HOUSTON COMMUNITY COLLEGE SYSTEM
NW SPRING BRANCH CAMPUS

ENGR 2301 Engineering Statics CRN: 70208 Spring 2011
Time: 9:00am- 1:00pm: Friday (16 weeks Semester course)
Lecture (room 205) at NW Spring Branch Campus
Instructor: Olatunde (Tunde) Amosu; Phone: 832-359-8414;
email address: olatunde.amosu@hccs.edu
Office Hour: before and after class on Friday or by appointment
Textbook: Vector Mechanics For Engineers –Statics by Beer, Johnston, Mazurek, Eisenberg. 9th edition. McGraw Hill *(ISBN 978-0-07-352923-3)*

Course Description
Engineering Statics: This course is intended for those who are planning to major in any branch of engineering and for those planning a career in engineering. The materials covered in the course will include composition and resolution of forces, free body diagrams, analysis of forces acting on structures and machines, friction, centroids and moments of inertia. The delivery format will include lectures, presentations, homework assignments, and examinations.
The course is generally transferable as a credit for engineering majors to any university.

Pre-Requisite
PHYS 2425 and Math 2414

Course Objectives
After successful completion of the course, the following objectives should be attained:

1. Demonstrate qualitative and quantitative understanding of equilibrium of a particle and rigid bodies.
2. Develop the skill to isolate rigid bodies and draw clear and appropriate free-body diagrams and thereby apply these skills to solution of statics problems in 2-D and 3-D.
3. Formulate the conditions for stability / instability of equilibrium.
4. Analyze trusses by the method of joints and sections.
3. Determine centroids and center of gravity of 2-D and 3-D objects
5. Formulate a method of analysis of forces acting on frames and machines.
6. Give analysis of structures, friction, and calculation of moment of inertia in two and three dimensional objects.

Attendance policy
Students are encouraged to attend all classes.

Attendance: HCCS Attendance Policy is stated in the ***2007-2008*** Student Handbook ***page 2*** as follows*: "You are expected to attend all lecture classes and labs regularly. You are also responsible for materials covered during your absences. Instructors may be willing to consult with you for make-up assignments, but it is your responsibility to contact the instructor.*

Class attendance is checked daily. Although it is your responsibility to drop a course for nonattendance, the instructor has the authority to drop you for excessive absences. You may be dropped from a course after accumulating absences in excess of 12.5 percent of the total hours of instruction (lecture and lab). For example:
• For a three credit-hour lecture class meeting three hours per week (48 hours of instruction), you can be dropped after six hours of absence.
• For a four credit-hour lecture/lab course meeting six hours per week (96 hours of instruction), you can be dropped after 12 hours of absence."
If circumstances significantly prevent you from attending classes, please inform the instructor.
http://www.hccs.edu/hcc/System%20Home/Departments/Student_Handbook/academic_info.pdf

If circumstances significantly prevent you from attending classes, please inform me. I realize that sometimes outside circumstances can interfere with school and I will try to be as accommodating as possible, but please be aware of the attendance policy.

Students with Disabilities
HCCS is committed to compliance with the American with Disabilities Act and the Rehabilitation Act of 1973 (section 504). "Any student with a documented disability (e.g. physical, learning, psychiatric, vision, hearing etc.) who needs to arrange reasonable accommodation must contact the appropriate HCC Disability Support Service (DSS) Counselor at the beginning of each semester. Instructors are authorized to provide only the HCC DSSO approved accommodations but must do so in a timely manner. Students who are requesting special testing accommodations must first contact the appropriate (most convenient) DSS office for assistance each semester.
Disability Support Services Offices:
System: 713.718.5165
Central: 713.718.6164 – also for Deaf and Hard of Hearing Services and Students
Outside of the HCC District service areas.
Northwest: 713.718.5422 Northeast: 713.718.8420
Southeast: 713.718.7218 Southwest: 713.718.7909
The student must request an accommodation before the start of each semester (as applicable) and should indicate to the DSS counselor when he/she is enrolled in a class. After student accommodation letters have been approved by the DSS office an email confirmation informing them of the Instructional Support Specialist assigned to their professor and that the accommodation letter has been processed. Upon consultation and documentation, you will be provided with reasonable accommodations and/ or modifications.
Also visit the ADA web site at:
http://www.hccs.edu/students/disability/index.htm. Faculty Handbook / faculty Orientation is also available at http://www.hccs.edu/sudnts/disability/faculty.htm

Academic Honesty
Students are responsible for conducting themselves with honor and integrity in fulfilling course requirements. Disciplinary proceedings may be initiated by the college system against a student accused of scholastic dishonesty. Penalties can include a grade of '0' or 'F' on the particular

assignment, failure in the course, academic probation or even dismissal from the college. Scholastic dishonesty includes but is not limited to cheating on a test, plagiarism and collusion.

Administrative and Student Withdrawals

For 16 week Spring '11 classes, this date is April 21st (4:30pm). In order to withdraw from a class, students MUST request to be withdrawn by notifying the professor. This must be done PRIOR to the withdrawal deadline to receive a "W" grade. If a student does not request to withdraw before the deadline, the student must be assigned a letter grade that is earned by the end of the semester (A, B, C, D, and F). I urge any student who is contemplating of withdrawing from the class to see me first. You may be doing better than you think. Either way, I want to be accessible and supportive. I don't believe in "weed out" classes, and I consider you to be much more than just a name or number. If you need assistance, do not hesitate to contact me (my phone number and e-mail address are listed above). I am here to help you.

Course Withdrawals - First Time Freshman Students - Fall 2007 and Later

Under Section 51.907 of the Texas Education Code "an institution of higher education may not permit a student to drop more than six courses, including any course a transfer student has dropped at another institution of higher education." This statute was enacted by the State of Texas in the Spring 2007 and applies to students who enroll in a public institution of higher education as a first - time freshman in fall 2007 or later. Any course that a student drops is counted toward the six - course limit if "(1) the student was able to drop the course without receiving a grade or incurring an academic penalty; (2) the student's transcript indicates or will indicate that the student was enrolled in the course; and (3) the student is not dropping the course in order to withdraw from the institution." Policies and procedures for implementation of this statute are being developed and will be published as soon as they are available.
HCC students affected by this statute that have attended or plan to attend another institution of higher education should become familiar with that institution's policies on dropping courses.
Web link to this information

Homework

There will be homework problems assigned after each class. Most of the problems will be of a practical nature and should appeal to engineering students. They will be primarily designed to illustrate the material presented in the text and to help the students understand the principles of mechanics. Students are strongly advised to attempt all these selected problems and other problems from the text. In general, student who fail to do these assigned problems do not do well in the course. All the assignments will be graded for credit. Students are strongly encouraged to attempt all assignments. The effort spent will enable you to perform better in tests and exams. Homework assignments must be turned in at the beginning of the class. Maximum of 5 points deduction for each assignment turn in late after the due date. You may be asked to explain your work in the classes. Explaining the Statics problems in your own words

helps you to understand Statics and to copy the answers without understanding of the Engineering Statics is a waste of time

Exams and Make-up Policy

Examinations consist of three regular exams and a compulsory comprehensive final will be administered during the semester. Quizzes and / or home works will be assigned as time permits. Make-up exams **will not** be given, so make every effort to take the exams on their scheduled dates.

Please note: 1) All students are required to take the final (no student can be exempted).
2) After the withdrawal date, no "W" can be given, and you **must** receive a regular grade (A-F) in the course.

Grading Policy: The final grade is based on the score out of 100% that the student accumulated from the three exams, quizzes/home works and the final exam. Below is the weighting of the categories:

60% (20% for each Exam => 3x 20%)
15% Home works and Quizzes
25% Final exam
100% Total

The *overall score* is based on the following:

Overall score = 0.60 (Average of three regular exams) + 0.15 (Homework) + 0.25 (Final Exams)

The course grade is then obtained from the overall score:

Final Average	90 – 100	80 – 89	70 – 79	60 – 69	< 60
Letter Grade	A	B	C	D	F

Tentative outline for ENGR 2301
NB. This outline is subject to change as the semester progresses

Week/ Date	***Chapter***	***Sections***
Assign	**1. NTRODUCTION**	1.1 What is Mechanics? 1.2 Fundamental Concepts and Principles 1.3 System of Units 1.4 Conversion from One System of Units to Another 1.5 Methods of Problem Solutions

	2. STATICS OF PARTICLES	2.1 Introduction Forces in a Plane 2.2 Forces on a Particle: Resolution of Forces 2.3 Vectors 2.4 Addition of Vectors 2.5 Resultant of Several Concurrent Forces 2.6 Resolution of Forces into Components 2.7 Rectangular Components of a Force. Unit Vectors 2.8 Addition of Forces by Summing *x* and *y* Components 2.9 Equilibrium of a Particle 2.10 Newton's First Law of Motion 2.11 Problems involving Equilibrium of a Particle. Free-Body Diagrams Forces in Space 2.12 Rectangular Components of Forces in Space 2.13 Force Defined by its Magnitude and Two Points on its Line of Action 2.14 Addition of Concurrent Forces in Space
	3. RIGID BODIES: EQUIVALENT SYSTEMS OF FORCES Exam I (suggested)	3.1 Introduction 3.2 External and Internal Forces 3.3 Principle of Transmissibility. Equivalent Forces 3.4 Vector Product of Two Forces 3.5 Vector Products Expressed in Terms of Rectangular Components 3.6 Moment of Force about a point 3.7 Varignon's Theorem 3.8 Rectangular Components of the Moment of Forces 3.9 Scalar Product of Vectors 3.10 Mixed Triple Product of Three Vectors 3.11 Moment of a Force about a Given Axis 3.12 Moment of Couple 3.13 Equivalent Couples 3.14 Addition of Couples 3.15 Couples Can Be Represented by Vectors 3.16 Resolution of a Given Force Into a Force at *O* and a Couple 3.17 Reduction of System of Forces to One Force and One Couple 3.18 Equivalent System of Forces 3.19 Equipollent System of Forces 3.20 Further Reduction of System of Forces [1]3.21 Reduction of System of Forces to a Wrench
	4. EQUILIBRIUM	4.1 Introduction

[1] *Optional Section/Chapter*

	OF RIGID BODIES	4.2 Free-Body Diagram Equilibrium in Two Dimensions 4.3 Reactions at Supports and Connections for a Two-Dimensional Structure 4.4 Equilibrium of Two Bodies in Two Dimensions 4.5 Statically Indeterminate Reactions, Partial Constraints 4.6 Equilibrium of Two-Force Body 4.7 Equilibrium of Three-Force Body Equilibrium In Three Dimensions 4.8 Equilibrium of a Rigid Body in Three Dimensions 4.9 Reactions at Supports and Connections for a Three-Dimensional Structures
	5. DISTRBUTED FORCES: CENTROIDS AND CENTERS OFGRAVITY Exam II (Suggested)	5.1 Introduction Areas and Lines 5.2 Center of Gravity of a Two-Dimensional Body 5.3 Centroids of Areas and Lines 5.4 First Moments of Areas and Lines 5.5 Composite Plates and Wires 5.6 Determination of Center of Gravity by Integration 5.7 Theorems of Pappus-Guldinus *5.8 Distributed Loads on Beams *5.9 Forces on submerged Surfaces Volumes 5.10 Center of Gravity of a Three-dimensional Body: Centroid of a Volume 5.11 Composite Bodies 5.12 Determination of Centeroids of Volumes by Integration
	6. ANALYSIS OF STRUCTURES	6.1 Introduction Trusses 6.2 Definition of a Truss 6.3 Simple Trusses 6.4 Analysis of Trusses by the Method of Joints *6.5 Joints under Special Loading Conditions *6.6 Space Trusses 6.7 Analysis of Trusses by the Method of Sections *6.8 Trusses Made up of Several Simple Trusses Frames and Machines 6.9 Structures Containing Multiforce Members 6.10 Analysis of Frames 6.11 Frames which cease to Be Rigid When Detached from their Supports 6.12 Machines

	***7. FORCES IN BEAMS AND CABLES**	7.1 Introduction 7.2 Internal Forces in Members Beams 7.3 Various types of Loading and Supports 7.4 Shear and bending Moment in a Beam 7.5 Shear and Bending-Moment Diagrams 7.6 Relations among Load, Shear, and Bending Moment Cables 7.7 Cables with Concentrated Loads 7.8 Cables with Distributed loads 7.9 Parabolic Cable 7.10 Catenary
	8. FRICTION Exam III (Suggested)	8.1 Introduction 8.2 The Laws of Dry Friction, Coefficient of Friction 8.3 Angles of Friction 8.4 Problems Involving Dry Friction 8.5 Wedges 8.6 Square-Threaded Screws *8.7 Journal Bearings, Axle Friction *8.8 Thrust Bearings, Disk Friction *8.9 Wheel Friction, Rolling Resistance *8.10 Belt Friction
	9. DISTRIBUTED FORCES: MOMENTS OF INERTIA	9.1 Introduction Moments of Inertia of Areas 9.2 Second Moment, or Moment of Inertia of an Area 9.3 Determination of the Moment of Inertia of an Area by integration 9.4 Polar Moment of Inertia 9.5 Radius of Gyration of an Area 9.6 Parallel Axis Theorem 9.7 Moment of Inertia of Composite Areas *9.8 Product of Inertia *9.9 Principal Axis and Principal Moments of Inertia *9.10 Mohr's Circle for Moments and Products of Inertia
		Moments of Inertia of Masses 9.11 Moments Of Inertia of a Mass 9.12 Parallel Axis Theorem 9.13 Moments of Inertia of a Thin Plate 9.14 Determination of the Moments of Inertia of a Three Dimensional Body by Integration 9.15 Moments of Inertia of Composite Bodies

		*9.16 Moment of Inertia of a Body with respect to an Arbitrary Axis through O, Mass products of Inertia *9.17 Ellipsoid of Inertia, Principal Axis of Inertia *9.18 Determination of the Principal Axis and Principal Moments of Inertia of a Body of Arbitrary Shape
	***10. METHOD OF VIRTUAL WORK**	10.1 Introduction 10.2 Work of a Force 10.3 Principle of Virtual Work 10.4 Applications of the principle of Virtual Work 10.5 Real Machines, Mechanical Efficiency 10.6 Work of a Force during a Finite Displacement 10.7 Potential Energy 10.8 Potential Energy and Equilibrium 10.9 Stability of Equilibrium
	Final Exam	Comprehensive

Success in this course depends solely on the individual student

The following are strongly recommended for each student:

- Read and understand all elements of the Syllabus, Distance Education and Student handbooks.
- Give your professor evening (after 9pm or week-ends) phone calls and e-mail.
- Read and comprehend the required chapters in the textbook prior to the exams.
- Successfully complete all requirements of this course as outlined in this document.
- Contact your professor if you have any questions regarding any element of the course you do not understand.
- HINT: Work hard from the beginning of the semester rather than playing a "catch-up game during the second half of the semester.
- Plan to attend all class review sessions to clarify your concerns about the course content/tests.

Important dates

January 18:	Regular classes' begin- Drop/Add/Swap
January 19:	Registration Ends
January 19:	Last day for Drop/Add/Swap
Feb 21:	Office closed- Presidents Day (Holiday)
March 14- 20:	Offices closed- Spring Break (Holiday)
April 21:	Last day for student withdrawals- 4:30pm
April 22-24:	Offices closed- Easter Holiday
May 8:	Instruction ends
May 9-10:	Final exam begins on HCCS regular class schedule
May 15:	Semester Ends
May 16:	Grades Due by 12:00 noon
May 20:	Grades available to students