Course Syllabus

E MCH 213 – Strength of Materials (3 credits)
World Campus – SU 2013
5-13-2013 - 8-5-2013

Instructor:

James A. Hendrickson, P.E.
Instructor in Engineering
Penn State Beaver
Instructor Information:

Instructor: James A. Hendrickson, P.E.
Location: Penn State Beaver
100 University Drive
Monaca, PA 15061

Web Resources: http://cms.psu.edu (Angel Website)

Course Description:

E MCH 213 STRENGTH OF MATERIALS (3) Axial stress and strain; torsion; stresses in beams; elastic curves and deflection of beams; combined stress; columns.
Prerequisite: E MCH 211

http://bulletins.psu.edu/bulletins/bluebook/university_course_descriptions.cfm?letter=E&courselong=E_MCH|213|200708SP

Course Objectives:

- Develop understanding of relationship between external loads and internal forces/stress in structural and machine members.
- Develop familiarity to determine basic material properties from experimental stress/strain data.
- Demonstrate proficiency in calculation of basic fundamental stress quantities for situations involving bending, axial loading, torsional loading, transverse shear forces and combined load cases.
- Develop understanding of concepts of normal and shear strain and their application to problems of mechanics of materials.
- Demonstrate proficiency in calculations of deformations and deflections in problems involving axial, transverse, and torsional loadings.
- Demonstrate proficiency in the generation of shear, moment, force, and torque diagrams to facilitate engineering simulations for stress and deflection.
- Develop skills in stress transformation techniques for both stress and strain based on the Mohr’s circle analysis for 2D and 3D load cases. Specific detail will be presented for common scenarios of plane stress and plane strain analyses.
- Demonstrate proficiency in determination of moments and deflections of beams for a variety of load cases using principles of integral and differential calculus.
- Develop basic understanding of column design with specific focus on buckling criteria for common constraint conditions.

Textbook Information & Course Resources:

**Required Text:** Mechanics of Materials
Pytel & Kiusalaas
Published by Brooks/Cole-Thomson Learning
ISBN 0-534-38026-3

Study Guide for Pytel & Kiusalaas
Mechanics of Materials
Published by Brooks/Cole-Thomson Learning
Grading

**Proctored** Midterm Exams (2) – 250 points each  
500 points total

**Proctored** Final Exam – (1)  
350 points total

**Online** ANGEL Quizzes (10) – 15 points each  
150 points total

**Total Points Available in the course:**  
1000 points

Letter grades will be assigned based on the cumulative earned points of the activities listed above. The grades will be determined as follows:

<table>
<thead>
<tr>
<th>Percentage of available points (%)</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-93</td>
<td>A</td>
</tr>
<tr>
<td>92.9-90</td>
<td>A-</td>
</tr>
<tr>
<td>89.9-86</td>
<td>B+</td>
</tr>
<tr>
<td>85.9-81</td>
<td>B</td>
</tr>
<tr>
<td>80.9-77</td>
<td>B-</td>
</tr>
<tr>
<td>76.9-72</td>
<td>C+</td>
</tr>
<tr>
<td>71.9-67</td>
<td>C</td>
</tr>
<tr>
<td>66.9-60</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
</tbody>
</table>

**Important Notes Relative to Quizzes and Exams:**

1. Refer to the course schedule on ANGEL for the dates of all quizzes and exams.

2. The quizzes will be taken online on ANGEL and automatically graded by ANGEL. The quiz questions will typically be multiple choice and/or true/false format. The coverage for the quizzes should be considered to be comprehensive in nature of all course material up to the date of the quiz though typically will be focused on the material covered in the chapter leading up to the quiz.

3. Quiz solutions will be posted on ANGEL and the solutions will provide sufficient detail to reinforce student learning of the material. Students should also consider the quiz to reflect the Instructor’s expectation of the material that should have been mastered by the student at the time of the quiz. **Falling behind on the course schedule will not be a successful strategy!**
4. Each exam problem will include both “fill in the blank”, (results), and “essay”, (solution), elements. Please be aware that the grading policy for exam problems will be based as follows:

a. **Results (20%)** - The results clearly are the numerical or algebraic expression requested reported with appropriate units. Units are critical in engineering problem solving and **50% or your result score will be based on correct units.**

b. **Solution (80%)** - This is the critical aspect of the problem and provides the basis, or defense, of your results. **Essential elements** of your solution must include:
   
   i. **Definition of coordinate system**
   ii. **Free body diagrams**
   iii. **Listing of any stated assumptions**
   iv. **Fundamental definitions used**
   v. **Logical derivation/development of equations and calculations used to support your Results.**

5. Detailed exam solution notes will be posted to the ANGEL site following confirmation from all proctors that all students have completed taking the exam. Please reinforce with your proctor that it is critical for them to return the exam, per the instructions provided to them, immediately after completion. **You will be very unpopular with fellow students in the course if you are the sole reason for delay of posting of the exam solutions.**

6. Exam and quiz dates are defined on the course schedule on the ANGEL course site. Please do not expect exceptions at the last minute to attempt to reschedule them
Notes concerning Grading and General Course Policy!

1. The midterm exams must be taken on the specified dates as published on the course schedule! No exceptions or extensions will be granted. Please be aware of this policy before starting the course. All Exams are closed book/closed notes with equations sheets provided. A link is provided to the equation sheet on the ANGEL site. You should familiarize yourself with it prior to the examinations.

2. “There will not be any opportunities for “extra-credit” in this course. Your course grade will be solely based on the total points that you accrue on the two midterm exams, ten, 10, online ANGEL quizzes, and the final exam.

3. All course communications will be via the ANGEL course website. Please do not email me outside of ANGEL; I do not want to miss your messages! Please do not contact me for issues dealing with proctors, course scheduling, or general University policy. The appropriate contacts in the Continuing and Distance Education Department are provided on ANGEL. I am a course specific resource for you to provide feedback, direction, and assistance relative to the course content.

4. Due to the large class size I encourage all students to take advantage of the ANGEL chat room so that we can all share questions and suggestions relative to problem solutions. I will monitor the chat room and make additions when appropriate.
Academic Integrity:

“All students are expected to act with civility and personal integrity; respect other student’s dignity, rights and property; and help create and maintain an environment in which all can succeed through the fruits of their own efforts. An environment of academic integrity is requisite to respect for self and others in a civil community. Academic integrity includes a commitment to not engage in or to tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty include cheating or copying, plagiarizing, submitting another person’s work as one’s own, using Internet sources without citation, fabricating field data or citations, “ghosting” (taking or having another student take an exam), stealing examinations, tampering with the academic work of another student, facilitating other student’s acts of academic dishonesty, etc. In an online course environment the expectations, responsibilities, and obligations remain at the same high standard. The ANGEL online quiz environment is considered to be no different than a classroom quiz environment. In this course if a student consistently scores very high on the ANGEL quizzes yet does not demonstrate the ability to solve similar problems on the exam will find that they will draw attention to themselves and need to provide an explanation to the course Instructor. Students charged with a breach of academic integrity will receive due process and, if the charge is found valid, academic sanctions may range, depending on the severity of the offense, from F for the assignment to F for the course.” Please know that it has been my policy to apply the highest level of academic sanctions allowed by the offense without hesitation. Please know that your Proctor selection is critical and they are obligated to act in my stead to maintain the integrity of the exam environment. The University’s academic integrity policy is available at: http://www.psu.edu/dept/oue/aappm/G-9.html

Disabilities:

"The Pennsylvania State University is committed to providing access to a quality education for all students, including those with documented disabilities. If a student has a disability and wants to request an accommodation for a course, it is the responsibility of the student to first obtain a University accommodation letter confirming the disability and suggesting appropriate remedies. This letter can be obtained from the Penn State Office for Disability Services or the campus Disability Contact Liaisons. The contact person at Penn State Beaver is the campus nurse whose office is located in the Ross Administration Building, (724) 773-3955. Students are encouraged to request their accommodation needs early in the semester, and once identified, a reasonable accommodation will be implemented in a timely manner. Students may also access the website for the Office of Disability Services at University Park.” http://www.equity.psu.edu/ods