

ME 231-003 – Kinematics of Machinery

Meeting Times & Location:

T, Th 4:00 – 5:20pm
~~CKB-219~~ TIER 112

Course Description:

ME 231 is an introductory course in the design, selection and evaluation of mechanisms for various applications

Prerequisites:

CS101, ME234

Textbook Required:

K. Russell, Q. Shen and R. S. Sodhi, *“Kinematics and Dynamics of Mechanical Systems: Implementation in MATLAB® and SimMechanics® Second Edition”*
CRC Press, Boca Raton, 2019. ISBN 9781138584044.

Instructor:

Mr. Anthony Glick
Office hours: T, Th 2:40 – 3:30pm MEC 333CD or via Webex by appointment
Email: aglick@njit.edu

Course Objectives:

1. To develop skills for designing and analyzing linkages, cams, gears and other mechanisms
2. To provide a foundation for the study of machine design
3. To develop skills for use of mathematics software and for writing computer programs to solve kinematic problems

Topics:

1. Weeks 1 – 2: Introduction to Kinematics – Kinematic chains and mechanisms, degrees of freedom, types of motion. Mathematical Concepts in Kinematics – Complex number methods, linear simultaneous equations, matrices

2. Week 3: Fundamental Concepts in Kinematics – Types of planar and spatial mechanisms, Grashof's Criteria, Transmission angle

3. Weeks 3 – 5: Kinematic Analysis of Planar Mechanisms – Link velocity and acceleration, four bar mechanism analysis, slider-crank mechanism analysis

EXAM 1: Week 5

4. Week 7: Dimensional Synthesis – Motion generation, path generation and function generation

5. Weeks 8 – 9: Design and Kinematic Analysis of Gears – Spur gears, helical gears, rack and pinion gears, helical gears, bevel gears, worm gears, planetary gears

6. Weeks 9 – 10: Design and Kinematic Analysis of Disk Cams – Followers and follower motion, cam design, pressure angle

EXAM 2: Week 11

7. Week 11: Introduction to Robotic Manipulators

8. Weeks 12 – 14: Geared 5-bar mechanism analysis, Watt II mechanism analysis, Stephenson III Mechanism Analysis

9. Week 15: Review

Grading:

Final Exam: 30%

2 Examinations: 20% each

Homework: 25%

Attendance: 5%

Grading Scale:

A: 100.00 – 90.00%

B+: 89.99 – 87.00%

B: 86.99 – 80.00%

C+: 79.99 - 77.00%

C: 76.99 - 70.00%

D: 69.99 – 60.00%

F: 59.99 – 0%

Policies:

Homework submitted after due date will be penalized as follows: ½ credit if one week late and no credit beyond one week.

Statement on Academic Integrity:

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.*