

## E MCH 211 Engineering Mechanics – STATICS

### INSTRUCTOR

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**TEXT BOOK** J.C.Hibbeler, Engineering Mechanics – STATICS, 11<sup>th</sup> edition, (2007)

### BACKGROUND

**Engineering Mechanics** is that engineering science that relates **Forces** (push, pull) and **Torques** (twists) to the **Motion** (deformation, acceleration, velocity) of bodies. The understanding of such concepts is essential to those who wish to design efficient engineering components ranging from a bridge to a wing strut to a robot arm to the motherboard of a computer. **Statics** is the foundation course in which three stems are constructed; **Dynamics** (E MCH 212) for motion; **Strength of Materials** (E MCH 213) for deformation and fracture criteria for solids; and Fluid Mechanics. Mechanics courses are founded on modeling engineering components via the **Free Body Diagram**, applying the equations of motion, then solving for the particular set of boundary conditions appropriate to the expected situation.

### COURSE OBJECTIVES

Statics will provide you with the tools and guidance to allow you to master the use of equilibrium equations and Free Body Diagrams (FBD's) to solve real engineering problems. You should leave this class with the ability to logically approach a variety of static engineering problems, to translate a physical situation into an analytic model, and to use various mathematical tools to "solve" for desired information.

### EXPECTATIONS

- ▶ You are expected to have a working knowledge of:
  - Trigonometry (sines, cosines, directions cosines, etc.),
  - Vector Calculus ("Dot" and "Cross" Products), orthogonal representations,
  - Differential and Integral Calculus,
  - Spatial Visualizations, *engineering sketching*.
- ▶ You are expected to devote appropriate time to study and problem solution (approximately two hours for each hour of class, i.e. about ninety hours for the semester.)
- ▶ **You are expected to attend ALL scheduled classes and attempt ALL assigned homework.**

### PARTIAL CREDIT GRADING

- ▶ Partial credit will be given on exams and quizzes **only if** your work is clearly organized.
- ▶ Problem solutions without **FBD's** (sketches) or supporting calculations will receive a much reduced, or zero, grade. FBD's must be neatly sketched and include all relevant dimensions, forces and couples.

### GENERAL ADVICE

- ▶ **Don't fall behind!** If you need help, see your TA or instructor ASAP.
- ▶ The three most important things you can do to be successful in the course are:
  1. Do **ALL** the homework problems,
  2. Do **ALL** the homework problems,
  3. Do **ALL** the homework problems.

## ACADEMIC INTEGRITY

The Department of Engineering Science and Mechanics at the Pennsylvania State University considers academic training to be apprenticeship for practice in the professions. Students are expected to demonstrate a code of moral integrity and ethical standards commensurate with the high expectations that society places upon professional practice. Accordingly, it is the policy of the department to maintain the highest standard of academic honesty and integrity.

Academic dishonesty includes, but is not limited to, cheating, copying on tests, plagiarizing, acts of aiding or abetting, unauthorized possession of materials, tampering with work, ghosting, altering examinations and computer theft. Students are encouraged to report incidents of academic dishonesty to their instructors in order to promote a fair academic climate and equal opportunity learning environment.

A student charged with academic dishonesty will be given oral or written notice of the charge by the instructor. A student contesting such a charge may seek redress through informal discussions with the instructor(s), department head or college dean. If the instructor believes that the infraction is sufficiently serious to warrant referral to the Office of Conduct Standards, or if the instructor awards a final grade of F in the course because of the infraction, the student and instructor will be afforded formal due process procedures governed by Penn State Senate Policy 49-20. Policy 49-20 and procedures can be found in the document "Policy and Rules for Students" issued annually by the Senate Office and available through each student's home department or college dean's office. Penn State Academic Integrity policy information can also be found on the web at <http://www.engr.psu.edu/CurrentStudents/acadinteg.aspx>

Professor Judith A. Todd  
P. B. Breneman Department Head Chair

## PERSONAL RESPONSE SYSTEM

Each student in this course is required to purchase a Radio Frequency (RF) transmitter for the Interwrite Personal Response System (PRS) from GTCO Calcomp that will be used in each lecture this semester. The same system will be used in E MCH 213 during the Spring 2009 semester.

To receive proper credit for class participation, your transmitter ID must be set to the characters of your Penn State e-mail address that appear before the '@' (This is your CAC ID, NOT your student ID number). **Steps to set up the transmitter ID:** 1) First turn on your transmitter. 2) Ignore the 'Scanning classes Please wait' message and press the '\*' button to enter the Setup menu. 3) Use the up and down arrows until you see the ID setting then press the green 'enter' key. 4) Enter your CAC ID one character at a time. (This should be three letters and three or four numbers... mine is cbm100. DO NOT enter your 9 digit PSU ID number!) If you are entering a letter, first select any letter key on the transmitter then use the up or down button to scroll to other letters of the alphabet. When you have reached the desired letter simply hit another letter or number button on the transmitter to begin entering the next character. 5) Press the green 'enter' key again to save the ID.

If your ID is set incorrectly, you will not receive proper credit for participation during class.



**E MCH 211 - GRADING POLICY** Total

Class Participation – 8 points each lecture 80

- Several multiple choice questions will be asked during the Wednesday lecture.
- Responses will be submitted using the PRS transmitter/receiver system.
- The lowest four week's scores will be dropped.

Homework Quizzes – 12 points each 120

- Thirteen calculation type quizzes will be given on-line starting each Sunday morning to be completed before 11:55pm each Tuesday.
- Each quiz will be very similar to the suggested HW problems for the week.
- The lowest three homework quiz scores will be dropped.
- Be sure to save your written work used to answer the quiz problems to use if you have questions for the TA's about the correct solution of each problem.
- No make-up quizzes will be given.

Exams – 250 points each 500

- Two 90-minute evening exams will be given during the semester on the nights indicated on the course schedule.  
The dates of the exams are as follows:  
Thursday, October 2      Time and location TBD (to be determined)  
Wednesday, November 5      Time and location TBD
- If you have a conflict between either of the evening exams and **regularly scheduled** University functions, notify your instructor no later than two weeks prior to the exam date. No conflicts are permitted for other than **regularly scheduled** University functions. In the event of illness, notify the ESM Office (865-4523) **PRIOR** to 5 pm on the day of the exam.

Final Exam – 300 points 300

- The final exam will be given during finals week as scheduled by the Registrar. **DO NOT** make plans to leave for break until the official final exam schedule has been posted.
- Final exam is cumulative.

Exam Policies

- Calculators may be used during all exams, but sharing calculators is not permitted.
- All exams are closed book, closed notes. Bring your ID to each exam.
- All personal items (book bags, hats, coats, etc.) must be left in the front or the back of the exam room. Only calculators, pencils and erasers are permitted in the seats.
- Academic dishonesty will not be tolerated.

Total 1000

Approximate Grade Distributions

A's : 900+    B's : 800+    C's : 700+    D : 600+    F : Below 600 points

Your grade will be determined by your performance without reference to that of your classmates. (i.e. I do not grade on a curve.)

## EXTRA CREDIT

There will be several opportunities to earn extra credit in this course throughout the semester. Each student may earn up to but no more than 50 total points of extra credit.

### Homework

- **Homework is important** for success in this course. And peer-to-peer collaboration on homework is strongly encouraged.
- Students who wish earn extra credit for working on their E MCH 211 homework with a group of peers should form or join homework groups of 4 to 8 students by the start of the 4<sup>th</sup> week of classes. Groups formed after this date will be encouraged to meet regularly but will not be eligible to receive extra credit points for their participation.
- Each week students who have participated in the group homework session (as reported by the group leader) will receive 2 extra credit points. These points can be accumulated up to a total of 20 for the semester.
- A leader from each group who takes charge of scheduling meeting times, contacting group members, and submitting the weekly group meeting form can earn up to 5% extra credit. To qualify for any HW group extra credit points, a group leader must
  - Send an initial e-mail to his or her TA no later than Monday, September 15<sup>th</sup> listing the name, CAC ID, and section number of each group member
  - Schedule and conduct, in coordination with group member's availability, at least 9 weekly meetings throughout the semester where group members can work on homework or study together
  - Send an e-mail report to his or her TA no more than two days after each group meeting listing the name, ACCESS ID, and section number of each member in attendance at the meeting.
  - Alert the TA or course instructor if a group member is having serious trouble with the course material needing individual attention from a graduate student or the professor.

(extra credit for homework group leaders is calculated as a percentage of total points earned, not total points possible)