Course Details:
Description: The course is an integrated development of modeling and problem-solving techniques for particle and rigid-body motion emphasizing the use of free-body diagrams and vector algebra.

Objectives/Learning Outcomes:
1) The student should master the basic principles of particle and rigid body dynamics.
2) The student should be able to systematically apply these principles to mechanical systems arising in diverse aspects of technology.
3) The student should be able to solve the mathematical equations which govern these systems and physically interpret the results.

To these ends, the student should master vector algebra at a high level.

Topics Covered: two- and three-dimensional kinematics of particles and rigid bodies; two-dimensional kinetics of particles and rigid bodies using Newton’s 2nd Law, the energy method, and the impulse-momentum method; introduction to three-dimensional kinetics of rigid bodies.
(4 credits)

Prerequisites:
ENGR-1100: Introduction to Engineering Analysis (Engineering Mechanics: Statics)
PHYS-1100: Physics 1 (Mechanics)

Corequisite:
MATH-2400: Introduction to Differential Equations

Instructor:
Zahra Sotoudeh
Office: JEC 2034, email: sotouz@rpi.edu
Course Office Hours: Tuesday/Friday 1:00-2:00 pm
If none of these works for you, email for an appointment with your reason.

Sections:
Section 4: Tuesday/Friday: 2:00 – 3:50 PM, DCC 330

Web:
We use new RPILMS: https://bblms-fe1.server.rpi.edu/
TAs:
Andrew Hess, email: hessa@rpi.edu
Office hours: Monday/Thursday 2-3 PM, JEC 2001

Please Note:
There will be about 10 graded quizzes during the semester, during the last half hour portion of the class. The general pattern is that there is a quiz or a test every other class period. Surprise quizzes are possible. You must be present for the whole class period to take the quiz.

Generally, the class format will be as follows. I will go over the theory and background for about one half hour. Then for about one hour I will work problems. The problems will be handed out on individual worksheets. For the last part of the class (if there is not a quiz) you may leave or stay to get individual help, work on homework, etc. The instructor will help individually during this last half hour period as best she can.

Homework problems will be assigned, but will not be collected or graded.

Worksheets for the homework problems will be available on LMS. Solutions for most of the problems will be provided before the upcoming quizzes.

Homework Assignments:
Three or four homework problems will be assigned for each class. It is only through individual problem solving that will you uncover what you do not understand and thus prepare yourself for quizzes, tests and the final. These problems are not to be handed in, but should ideally be completed by the next class after the assignment is given. If you can work the homework problems and the class example problems, you will do very well on the quizzes and tests.

Textbook:
Engineering Dynamics for RPI
JL Meriam and LG Kraige
7th Edition (2012), John Wiley and Sons

Extra Resource:
An introduction to Dynamics
D. J. McGill and W. W. King
**Quizzes:**
There will be *about* ten in-class, closed-book, closed-note, 20-30 minute quizzes during the semester. The overall quiz grade comprises 15% of your final grade. Bring a page of formula. **There are no make-up quizzes.** If you have a valid excuse, your quiz grade will be proportionally based on fewer than ten quizzes. I accept at your word most reasonable quiz excuses, especially if you ask beforehand. If you ask for an excuse after class, I will probably be skeptical and may or may not grant the excuse.

Occasionally, the quizzes will be take-home. The take home quizzes are slightly more difficult than in-class ones. You may need a computer program such as MATLAB, MATHEMATICA, or MAPLE to draw figures.

**Tests:**
There will also be three 110-minute, in-class tests during the semester. Each test counts for %20 of your total grade. Each test will be of closed-book, closed-note format. You can bring 2 pages of formula. Laptop computers are not permitted; a basic hand calculator will be all that is allowed for the tests. Any request for a make-up test (not a quiz) must be accompanied by an official excuse from the Student Experience Office, x8022, se@rpi.edu. The make-up test will be given at the earliest possible date at a common time for those who missed the test.

**Final Exam:**
There will be a closed-book, closed-note final exam given during the final exam period. The same policy applies – You can bring 3 pages of formula. Laptop computers are not permitted; a basic hand calculator will be all that is allowed for the tests. The final exam counts 25%. Unfortunately, the final for this course is usually scheduled on the last date. **Do not make travel plans to leave before the end of finals.** The same rules for a make-up final apply as to make-up tests, which are consistent with Institute policy in the Catalogue.

**Class Attendance, Preparation, and Participation:**
Attendance at classes is mandatory and participation in class is strongly encouraged but not obligatory when there is no test or quiz. **Remember, there will be surprise quizzes and if you miss a class and as a results, a surprise quiz, it will effect your final grade.**

**Course Conduct and Academic Integrity:**
Students are expected to conduct themselves in a professional manner at all times by, *e.g.*, being attentive, being on time, not leaving early, not sleeping, not obviously doing other things such as reading the *Poly*, not disrupting the class, not texting or using cell phones, not using laptop computers unless instructed to do so, etc. Repeat offenders may be asked to leave. I am only asking for the same reasonable standard of conduct of any professional environment. If it would be unacceptable and rude behavior in the workplace, it is likewise unacceptable and rude in the classroom.
Student-teacher relationships are built on trust. Acts which violate this trust undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities defines various forms of academic dishonesty and you should make yourself familiar with these; all forms are violations of the trust between students and teachers. Collaborative discussion on homework assignments is encouraged, although you should certainly strive to be able to work the problems independently. Of course, no collaboration of any kind or use of unauthorized notes/materials is permitted on in-class quizzes or tests. Violation of this policy will result in a grade of zero for the quiz or test.

**Grade Summary:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Attendance / Class participation (extra credit)</td>
<td>up to 5%</td>
</tr>
<tr>
<td>Graded In-Class Quizzes (10 @ 2%)</td>
<td>15%</td>
</tr>
<tr>
<td>Tests (20%, 20%, 20%)</td>
<td>60%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
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Letter grade (out of 4.0): A (4.0), A- (3.67), B+ (3.33), etc. Based on the above weighting you will have an overall numerical score and final letter grade.

**Grade Appeal:**

Students are encouraged to discuss their grades with the instructor as frequently as needed and to seek assistance at any time from either the instructor or TA. Test appeals should be made within one week of the return of the test to the student. The student should resubmit the test to the instructor along with the grading complaint *in writing.* The instructor will pass the appeals to the TA who will regrade the test, keeping in mind consistency with the overall grading scheme. If the student is not satisfied with this outcome, the instructor will be the final arbiter.