ENGR 2350 Dynamics

Catalog Data:  ENGR 2350: Dynamics (3). Pr., ENGR 2050. Fundamental principles of dynamics including kinematics and kinetics of particles, kinematics and kinetics of rigid bodies, mass moments of inertia, planar dynamics of rigid bodies, and simple harmonic motion.


Coordinator:  R. Steven Gross, Associate Professor of AE, Davis 314, 844-6846, office hours 8-9am MWF and by appointment. grossrs@auburn.edu website: www.eng.auburn.edu/users/rgross

Goal:  The goal of this course is to teach the students to formulate and solve equations of motion for particles and rigid bodies. This includes the direct application of Newton's laws of motion, the use of the work-energy principle and the application of impulse-momentum concepts.

Prerequisites by Topic:  1. Calculus
   2. Statics

Topics:
1. Introduction (Chapter 1).
2. Kinematics of Particles (Chapter 2)
   a) Rectilinear Motion (Sec 2/1, 2/2)
   b) Plane Curvilinear Motion – Rectangular Coordinates (Sec 2/3, 2/4)
   c) Plane Curvilinear Motion – Normal and Tangential Coordinates (Sec 2/5)
   d) Relative Motion -Translating Axes (Sec 2/8)
3. Kinetics of Particles (Chapter 3)
   a) Newton’s Second Law (Sec 3/1, 3/2, 3/3)
   b) Rectilinear Motion (Sec 3/4)
   c) Curvilinear Motion (Sec 3/5)
   d) Work and Kinetic Energy (Sec 3/6)
   e) Potential Energy (Sec 3/7)
   f) Linear Impulse and Momentum (Sec 3/8, 3/9)
   g) Angular Impulse and Angular Momentum (Sec 3/10)
4. Plane Kinematics of Rigid Bodies (Chapter 5)
   a) Rigid Body Rotation (Sec 5/1, 5/2)
   b) Relative Velocity (Sec 5/4)
   c) Relative Acceleration (Sec 5/6)
5. Mass Moments of Inertia (Appendix B)
   a) Mass Moments of Inertia (Appendix B/1)

6. Plane Kinetics of Rigid Bodies (Chapter 6)
   a) General Equations of Motion (Sec 6/1, 6/2)
   b) Translation (Sec 6/3)
   c) Fixed-Axis Rotation (Sec 6/4)

7. Vibration and Time Response (Chapter 8)
   a) Free Vibration of Particles (Sec 8/1, 8/2)

**Homework:** The homework will be assigned in class through CANVAS and also posted on my website [www.eng.auburn.edu/users/rgross](http://www.eng.auburn.edu/users/rgross). The homework will typically be collected on a Friday, graded and returned. Homework will not be accepted after the due date, except in unusual circumstances. Homework may always be turned in early.

**Tests:** Four tests will be given
- **Test 1:** Feb 3rd
- **Test 2:** Feb 24th
- **Test 3:** March 23rd
- **Test 4:** April 13th

**Grading:**
- Homework: 20%
- Tests (4): 60%
- Final Exam: 20%
- **Total:** 100%

**Grading Scale**

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<th>Percentage Score</th>
<th>Letter Grade</th>
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<tr>
<td>90-100%</td>
<td>A</td>
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**Attendance:** Class attendance is not required. If you do attend class, then please be punctual. I make every effort to start and end class on time and I expect the same courtesy from you.

**Classroom Cellphone Policy**

Please refrain from using your phone during class. If you have an emergency situation and need to keep your phone on during class, please leave the classroom to conduct your business.

**Special Needs:** Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately.