



UNIVERSITY OF ARIZONA  
Department of Civil Engineering and Engineering Mechanics

**CE 215 - MECHANICS OF SOLIDS, Policy and Syllabus – Spring 2017**

**Catalog Description:** (3 units) Material behavior; relationship between external forces acting on elastic and inelastic bodies and the resulting behavior; stress and deformation of bars, beams, shafts, pressure vessels; stress and strain; combined stresses; columns.

**Instructor:** George N. Frantziskonis, Room 206A, Civil Engineering Building  
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**Lecture:** Section 1, MWF 11:00-11:50 Harvill, Room 301  
**Office hours:** M 1:00 –2:00pm, W 1:00-2:30pm. See TA office hours for recitations and homework.

**Teaching Assistant:** Hadi Hafezi, Civil Engineering Building  
**Email:** [hafezi@email.arizona.edu](mailto:hafezi@email.arizona.edu)  
**Office hours:** Wedn. 5:00pm-6:30pm, Fri. 9:00am-10:30am in Civil Engr. Bldg. Rm 318  
**Grader:** Francisco Villegas, [fcovillegas@email.arizona.edu](mailto:fcovillegas@email.arizona.edu)  
**Recitations:** Tuesdays, 5:00pm-5:50pm, Chavez room 307  
Thursdays, 5:00pm-5:50pm, Chavez room 307  
Fridays, 3:00pm-3:50pm, Chavez room 307

**Prerequisite:** CE 214 – Statics

**Textbook:** Mechanics of Materials, by R. C. Hibbeler, 10<sup>th</sup> Edition, Pearson Publications. Textbook (hardcopy or electronic, and Mastering Engineering)

**Weights for course grade:**

10 points – homework,  
54 points – 3 tests @ 18 points each,  
31 points – final exam,  
5 points attendance (main lecture and recitations)

**Scale for final grade:**

A Outstanding	90 - 100
B Above Average	80 < 90
C Average	70 < 80
D Below Average	60 < 70
E Failure	< 60

*The cutoffs for grades may be lower, but will not be higher (I will not raise the standards mid-semester). The course grades are not curved. I feel very strongly that learning should be measured with a standard (maybe a high standard, but a standard none the less) and that you should not be directly competing with anyone other than yourself. I fully expect everyone in the course to be successful and if you are having problems, then you must initiate a process for improvement.*

## **COURSE CONTENT**

Homework problems and due dates will be posted in D2L and also emailed to all students.

<u>Week of</u>	<u>ARTICLES</u>
Jan. 11	Axially Loaded Bar, Normal Stress, Normal Strain, Uniform and Non-uniform Stress and Strain, Hooke's Law, Spring Analogy
18	Poisson Effects, Safety Factor, Non-uniform Bars
23	Statically Indeterminate Bars, Temperature Effects, Shear Stress
30	Shear Strain, Shafts, Review
Feb. 6	Shafts, Non-uniform Shafts, Shear Modulus
<b>Exam 1 Wednesday February 8</b>	
13	<u>Beams, Shear Force and Bending Moment Diagrams</u>
20	Beam Deflection and Curvature, Normal Stresses in Beams
27	Shear Stresses in Beams, Shear Flow, Plane Stress
March 6	Stress Transformation, Extreme Stresses, Mohr's Circle
<b>Exam 2 Wednesday March 8</b>	
20	<u>3-D Stresses, Generalized Hooke's Law, Pressure Vessels</u>
27	Combined Stress, Beam Theory
Apr. 3	Beam Deflection, Statically Indeterminate Beams, Superposition
10	Compatibility Conditions, Combined Stress and Beam Deflection Review
<b>Exam 3 Wednesday April 12</b>	
17	<u>Buckling and Stability</u>
24	Uncovered Material
May 1	Review
<b>Final Exam Monday May 8, 2017, 10:30am-12:30pm (per Schedule of Final Exams)</b>	

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## **HOMEWORK**

Homework problems will be collected, graded and returned. Homework is to be done in a neat, orderly fashion on Engineering Problem paper using only one side of a sheet. Homework is due at the beginning of the period in which it is due or as mentioned orally in class. Late homework is not accepted for any reason and receives a grade of zero.

A problem statement in sufficient detail must precede each problem solution so that grading can be done without reference to the textbook. The purpose of the problem statement is to ensure that the problem is understood.

Failure to comply with the policy on homework may result in downgrading and/or refusal to accept the work.

## **EXAMINATIONS**

You must take three examinations during the semester and a final examination. All examinations will be held during the regular class session in the lecture room assigned to this course. All exams are closed book and calculators are permitted. **However, only calculators approved by the Civil Engineering department are allowed. A list of approved calculators will be emailed to all students shortly. The list can also be found in:** <http://ncees.org/exams/calculator/>

No credit is given for correct answers obtained by incorrect reasoning and/or compensating errors. Partial credit will be given for work that pertains to the correct solution. The final exam is mandatory and there will be no change in time as this would be a violation of University policy. A similar policy holds in this class for the tests, yet under exceptional circumstances other

arrangements may be made, on a case-by-case basis. There will be no make up for missed examinations. The final examination score will be adjusted for, at most, one acceptable excused missed examination. An unexcused missed examination or a second missed examination is scored as zero.

Examinations are regarded as engineering reports. Procedures and presentation of solutions should be precise and legible. Penalties are assessed for:

- (I) algebra and arithmetic errors;
- (II) answers presented without proper units, sign or direction;
- (III) incomplete free body diagram; and
- (IV) messy or illegible presentation.

**A summary of your grades will be posted regularly in D2L. You must check that your grades are correct. You must notify the instructor of any omission or error within 10 days after grades are posted. Changes may not be accepted after that.**

### **ACADEMIC INTEGRITY**

One sanction for dishonest academic work permitted under the University CODE OF ACADEMIC INTEGRITY is a failing grade in the course. The grade of E will be assigned for dishonest academic work.

### **ATTENDANCE POLICY**

The following is the University policy on absence:

Students are expected to be regular and punctual in class attendance. The University believes that students themselves are primarily responsible for attendance. Instructors will provide students with written statements of their policies with respect to absences. Excessive or extended absence from class is sufficient reason for the instructor to recommend that the student be administratively dropped from the course. For those courses in which enrollment is limited, missing the first class session may be interpreted as excessive absence. If this action is filed in the Registrar's Office by the end of the fourth week of classes, it will result in cancellation of registration in the course. If the student is administratively dropped after the end of the fourth week of classes, it will result in a failing grade being awarded in that course.

Policy of this class:

- If you need to be absent from the class for justifiable reasons (sickness, family obligations, etc.), you must inform the instructor in advance or immediately after the day of absence.
- It is required that you attend all classes and recitations. The instructor may report to the Registrar's Office if absence is excessive, which may result in administrative drop from the class. Attendance accounts for 5% of the course grade.

Auditors are also expected to attend the classes.

***THIS POLICY WILL BE STRICTLY ENFORCED.***

### ABET 2010 Criteria Course Classification Form

Course Number CE 215 Course Name Mechanics of Solids  
 Required? Circle: YES / NO Semester/Instructor Spring, Summer, and Fall each year  
 Homework Frequency? Weekly Exam Frequency? Three (3) 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	H	Analysis of basic structures and structural elements using first principles of math/physics and engineering and by reference to experiments.
B. Ability to design and conduct experiments and interpret data		
C. Ability to design a system, component, or process to meet desired needs		
D. Ability to function on multidisciplinary teams		
E. Ability to identify, formulate, and solve engineering problems	H	Actual problems are identified and solved. The methodology and process of solving the problems are emphasized in lecture.
F. Understanding of professional and ethical responsibility		
G. Ability to communicate effectively	L	Transfer of information to other engineers and drafters is indicated.
H. The broad education necessary to understand the impact of engineering solutions in a global context		
I. Recognition of the need for and an ability to engage in life-long learning		
J. Knowledge of contemporary issues		
K. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice		
L. Pass the FE exam as the first step towards professional registration.	H	Entire course focuses on mechanics which is covered in the morning section of the FE exam
M. Be proficient in the major areas of civil engineering	M	Important for structural analysis