School of Engineering EGR
Mercer University

Syllabus for *EGR 236*
Dynamics
Summer Semester, 2nd Session 2008
M, T, W, Th
2:45-4:45 PM
Room EGC *109*

Instructor: Richard K. Kunz, Ph.D., P.E.
Associate Professor
Department of Mechanical Engineering

Office: Suite 10F-F, School of Engineering

Hours: By appointment or drop by
During summer an appointment is recommended.

Phone: 478-301-4061

Email: kunz_rk@mercer.edu

Textbooks and Supplies:
Required: ***Vector Mechanics for Engineers: Dynamics, 8th Edition***
Ferdinand P. Beer, E. Russell Johnston, Jr., William E. Clausen, Phillip J. Cornwell
McGraw-Hill Publisher, ©2007, ISBN-13 9780073212203

Catalog Description:
Planar kinematics of particles and rigid bodies. Planar kinetics of particles and rigid bodies: force and acceleration, work and energy, impulse and momentum.

Course Objectives:
Upon successful completion of this course, you should be able to do the following:
- Use rectangular and cylindrical coordinate systems for 2-D and 3-D vectors.
- Determine position, velocity, and acceleration of particles in 2-D and 3-D.
- Prepare appropriate free body diagrams for rigid bodies that are not in equilibrium.
- Determine forces and moments imposed upon a dynamic rigid body.
- Solve dynamic problems involving linear and angular momentum.
- Determine effects of impact on two bodies in a plane.
- Solve dynamic problems involving friction.
- Use energy and work relationships to solve dynamic problems.
- Calculate mass moment of inertia for bodies.
- Determine translational and rotational planar movements for rigid bodies.

Prerequisites:
EGR 232, MAT 192, PHY 161

Course Content:

Particle Kinematics: Rectilinear Motion
Curvilinear Motion: Rectangular, Normal/Tangential, Cylindrical Coordinates
Dependent Motion
Relative Motion
Newton's Laws of Motion
Equations of Motion: Rectangular, Normal/Tangential, Cylindrical Coordinates
Particle Kinetics: Work and Energy and Conservation of Energy
Particle Kinetics: Impulse and Momentum and Impact
Particle Kinetics: Angular Momentum
Rigid Body Kinematics: Translation & Rotation
Rigid Body Kinematics: Relative Velocity and Acceleration
Mass Moment of Inertia
Planar Equations of Motion
Rigid Body Kinetics: Translation
Rigid Body Kinetics: Rotation about fixed axis
Rigid Body Kinetics: General Plane Motion
Rigid Body Kinetics: Momentum and Impulse
Rigid Body Kinetics: Work and Energy

Grading:

Homework	15%
Midterm	35%
Final Exam	50%

Grade Averages: A (90-100), B (80-89), C (70-79), D (60-69), F(<60)

Course Standards:

1. **Homework** is an important part of learning, as performing the homework is the only way to have a good understanding of the course material and form good engineering work habits. Problems will be assigned each class period, and with a due date of the following class period. Selected problems will be collected and graded on a random basis. Problems may be collected on the due date or later.

   The homework grade will be based mostly on effort, so a good attempt at a solution is required for all problems. You may work together in small groups, but you must do and turn in your own work. Work that is copied from another student or from the posted solutions is a violation of the Mercer University Honor Code and will receive a zero score. Late homework will not be accepted.

   - Homework must be done neatly in pencil.
   - Place your name in the upper right hand corner.
   - Begin each problem on a separate page.
   - Do not write on the backs of paper.
   - Sketches must be neat, labeled, and clear.
   - Show all forces, coordinate systems, governing equations, and assumptions that are used in the solution.
   - Equations and solutions must follow logically, step by step. Thus, your complete solution is supported by what you have presented. Show all your work.
   - Numerical answers without units are meaningless.
   - Papers not adhering to these rules will receive less than full credit.

   Solutions to all homework problems will be placed in the library on 2-hour reserve.

2. **Tests:** There will be one two-hour mid-term test during the semester. Problems will be similar to the homework. For full credit, problem solutions must follow logically, step by step to the clearly indicated solution with proper units. Thus, your solution is supported by what you have presented Mid-term will be closed notes and closed book. A calculator is recommended. No make-up will be given without a documented excuse.

   Tentative date for the mid-term is **Tuesday, 8 July, 2:45 – 4:45 p.m.**

3. **Final Exam:** The final exam will be comprehensive, with an emphasis on material covered during the last half of the course. It will be closed notes and closed book. It will consist of problems similar to those on the mid-term.

4. The final exam will be given **Saturday, 26 July, 1:00 – 3:00 p.m.**

5. **Reading** assignments will (roughly) follow the attached schedule. You are encouraged to read the listed sections before the next class to prepare for the material to be covered.

Additional Information:

1. Please feel free to arrange a meeting with me at any point that you feel you need it. If you would like to see me, come to my office, catch me after class to schedule a time, call, or email.

2. Please turn off cell phones, pagers, and other electronic noise-making devices before entering the classroom.

3. The **honor code** provisions as outlined in the *Catalog* and in the student handbook, *The Lair*, and on the web at http://www2.mercer.edu/HonorCouncil/default.htm apply to everyone. Plagiarism is a violation of the honor code and is prohibited. When in doubt, please ask to avoid potentially embarrassing situations.

4. Electronic communication is an important adjunct to face-to-face communication, including from professor to students, students to professor, and students to students. You must have regular access to your Mercer e-mail. If you do not have an active e-mail address on the first day of class, please secure one. Access to the Web and to the Internet is also integral to the class work. A number of laboratories on campus will provide access, in addition to EGC 102 and EGC 111-B.

5. Students requiring accommodations for a disability should inform the instructor at the close of the first class meeting or as soon as possible. If you are not registered with Disability Services, the instructor will refer you to the Disability Support Services office for consultation regarding documentation of your disability and eligibility for accommodations under the ADA/504. In order to receive accommodations, eligible students must provide each instructor with a "Faculty Accommodation Form" from Disability Services. Students must return the completed and signed form to the Disability Services Coordinator on the 3rd floor of the Connell Student Center. Students with a documented disability who do not wish to use academic accommodations are also strongly encouraged to register with Disability Services and complete a Faculty Accommodation Form each semester. For further information, please contact Carole Burrowbridge, Disability Services Coordinator, at 301-2778 or visit the website at http://www.mercer.edu/stu_support/swd.htm