Syllabus
MAE 30: Statics of Rigid Bodies and Structures — Fall Quarter 2008
(Required for ME and AE)

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Class schedule: *Lecture:* TTh 9.30 – 10.50am, ELH 100
Discussion: (1) M 12.00 – 12.50pm, BDH 1200
(2) M 11.00 – 11.50pm, ICF 101
(3) T 5.00 – 5.50pm, DBH 1200
(4) W 1.00 – 1.50pm, PCB 1200

Textbook: FP Beer, ER Johnston, ER Eisenberg, *Vector Mechanics for Engineers – Statics,* 8th Ed., McGraw-Hill, New York, 2007.

References: For the portions of the syllabus not covered by the textbook, hand-outs from the instructor will be posted on the course website.

Course website: https://eee.uci.edu/08f/19030

Course Noteboard: https://eee.uci.edu/toolbox/noteboard/index.php?board=7299

The noteboard contains a forum for the class, where students can ask questions and suggest answers to other students' questions. The instructor and teaching assistant will act as moderators, and periodically log in to provide answers to students' questions that haven't been answered by fellow students. **Students are encouraged to ask questions on the board as opposed to emailing the instructors, as this will lead to faster response**. The moderators reserve the right to remove duplicate questions, wrong answers, or any irrelevant material. **Students will receive extra credit for volunteering good answers; this credit is part of the class participation extra credit (which can amount to a maximum of 5%).**

Course description: This course is designed to develop skills in treating the static analysis of rigid bodies and structures. The difference between statically determinate and indeterminate structures is emphasized; whereas the standard analytical methods of solution are presented only for the former, students also learn how to write a finite element procedure for the solution of any truss (whether statically determinate or indeterminate.)

Prerequisites By Topic: Newtonian mechanics, kinematics, and dynamics of motion. Differential and integral calculus of real-valued functions of several real variables (including applications). Familiarity with scientific programming.

Grading Criteria:
Homework: 15%
Midterm: 35%
Final: 50%
Attendance to lectures and discussion sessions is mandatory. An extra credit of up to 5% will be given for class participation (measured by the quality of answers in class (with clickers) and on the note board).

Homework Policy: There will be weekly homework assignments throughout the course. Homework assignments are posted on the website on Friday afternoons. They are due on the following Friday, at 12pm in the drop box outside of EG4200. Solutions will be posted on the website on the following Monday at 6.30pm.
Late homework is not accepted and will not be graded. Nonetheless, one opportunity is provided to each student to turn in ONE late assignment and receive full credit for it. This is meant to provide a "stress-release valve" when things get hectic in the quarter. In any case, this late assignment needs to be turned in BEFORE the solution is posted, i.e. before Monday at 6.30pm. No other exception will be granted.

Working together is strongly encouraged (but NOT copying each other). Identical homework assignments from two students will be considered cheating and not tolerated.

Some homework assignments might require the use of MATLAB, which is available in the computer lab as noted above.

These factors ALL contribute to the grade:
- Conceptually sound problem-solving approach.
- Numerical accuracy of results.
- Neatness of the presentation and description of the procedure.

Please, format your homework in a clear way. The TAs don't have to make effort in interpreting or guessing your thinking process. All the fundamental steps of your derivations need to be clearly stated. Illegible homework will not be graded.
A correct solution obtained with a wrong or unclear methodology will be given no credit. Conversely, numerical mistakes associated with sound and reasonable approaches will result in partial credit.

Midterm and final examinations. There will be one midterm and one final examination. The final examination has been set by the registrar's office on Thursday, Dec 11, 2008, from 8.00 – 10.00am. A tentative date for the midterm is Thursday, October 30, 2008. This schedule is tentative and subject to change. The midterm will take place in class at normal lecture time.
Midterm and final are closed-book exams. However, students are allowed to bring ONE 3"X5" card with any writing on it (front and back) at the first midterm. Two cards are allowed during the final exam. Standard scientific calculators can be used during midterm and final exam.
The same grading approach that was described for homework applies to midterm and final exam: all the derivations need to be clearly shown. Correct but unjustified answers will receive no credit. Neatness is required.

Computer Usage: A commercial programming language (MATLAB) will be used to develop a code for the matrix analysis of a arbitrarily complex trusses using the stiffness method.

Computer labs: There are two main computer labs available to all School of Engineering students, ECT 123 and AIRB 2040. ECT 123 is open during normal business hours, 8:30am-5:00pm. This lab has 47 computers running Windows XP and it is mainly used for lectures and discussion. Students can use it on a drop-in basis between scheduled classes. The schedule is posted on the door.
AIRB 2040 will open at the start of the quarter (it's moving from EG 3151). This lab will be open 24 hours a day, 7 days a week. However, please know that the main door to AIRB closes around 10:30pm and opens around 6:00am. Students can obtain a key for the room at the Dean's office, 3rd Floor Rockwell Bldg. during business hours. They need to bring their Student ID and $1.00. This lab has 32 Windows XP machines and it will have 10 linux machines some time in Winter 08.
The Windows computers in both labs are the same hardware and have the exact same software installed. Printers are available in each room. To print, students must get a print card from the Payprint machines in the NACS computer labs, 1st floor of Engineering Gateway.
To log in, use your UCINetID and password. Select UCI.EDU for the domain. Students should save data to their server space (currently a 50MB limit) or to an external flash drive. Sometimes the lab manager has to re-image the labs mid-quarter so any data you save on the computers can be lost.

Lecture topics (tentative)

Date	Topic	Book sections
Thu, 09/25	Introduction to the course; units; vectors	1, 2.1 – 2.8
Tue, 09/30	Equil. of a particle in 2D; free-body diagrams	2.9 – 2.11
Thu, 10/02	Forces and particle equilibrium in 3D	2.12 – 2.15
Tue, 10/7	Vector and scalar product. Moments of forces	3.1 – 3.11
Thu, 10/9	Couples and equivalent system of forces	3.12 – 3.20
Tue, 10/14	Equilibrium of rigid bodies (2D)	4.1 – 4.7
Thu, 10/16	Equilibrium of rigid bodies (3D)	4.8 – 4.9
Tue, 10/21	Distributed forces in 2D	5.1 – 5.7
Thu, 10/23	Distributed forces in 3D	5.10 – 5.12
Tue, 10/28	Review and/or buffer class	
Thu, 10/30	MIDTERM EXAM	
Tue, 11/04	Midterm solution	
Thu, 11/06	Trusses and frames. Static determinacy. Maxwell's rule. Solution of statically determinate trusses (method of joints)	6.1 – 6.5 + Notes
Tue, 11/11	Solution of statically determinate trusses (method of sections)	6.7
Thu, 11/13	Internal forces in bars, beams and cables	7.1 – 7.5; 7.7
Tue, 11/18	Statically indeterminate trusses. The need for a constitutive equation. Stress and strain. Elastic deformation of a bar	Notes
Thu, 11/20	Solution of arbitrarily complex trusses with the stiffness method I	Notes
Tue, 11/25	Solution of arbitrarily complex trusses with the stiffness method II	Notes
Thu, 11/27	THANKSGIVING	
Tue, 12/02	Numerical solution of arbitrary trusses with MATLAB	Notes
Thu, 12/04	Review	