

**M.E. 2033, Dynamics**  
**C.E. 3111, Analytical Mechanics II**  
University of Colorado Denver

Term: Summer 2008  
Meeting Time: Monday and Wednesday from 5:30 to 8:15 PM in NC 1323  
Instructor: Joe Cullen  
Office: NC 3518B  
Office Hours: Monday: 4:00 PM to 5:30 PM and after class  
Wednesday: 4:00 PM to 5:30 PM and after class  
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### **Catalog Description**

A vector treatment of dynamics of particles and rigid bodies, including rectilinear translation, central force, general motion of particles, kinematics of rigid bodies, the inertia tensor, plane motion of rigid bodies; energy and momentum methods for particles, systems of particles and rigid bodies. Prerequisite: C.E. 2121 or M.E. 2023.

### **Required Text**

J. L. Meriam and L. G. Kraige, *Engineering Mechanics: Dynamics, 6<sup>th</sup> Edition*, John Wiley & Sons, 2006 (ISBN 978-0-471-73931-9).

### **Homework Assignments**

Homework assignments will be handed out in class and homework will be due each class meeting. Homework assignment grades will be 25% of your grade for the course. You will be given a score from 0 to 100 points on each assignment. None of the homework will be dropped before your homework average is computed. The graded homework assignments will be returned in class.

### **Tests**

There will be three tests and each test will be worth 25% of your grade for the course. The first test will be on June 18<sup>th</sup>, the second will be on July 7<sup>th</sup>, and the third will be on July 23<sup>rd</sup>. Each test is open book and open notes. Each test will be given a score from 0 to 100 points and each problem on a test has the same value (i.e., if there are seven problems on the test then each problem is worth  $\frac{100}{7} = 14.3$  points). The first and second tests will be returned at the start of class during the next class meeting. You will need to make arrangements with the instructor to collect the third test if you would like to have it returned to you. The third test will not be given early and everybody is expected to attend class the last week of the semester.

## Grading

Homework Assignments	25%
Test #1	25%
Test #2	25%
Test #3	25%

Each homework assignment and each test is graded on a scale of zero to 100 points. Your grade in the course will be computed as a weighted average of your homework assignment and test averages using the following equation:

$$AVERAGE = 0.25 \times HW + 0.75 \times TEST$$

*HW* is the average of your homework assignment grades (0–100) and *TEST* is your average test grade (0–100). The following scale will be used to assign grades at the end of the semester:

Average	Grade
94 and above	A
90 to 93.9	A–
87 to 89.9	B+
83 to 86.9	B
80 to 82.9	B–
77 to 79.9	C+
73 to 76.9	C
70 to 72.9	C–
60 to 69.9	D
Below 60	F

## Course Policies

There will be no extra credit work given to make up for missing homework assignments or poor performance on the tests. Late homework will not be accepted for grading. If you have a good reason why you could not turn in an assignment on time then you may, *with the instructor's permission*, turn in the completed assignment for consideration. If the reason is acceptable then the assignment will be examined for completeness and recorded as completed. These completed assignments will not be included in the computation of your homework average and will simply be excused. Solutions that are merely copies of the work of others or a copy of any kind of posted or published solutions will not be accepted for grading. Any work on a test that is not your own will result in a failing grade for the course.

## Course Schedule

Week	Topics Covered
Meeting #1 June 2 and 24	Read 1/1 to 1/7 and 2/1 to 2/3 Units. Newton's law of gravitation. Rectilinear motion and Cartesian coordinates.
Meeting #2 June 4	Read 2/4 to 2/7 Rectangular coordinates. Normal & tangential coordinates. Polar, cylindrical, and spherical coordinates.
Meeting #3 June 9	Read 2/8 to 2/9 and 3/1 to 3/4 Relative motion. Newton's 2 <sup>nd</sup> law for a particle - rectilinear motion.
Meeting #4 June 11	Read 3/5 Newton's 2 <sup>nd</sup> law for a particle - curvilinear motion.
Meeting #5 June 16	Read 3/5 Newton's 2 <sup>nd</sup> law for a particle - curvilinear motion.
Meeting #6 June 18	Read 3/6 to 3/7 Work and energy for a particle. Conservation of energy for a particle. Test #1 will be during the second half of the class.
Meeting #7 June 23	Read 3/8 to 3/9 and 3/12 Impulse and momentum for a particle. Impact.
Meeting #8 June 25	Read 3/10 and 4/1 to 4/5 Angular momentum. Newton's 2 <sup>nd</sup> law for a system of particles. Work and energy for a system of particles. Conservation of energy and momentum.
Meeting #9 June 30	Read 5/1 to 5/4 Rigid body rotation. Absolute motion analysis. Relative velocity motion analysis.
Meeting #10 July 2	Read 5/5 to 5/6 Instantaneous center of rotation. Relative acceleration motion analysis.
Meeting #11 July 7	Read 5/7 Motion relative to rotating axes. Test #2 will be during the second half of the class.
Meeting #12 July 9	Read 6/1 to 6/3 Newton's 2 <sup>nd</sup> law for a rigid body. Rigid body translation.
Meeting #13 July 14	Read 6/4 to 6/5 Fixed-axis rotation of a rigid body. General plane motion of a rigid body.
Meeting #14 July 16	Read 6/5 General plane motion of a rigid body.
Meeting #15 July 21	Read 6/6 to 6/7 Work and energy for a rigid body. Virtual work.
Meeting #16 July 23	Test #3