Mechanical and Industrial Engineering Syllabi NJIT Syllabi

Fall 2019

ME 231-003: Kinematics of Machinery

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ME231-003 – Kinematics of Machinery

Meeting Times & Location:
T, Th 4:00 – 5:20pm
ME 221

Course Description:
ME231 is an introductory course in the design, selection and evaluation of mechanisms for various applications.

Prerequisites:
CS101, ME234

Textbook Required:
"Kinematics and Dynamics of Mechanical Systems – Implementation in MATLAB and SimMechanics"
K. Russell, Q. Shen, R. Sodhi
CRC Press, Boca Raton, 2019

Instructor:
Mr. Anthony Glick
Office hours: T, Th 2:30 – 3:30pm MEC 324
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 (9/2, 9/9): 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 (9/16): Fundamental Concepts in Kinematics – Types of planar and spatial mechanisms, Grashof's Criteria, Transmission angle

3. Weeks 3 – 4 (9/16, 9/23): Kinematic Analysis of Planar Mechanisms – Link velocity and acceleration, four bar mechanism analysis, slider-crank mechanism analysis

EXAM 1: Week 5 (9/30)

4. Week 6 (10/7): Dimensional Synthesis – Motion generation, path generation and function generation

5. Weeks 7 – 8 (10/14, 10/21): 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 (10/28, 11/4): Design and Kinematic Analysis of Disk Cams – Followers and follower motion, cam design, pressure angle

EXAM 2: Week 10 (11/4)

7. Week 11 (11/11): Introduction to Robotic Manipulators

8. Weeks 12 – 14 (11/18, 12/2): Geared 5-bar mechanism analysis, Watt II mechanism analysis, Stephenson III Mechanism Analysis

9. Week 15 (12/9): Review

Grading:
Final Exam: 30%
2 Examinations: 20% each
Homework: 25%
Attendance: 5%

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.*