Dr. Cameron W Coates  
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Office Hrs MWR 1330-1530  
Office Loc. UH251

Class Schedule:  

<table>
<thead>
<tr>
<th>Days</th>
<th>Time</th>
<th>Building</th>
<th>Room</th>
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<tbody>
<tr>
<td>MWF</td>
<td>0900-0950</td>
<td>Science</td>
<td>2506</td>
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Required Text:  

*Engineering Mechanics, Statics and Dynamics, 5th Ed.*  
Bedford and Fowler

Required Course:  

ENGR2202

Course Credit Hours:  

3

Grade Type: Whole Letter Grade (A - F)

Grade Percentage:

- 24% - Final Exam
- 36% - Tests (3 @12% each)
- 20% - 6 Quizzes, one will be dropped (5 @ 4% each)
- 20% - Group Projects (2@10% each)


Course Description

Kinematics and dynamics of particles and rigid bodies in one, two, and three dimensions. Work-energy and impulse-momentum concepts.

Website:  
http://engineering.armstrong.edu/cameron/courses.html

Be sure to visit the website and utilize the tools available to enhance your expertise.

Course Outline

Dynamics

1. Particle motion  
2. Planar kinematics of rigid bodies  
3. Newton-Euler analysis of planar rigid body systems  
4. Angular velocity in three dimensions  
5. Angular acceleration in three dimensions  
6. Euler angles  
7. Rotation matrices  
8. Angular momentum  
9. Inertia properties  
10. Principal moments and axes of inertia  
11. Euler equations  
12. Impact; Impulse-momentum relations for rigid bodies  
13. Work-Energy analysis of conservative and non-conservative rigid body systems
Course Outcomes:

**Outcome 1**: To teach students the basic principles underlying the dynamics of rigid bodies in planar and 3D motion

1.1 Students will demonstrate an understanding of Newtonian-Eulerian physics and basic equations underlying kinematics and kinetics of rigid bodies in 2D and 3D motion.

**Outcome 2**: To educate students to identify, formulate and solve engineering problems in rigid body dynamics.

2.1 Students will demonstrate the ability to isolate rigid bodies and to draw clear and appropriate free body diagrams.
2.2 Students will demonstrate an ability to identify kinematic and kinetic knowns and unknowns.
2.3 Students will demonstrate an ability to identify and effectively account for kinematic constraints such as rolling and/or sliding, and their kinetic consequences.
2.4 Students will demonstrate that they can apply the appropriate principles referred to in Objective 1 to the solution of problems.
2.5 Students will demonstrate that they can combine the appropriate principles referred to in Objective 1 in the solution of problems.
2.6 Students will demonstrate that they can determine the mass moments and products of inertia for arbitrary rigid bodies.
2.7 Students will demonstrate that they can calculate the principal coordinates and the principal moments of inertia for arbitrary rigid bodies.

**Outcome 3**: To introduce students to the concepts of work-energy and impulse-momentum for rigid body systems.

3.1 Students will demonstrate an understanding of work-energy principles as applied to rigid bodies in 2D and 3D motion.
3.2 Students will be able to evaluate the kinetic energy of rigid bodies as well as the potential energy associated with gravity and spring forces.
3.3 Students will demonstrate an understanding of conservation laws for momentum and energy.
3.4 Students will demonstrate an ability to apply impulse-momentum relations where appropriate.
3.5 Students will demonstrate that they can utilize coefficient of restitution data in the solution of impact problems in rigid-body dynamics.

**Attendance**
Consistent class attendance is expected but not mandatory, students are responsible for all material covered in class. The material taught is extremely dependent on previous material; therefore it is highly recommended that you do not skip any class. I will NOT tutor you to make up material you missed unless you have a valid excuse (preferably with proof i.e. medical, family emergency) for missing class.

**Exams**
Exams will be closed book and closed notes and are to be individual effort. Exams will cover all course material (lectures, handouts, reading assignments, etc.) as provided on the course schedule. You are expected to abide by the exam dates. No makeup exams will be given except for a medical or family emergency (documented proof required). Correct Free Body Diagrams must be drawn for all statics problems attempted on any test or quiz given, where applicable.
Disabilities or Special Needs
If you have a physical, psychological, and/or learning disability that might affect your performance in this class, please contact the Disability Services Office (344-2744, MCC 207) as soon as possible. The Disability Services Office will determine appropriate accommodations based on testing and medical documentation. Please notify me that you might need accommodations within two weeks of the start of the semester or two weeks of being diagnosed. Notification after the start of an exam or last minute notification on an assignment will not be accepted.

Office Hours
If topics are unclear after class attendance or you genuinely attempted assigned problems, come by during office hours for additional help. If you cannot make it at these times, email me to make an appointment. Do NOT bother to come by the day before the test if you have not been doing the homework problems (i.e. be able to show attempts made at the majority of problems). If you stop by my office with questions outside of office hours or without an appointment, it's highly unlikely I will be able to see you, even if you only need a minute of my time. You may email Mrs. Brenda King at brenda.king@armstrong.edu to make an appointment.

Honor Code
Please read and abide by Armstrong’s policies and procedures regarding honor code expectations and violations. Visit:


Ignorance of the honor code cannot be used as an excuse for any offense which violates the honor code.

Additional Tutoring
The CST tutoring center provides free tutoring for most lower level mathematics and science courses. http://www.armstrong.edu/Departments/advising/advising_tutorial_services

Assignments
Readings and projects are assigned as per the schedule given. Projects should be done in groups of 2 or 3. The addition OR removal of names is NOT allowed once the project is turned in. All group members will receive the same grade. Assignments are due at the beginning of class on the specified dates in the syllabus. Late assignments will be accepted with the following penalties: submitted <1 day =-20%, 1 day < submitted <2 days=-30%, 2< submitted <3 days=-40%. Homework on the syllabus sheet will not be collected, however quizzes and tests are strongly influenced by the homework problems and it is highly recommended that all homework problems be attempted. Occasionally, special homework assignments (not from the textbook) will be collected and graded. These are to be an individual effort. No projects will be accepted 3 days after the due date and time without proof of a medical or family emergency.