



ME331 Mechanics of Machines (Required Course)

Code and Name: ME331 Mechanics of Machines

Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:

- Design of Machinery: An introduction to the synthesis and analysis of mechanisms and machines, Robert L. Norton, 5th Edition, McGraw Hill, 2012.

Other References:

- Theory of Machines and Mechanisms, Joseph E. Shigley, and John J. Uicker, Jr., 4th edition, Oxford University Press, 2010.

Course Description:

Position, velocity and acceleration analysis of linkages using graphical and analytical methods, dynamic force analysis.

Pre-requisites: Linear Algebra Math226, Dynamics GE202.

Co-requisites: None

Course Learning Outcomes:

With relation to ABET Student Outcomes (SOs: 1-7)

1. Understand basic mechanisms, their topology and degrees of freedom (1)
2. Learn position, velocity and acceleration analysis techniques for mechanisms (1)
3. Improve student's ability to think conceptually, critically and analytically (1)
4. Show ability to model, analyze and simulate an existing mechanisms and machines (6)
5. Visualize the motion of a mechanism and understand its function (1)
6. Select the best mechanism for a task and determine its required dimensions (6)
7. Encourage the students to share knowledge through the teamwork (5)
8. Direct the students to enrich themselves by self-learning in the field of modeling and simulation of mechanisms using MATLAB (1, 2, 6)
9. Participate in tutorial classes on related topics held in class weekly. (1, 2, 4, 6)
10. Encourage students to think seriously and get involved in discussions with the instructor in classroom (2)
11. Encourage peer discussions and offer one to one discussion. (3)

Topics to be covered:

- Introduction to mechanics of machines, types of motion, and calculations of degrees of freedom (DOF)
- Inversions of kinematic chains, classification of planar mechanisms and calculations of transmission angle
- Graphical linkage synthesis
- Analytical position analysis
- Graphical velocity analysis
- Instant center of velocity
- Analytical velocity analysis
- Graphical acceleration analysis
- Analytical acceleration analysis
- Dynamic force analysis
- Dynamic force analysis.

Grading Policy:

The grading for the course are 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, homework, and projects for the remaining 20% that is modified by the course instructor.

