

Miami University
School of Engineering and Applied Science
Department of Engineering Technology

ENT 314

MECHANISMS FOR MACHINE DESIGN

3

Course Number

Title

Credit Hours

DESCRIPTION: Rigid body kinematics is applied to the analysis and design of mechanisms used in machines. The concepts of motion and force transference from a power source to accomplish specific output tasks are emphasized. Various techniques for the study of motion of machines are discussed and a focus is placed on the application of kinematics theory to real-world machinery. Emphasis is placed on the determination of motion characteristics of a machine and the need for performing these analyses on design concepts to facilitate optimization of the machine arrangement.

PERIODS PER WEEK: 2 Lecture, 1 laboratory

PREREQUISITE(S): ENT: 301 Dynamics

CO-REQUISITE: None

TEXT: Machines and Mechanisms: Applied Kinematics Analysis, 5th Ed., David H. Myszka, Prentice Hall, 2005; ISBN: 0-13-183776-1

METHOD OF PRESENTATION:

Classroom presentations will be primarily lectures, discussions, and problem solving sessions. Assigned homework from the text book, and assigned laboratory projects will be used to present the course materials, prepare students for testing, and course grade determination.

METHOD OF EVALUATION:

The following is the distribution of credit for the required tasks:

Home Work Portfolio -	30%
Mid-Term Test	35%
Final Examination -	35%

OBJECTIVES:

The course is intended to bridge the gap between a traditional study of dynamics and the application to practical problems. Upon completion of the course each student should be able to:

- 1) Demonstrate a working knowledge of the basic principles of mechanisms analysis
- 2) Demonstrate a working knowledge of the basic principles of mechanisms design.
- 3) Demonstrate knowledge of these principles, through the use of manual and computer generated mathematical models, in the solution of simple machine analysis and design engineering problems.

COMPUTER SOFTWARE:

Working Model[®], AutoCAD[®], Solid Edge[®], Dynamic Designer[®], Microsoft Excel[®]

COURSE ASSESSMENT CRITERIA:

Outcome 3 “The ability to apply creative technical skills to the analysis and design of mechanical components and systems.”

Outcome 5 “Knowledge of machine mechanisms ability to apply creative technical analysis and synthesis that is essential to the design of machines and machine systems.”

Outcome 6 “Knowledge of modern computer aided engineering analysis and design that is essential to the design of machines and machine systems.

Outcome 11 “Effective team work skills”

ASSESSMENT TOOLS:

Student Evaluations
Lab Assignments and Projects
Tests
Examinations
Employer Surveys
Graduate Surveys

TOPICAL OUTLINE:

TEXT BOOK READING ASSIGNMENTS

Week 1	Introduction to Mechanisms and Kinematics	Chapter 1
Week 2	Computer Simulation of Mechanisms	Chapter 2
Week 3	Basic Review of Vectors (Graphical and Analytical)	Chapter 3
Week 4	Position Analysis	Chapter 4
Week 5	Mechanism Design	Chapter 5
Week 6	Velocity Analysis	Chapter 6
Week 7	Acceleration Analysis	Chapter 7
Week 8	Acceleration Analysis (Continued) (<i>Mid-Term Test</i>)	Chapter 7
Week 9	Computer-Aided Mechanism Analysis	Chapter 8
Week 10	Computer-Aided Mechanism Analysis	Chapter 8
Week 11	Cams: Design and Kinematics Analysis	Chapter 9
Week 12	Cams: Design and Kinematics Analysis	Chapter 9
Week 13	Static and Dynamic Force Analysis	Chapters 13 & 14
Week 14	Static and Dynamic Force Analysis (Continued)	Chapters 13 & 14
Week 15	Static and Dynamic Force Analysis (Continued)	
Week 16	<i>Final Examination</i>	

Home Work and Computer Laboratory Project Assignments:

- 1-Chapter 1 – problems: 7, 14, 19, 32, 39, 44, (ACAD): (7&32), (14&39), (19&44) should be combined. – (6)
- 2-Chapter 2 – problems: 10 (ACAD, Working Model, Solid Edge) – (3)
- 3-Chapter 3 – problems: 16, 18 (Hand Computed) 30, 42, 44 (ACAD) – (5)
- 4-Chapter 4 – problems: 82, 83, 85 (Working Model) – (3)
- 5-Chapter 5 – problems: 2, 4, (Hand Computed); 10, 16 (ACAD) – (4)
- 6-Chapter 6 – problems: 23, 25, 27 (ACAD) – (3)
- 7-Chapter 7 – problems: 7 (Hand Computed); 26, 35 (ACAD) – (3)
- 8-Chapter 8 – problems: 8, 10 (Working Model and Excel): export WM data to Excel – (4)
- 9-Chapter 9 – problems: 37 (Working Model and Excel): use Excel to compute cam profile; export profile data to WM to create cam profile(2)
- 10-Chapter 13– problems: 10 (Hand Computed) 16 (Working Model) – (2)
- 10-Chapter 14 – problems:14 (Hand Computed, ACAD, Working Model,-) (3)

Total Number of Home Work and Computer Laboratory Projects – 38 (See course portfolio grade sheet)

MIAMI UNIVERSITY LEARNING COMMUNITY:

Miami University is committed to fostering a supportive learning environment for all students irrespective of individual differences in gender, race, national origin, religion, handicapping conditions, sexual preferences, or age. Students should expect, and help create, a learning environment free from all prejudice. Disparaging comments, sexist or racist humor, or questioning the academic commitment of students based upon these individual differences are behaviors that undermine our learning community. If such behaviors occur in class, please seek the assistance of your instructor or department chair.

Students with disabilities are encouraged to register with the Disability Service Office in order that academic accommodations may be made.

Prepared by: Professor Ron Earley, January 2008