

EML 4262 - MACHINE DESIGN II
Common Course Syllabus

Catalog Description: CREDITS: 3. The study of kinematics, dynamics, and design of machinery and related mechanical components. Topics include analysis and synthesis of linkages, cams, gears, and gear trains.

Goals: To introduce fundamental principles of interaction between motion and force in machinery design, and to develop practical design methodology with emphasis on applications (sizing and selection) and synthesis of linkages, cams, gears, gear trains, and related components.

Prerequisites:

1. Engineering Graphics – EGN 1111C
2. Dynamics – EGN 3321 or equivalent
3. Strength of Materials – EGN 3331 or equivalent

Topics:

1. Introduction to design of machinery and mechanisms; degrees of freedom analysis and synthesis (6 hours)
 2. Basic mechanism synthesis: graphical method (6 hours)
 3. Kinematics of mechanisms – displacement, velocity, and acceleration analyses (6 hours)
 4. Basic mechanism synthesis: analytical and computer-aided methods (6 hours)
 5. Static load and force transmission (i.e. mechanical advantage) analysis (4.5 hours)
 6. Dynamic force analysis and balancing (4.5 hours)
 7. Gears and gear trains (6 hours)
 8. Cam design (6 hours)
- (Total: 45 hours)

Course Outcomes: (numbers in parentheses indicate correlation of the outcome with the appropriate ABET program outcomes 1-7)

1. The student will understand the concepts of path, motion, and function generations, and analyze the degrees of freedom of machinery. (1,2,6)
2. The student will be able to perform basic 4-bar and 6-bar mechanism synthesis. (1,2,6)
3. The student will be able to perform kinematic analysis, basic dynamic force analysis, assessing the mechanical advantage, and balancing for simple mechanisms or machinery. (1,2,6)
4. The student will be able to analyze and synthesize gears and gear trains for specific speed reduction ratio. (1,2,6)
5. The student will be able to understand the basic principles of cams and their design. (1,2,6)
6. The student will be able to communicate effectively through written and oral skills. (3)

Design Content:

This course contains one (1) credit of design content. 33% of the grade will be based on performance in design projects.

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