

Course discipline/number/title: CAD 2258: Product and Machine Design**A. CATALOG DESCRIPTION**

1. **Credits:** 4
2. **Hours/Week:** 1 lecture, 6 lab
3. **Prerequisites (Course discipline/number):** CAD 1039
4. **Other requirements:** Students must receive a grade of C or better in all CAD courses.
5. **MnTC Goals (if any):** NA

B. COURSE DESCRIPTION: This course covers machine design components such as gears, keys, keyways, and shafts, belts and pulleys, and linkages. Students will work in small groups similar to industrial practices. They will have the opportunity to model physical prototypes. A second component of this class will be learning the product design process and following it through by making a complete prototype project. Students will design projects beginning with ideas then producing layouts, detailed parts, and assembly drawings. Students will use these designs to create working prototypes by 3D printing or laser cutting. This course will be taught in a state-of-the-art facility featuring the latest release of SolidWorks

C. DATE LAST REVISED (Month, year): February, 2024

D. OUTLINE OF MAJOR CONTENT AREAS:

1. Introduction to Linkages
2. Spur gearing, belt and pulleys
3. Other gear types as time allows
4. Keys, Keyways, and shaft
5. Flexible power transmission elements
 - a) Shafting
 - b) Couplings
 - c) Bearings
6. Product design using SolidWorks
7. Introduction to product design
8. Product Design concepts
9. Product Design Packaging design
10. Team projects for linkages, gears, belts, pulleys, and product design

E. LEARNING OUTCOMES (GENERAL): The student will be able to:

1. Create Linkage layouts using SolidWorks and hands on laser projects.
2. Draw spur gears, calculate spur gear data, and draw.
3. Calculate speed ratios for gears, belts and pulleys.
4. Utilize the machinery handbook for calculations.
5. Interpret vendor and Internet catalogs.
6. Draw belt and pulley systems.
7. Be familiar with power transmission elements.
 - a) Shafts
 - b) Coupling
 - c) Bearings
8. Select chain and belt drives.
9. Evaluate design problems.
10. Solve problems with a practical solution.
11. Create assembly drawings.
12. Plan and give oral presentations.
13. Work as a team to produce a capstone product design project including layout, detail and assembly drawings and working prototypes with packaging design.
14. Work in teams to create physical prototypes for each segment above using the laser, 3DPrinting and any other process available.

F. LEARNING OUTCOMES (MNTC): NA

- G. METHODS FOR EVALUATION OF STUDENT LEARNING:** Methods may include but are not limited to:
1. Tests
 2. Quizzes
 3. Drawings
 4. Create physical prototype projects
 5. Oral presentations
- H. RCTC CORE OUTCOME(S).** This course contributes to meeting the following RCTC Core Outcome(s):
Personal and Professional Accountability. Students will take responsibility as active learners for achieving their educational and personal goals
- I. SPECIAL INFORMATION (if any):** None