | **Feb**  **5-9** | **Torsion (cont.)** | **3/5-8** | **#5** | **Mon#4** | |
| **6** | **Feb**  **12-16** | **MT#1 on Wed Feb14;**  **Fri: Shear-Moment Diagram(Review);** | **5/1-5** | **#6** | **Mon #5** | |
| **7** | **Feb**  **19-23** | **Feb19 President’s Day;**  **Bending Stresses in Beams;** | **4/1-5** | **#7** | **Wed #6** | |
| **8** | **Feb26**  **-Mar2** | **Bending Stresses in Beams (cont.); Beam Design** | **4/5-6** | **#8** | **Mon#7** | |
| **9** | **Mar**  **5-9** | **Shear Stresses in Beams** | **6/1-5** | **#9** | **Mon#8** | |
| **10** | **Mar**  **12-16** | **Spring Recess** | | | | |
| **11** | **Mar**  **19-23** | **Shear Stresses (cont.)** | **6/5-6** | **#10** | **Mon#9** | |
| **12** | **Mar**  **26-30** | **MT#2 on Mon; Transformation of Stresses** | **7/1-3** | **#11** |  | |
| **13** | **Apr**  **2-6** | **Mohr’s Circle** | **7/4-6** | **#12** | **Mon#10** | |
| **14** | **Apr**  **9-13** | **Deflections of Beams** | **9/1-4** | **#13** | **Mon#11** | |
| **15** | **Apr**  **16-20** | **Deflections of Statically-Indeterminate Beams** | **9/5,7,8** | **#14** | **Mon#12** | |
| **16** | **Apr**  **23-27** | **More Beam Deflections; Moment-Area Method, Review or MT#3(?) on Fri** | **9/9** | **#15** | **Mon#13** | |
|  | **May4** | **Fri 8-10am Final** |  |  |  | |
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|  | **May11** | **Friday: Commencement** |  |  |  | |
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**STATEMENT ON ACADEMIC INTEGRITY**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own.

All students are expected to understand and abide by these principles. *SCampus,* the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A:

<http://www.usc.edu/dept/publications/SCAMPUS/gov/>

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at:

<http://www.usc.edu/student-affairs/SJACS/>

**STATEMENT FOR STUDENTS WITH DISABILITIES**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible.

***DSP Contact Information***

**OFFICE LOCATION**

**STU301**

**HOURS OF OPERATION**

**8:30 a.m.until5:00p.m.,MondaytoFriday**

**PHONE NUMBER**

**(213)740-0776**

Part II Detailed Course

Objectives



**Course Description:** Analysis of stress and strain; axial, flexural, and torsional behavior of slender bars;

elastic deflections; combined stresses; introduction to elastic stability and energy methods. **Required for:** BSCE, BSCE Structural, BSCE Building Science, and BSCE Environmental **Prerequisites:** CE 205 Statics

**Co-Requisite:** none

**Required Textbook:** Beer, Johnston & DeWolf, *Mechanics of Materials,* 4h ed. (2006)

**Reference:** none

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| **Topics Covered** J **Learning Outcomes** | |
| Analysis of stress and strain; flexual and torsional behavior of slender bars; elastic deflections;  combined stresses;  introduction to elastic stability and energy methods | Students will understand the following topics, and perform analyses and calculations in these areas of study  1. Internal forces of members subjected to axial and torsional loads  2. Stress and strain, 1-D and generalized Hooke’s Law Stresses, strains and deformations of axially loaded members  3. Stresses, strains and rotations of torsionally loaded circular bars  4. Normal and shear bending stresses in beams  5. Combined stresses, Mohr's circle  6. Beam Deflections in statically determinate and indeterminate problems  7. Design of beams subjected to vertical, horizontal and moment loads |
| Analysis of the internal forces and moments of a structure | 8. Determine the axial forces of both statically determinate and indeterminate members  9 Determine the axial torques in both statically determinate and indeterminate circular solid and hollow shafts  10. Determine the internal shears, moments and axial force reactions in beams, and draw the Shear and moment diagrams |
| Analysis of stress | 11. Determine the internal stresses of statically determinate and indeterminate members  12. Determine the internal stresses of statically determinate and indeterminate circular solid and hollow shafts  13. Determine the normal and shear bending stresses in rectangular beams, beams with flanges and built up beams of various shapes  14. Determine the principal and maximum shear stresses by the transformation formula and/or Mohr's circle for plane stress |
| Deflections in a loaded beam | 15. Calculate beam deflections by direct integration, superposition and moment-area methods  16. Analyze the statically indeterminate beams |

Page **7**

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| **Lecture and Lab Schedule** | | | |
| **Lecture** | | **Discussion** | |
| Sessions per Week | Duration per Session | Session per Week | Duration per Session |
| 3 | 50min | 1 | 50min |

**Contribution of Course to Meeting the Professional Component**

**Engineering Topics 1 Design**

Students will understand the design process and learn approaches used to solve various engineering problems that are representative of those found in a professional environment. They will practice decision-making skills as they apply their knowledge of basic sciences, mathematics, and the engineering sciences to convert resources optimally to meet the stated needs of a project

This course will cover the design of beams subjected to vertical, horizontal and moment loads.

**Engineering Topics 1 other**

Constraints and Considerations. Students will understand the diverse constraints and considerations that are representative of what they will encounter in an engineering practice. This course covers the following topics:

Economic **1** Manufacturability

**Relation of Course**

**Objectives to Program Outcomes**

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

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| 1. An ability to apply knowledge of mathematics, science, and engineering. 2. Recognize the need for and to engage in lifelong learning. |  |

This course contributes to the program outcomes as outlined in the adjacent table:

**Prepared by:** V. Lee

Professor of Civil Engineering

**Date:** Spring 2016

Page**8**