**COURSE :**    ES 2410-01   MECHANICS OF MATERIALS                **SEMESTER:**   Fall   2015

**LECTURE HOURS:**  4          **CREDITS:**    4

**CLASS TIME:**  11:00 - 11:50 PM      **DAYS:**   M  T  Th  &  F                **ROOM:**  PS 214

**INSTRUCTOR'S NAME:**   ARDELL  KNUDSON

**INSTRUCTOR'S OFFICE:**  PS 211       **PHONE:**   268-2248      aknudson@caspercollege.edu

**OFFICE HOURS:**    M  - Th      10:00   –   11       M  &  W   11:00 – 12:00  and  1:00 -  2:00
                                        OTHER TIMES BY APPOINTMENT.

**COURSE DESCRIPTION:**
This course studies the mechanics of deformable bodies.  The concepts of stress (force per unit area) and the resulting strain (deformation) of structures and machine components are studied in detail.  The course will introduce students to some basic design work.

**PREREQUISITES:**
ES 2110  Statics.   Students should have completed Math 2205 Calculus II

**GOAL:**
This course covers the stresses set up in structures and machine components under a variety of loading situations.  There will be a complete framework of background followed by many examples of actual stress calculations.  Upon completion,  the student should be able to analyze the stresses occurring in many of the common structures and machine components one would encounter in the work place.

**OUTCOMES:**
Textbook problems will be used to develop the techniques and solutions needed for stress analysis.  There will be weekly assignments followed by a short quiz on a typical loading example.  Upon completion of the major sections and topics,  there will be four hour long exams to determine mastery of the material.  At the end of the course there will be a final measure using problems characteristic of the Fundamentals of Engineering standard national exam.

**GENERAL OBJECTIVES:**
Students will become familiar with the concepts of stress and strain, material properties, and different types of loadings.  Structural members, pressure vessels, and power transmission shafts will be sized and designed.  The course will look into modes of failure for several common materials subject to various loadings.

**SPECIFIC OBJECTIVES:**
Upon completion of this course, a person should be familiar with the following concepts:

-   sizing a structural member or machine component
-   designing a power transmission shaft
-   selecting the proper beam for a given load and span
-   familiarity with various materials and selection criteria
-   introduction to some computer software for design work.

**METHODOLOGY:**
Much of the material will be presented in lecture format, but the emphasis of this will be to encourage discussion and practical applications.  Students will have some say in how the class is conducted, but there will be student participation and presentations as part of the course requirements.

**EVALUATION CRITERIA:**
There will be homework assignments, exams, quizzes and some special projects including presentations and design work.  Tentative evaluation will be based on:

| | |
|---|---|
| Exams | 40% |
| Homework | 20% |
| Quizzes | 10% |
| Special projects | 5% |
| Final | 25% |

Homework will be submitted weekly and docked 20% per day late.  Assignments cannot be turned in after the corrected work has been returned.  Exams will be taken as scheduled unless prior arrangements are made.

**REQUIRED TEXT, READINGS, MATERIALS:**
Mechanics of Materials 6th Ed.  by  Beer,  Johnston,  DeWolf,  &  Mazurek.      McGraw Hill, Publ.

**LAST DATE TO CHANGE TO AUDIT STATUS OR TO WITHDRAW WITH A "W" GRADE:**
Thursday,  Nov 12,  2015  at 5:00 p.m.

**STUDENT RIGHTS & RESPONSIBILITIES:**
Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities.

**CHAIN OF COMMAND:**
If there are any problems with this class,  first contact the instructor and attempt to solve the problem.  If not satisfied with the solution offered by the instructor,  you should then take the matter through the appropriate chain of command starting with the Department Head,  the Dean of the School of Science, and lastly the Vice President for Academic Affairs.

**ACADEMIC DISHONESTY:**
Casper College demands intellectual honesty.  Proven plagiarism or any form of dishonesty with the academic process can result in the offending person failing the course in which the offense was committed or may result in expulsion from the school.  See the Casper College student Code of Conduct for more information on this topic.

**OFFICIAL MEANS OF COMMUNICATION:**
Casper College faculty and staff will employ the student's assigned Casper College email account as a primary method of communication.  Students are responsible to check their account regularly.

**ADA ACCOMODATIONS POLICY;**
If you need academic accommodations because of a disability,  please inform the instructor as soon as possible.  To request academic accommodations,  students must first consult with the college's Disability Services Counselor located in the Gateway Building,  Room 344,  ph (307) 268 2557,  bheuer@caseprcollege.edu
The Disability Services Counselor is responsible for reviewing documentation provided by the students requesting accommodations.  The Counselor will determine eligibility for accommodations and assist students in requesting and using appropriate accommodations.

**TENTATIVE SCHEDULE WITH COURSE CONTENT:**
See the attached schedule for the proposed schedule of topics and homework assignments.  There may be some deviation from this as the semester progresses, and this will be announced in class.

| Week | Sections | Topics | Assignment |
|------|----------|--------|------------|
| Aug  24 | 1.1 - 2 | Introduction, dimensions, and units | |
| Week  1 | 1.3 - 4 | Load and Stress | 1.2, 6, 8, 9, 15 |
| | 1.4 - 5 | Shear Stress | 1.24, 26 |
| | 1.8 - 9 | Factor of Safety | 1.42, 45, 49 |
| | | | |
| Aug  31 | 2.3 - 5 | Stress and Strain | 2.2,  3, 8, 16,  18 |
| Week  2 | 2.5 - 8 | Hooke's Law | 2.20, 24, 26, 27 |
| | 2.9 - 10 | Statically Indet. | 2.33, 36, 43 |
| | | | |
| Sept   8 | 2.11 | Poisson's ratio | 2.46, 53, 67 |
| Week  3 | 2.14 - 16 | Shearing strain | 2.69 |
| | 2.17 - 19 | Stress concentration | 2.96, 98 |
| | | Test  I | |
| | | | |
| Sept  14 | 3.1 - 4 | Torsion | 3.2, 6, 14 |
| Week  4 | 3.5 - 6 | Angle of twist | 3.24, 27, 47 |
| | 3.7 - 8 | Transmission shafts | 3.60,  65,  73 |
| | | | |
| Sept  21 | | There will be no class the week of  Sept  21   There will be guest | |
| Week  5 | | lectures and a take home exam. | |
| | | | |
| Sept  29 | 4.8 | Stress concentration | |
| Week  6 | 4.13, 15 | Eccentric loading | 4.103, 109, 113 |
| | | | |
| Oct   5 | 5.1 - 4 | Beams | 5.9,  14,  21 |
| Week  7 | 5.5 | Shear stresses | 5.23,  32,  58 |
| | 5.9 | Thin Walled members | 5.65,  78,  87 |
| | | | |
| Week  8 | 5.11 | Combined loading | |
| Oct   12 | 6.1 - 3 | Stress transformation | 6.3, 7,  11, 12, 13, 17 |
| | | | |
| Mid Term week   Fall Break  Mon  &  Tue  Oct  19 & 20 | | | |
| | | | |
| Oct   22 | 6.4 - 6 | Mohr's circle | 6.32,  46 |
| Week  9 | 6.9 | Pressure vessels | |
| | 7.1 - 2 | Load, shear, and moment | 7.6, 8,  18 |
| | | | |
| Oct   26 | 7.3 | Beam design | 7.31,  61 |
| Week 10 | 7.4 | Load relations | 7.110,  111,  117 |

| Week | Sections | Topics | Assignment |
|------|----------|--------|------------|
| ------- | ----------- | ---------- | ------------- |
| Nov   2<br>Week 11 | | Test  3 | |
| Nov   9<br>Week 12 | 8.1 – 4<br>9.1 - 3<br>9.6 | Combined loadings<br>Beam deflection<br>Singularity functions | 8.71<br>9.45,  48 |
| Nov   16<br>Week 13 | 9.1 - 3<br>8.7 - 8 | Singularity functions<br>Superposition | 9.45,  48 |
| Nov   23<br>Week 14 | 11.1 - 3 | Columns<br>Test  IV | Special Problems |
| | | Thanksgiving Break   Nov  25  -  27 | |
| Nov   30<br>Week 15 | | Review<br>Presentations | |
| Dec    7<br>Week  16 | | Review<br>Presentations | |
| Dec  14  -  17 | | Final Exams | |

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