TECHNOLOGY 342: Manufacturing Component Design

2007-08 Catalog Data: TECH 342 Manufacturing Component Design (3 Credits)

Catalog Description: Design of motion components for the manufacturing industry. Includes CAD techniques to study solid modeling and manufacturing components such as gears, cams, and linkages, and their application.

Prerequisites: MATH 230, TECH 211, TECH 212, and TECH 369

Co-requisites: None

Textbooks:

- Engineering and Computer Graphics Workbook using SolidWorks 2004 by *Barr et. al.* Schroff Development Corp. ISBN 1-58503-185-2.

Instructor:
C. Mirman, Ph.D.

Learning Objectives	**Relational ABET Learning Outcomes**	**Performance Assessment**
Ability to design parts using solid modeling and identify downstream applications.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives. F. An ability to identify, analyze and solve technical problems. G. An ability to communicate effectively in writing. J. An ability to understand professional, ethical and social responsibilities. M. An ability to program computers and/or utilize computer applications effectively.	Homework, Tests, Class questions
Knowledge and application of parametric solid modeling techniques.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives. F. An ability to identify, analyze and solve technical problems. M. An ability to program computers and/or utilize computer applications effectively.	Homework, Design Project, Tests, Class questions
Knowledge and skills in the usage of Solid Works.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives. F. An ability to identify, analyze and solve technical problems. M. An ability to program computers and/or utilize computer applications effectively.	Homework, Design Project, Tests, Class questions
Ability to determine position, acceleration and	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging	Homework, Tests, Class

velocity for a 4-bar mechanism.	applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems. M. An ability to program computers and/or utilize computer applications effectively.	questions
Ability to analyze a compound and epicycylic gear trains.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. F. An ability to identify, analyze and solve technical problems.	Homework, Tests, Class questions
Ability to design and analyze cams.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives. F. An ability to identify, analyze and solve technical problems. M. An ability to program computers and/or utilize computer applications effectively.	Homework, Design Project, Tests, Class questions
Ability to synthesize and analyze a 4-bar mechanism.	A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines. B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology. D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives. F. An ability to identify, analyze and solve technical problems. M. An ability to program computers and/or utilize computer applications effectively.	Homework, Design Project, Tests, Class questions

Topics:

Solid Modeling

- Solid modeling concepts
- Parametric solid modeling and its applications
- Part modeler and Assembly modeler in SolidWorks

Kinematic Analysis

- Position analysis
- Velocity Analysis
- Acceleration Analysis
- Gear trains
- Cams
- Mechanism Synthesis

Computer Usage: Students will make use of Excel, Word, and Visual Basic in the preparation of homework solutions. SolidWorks CAD software will also be used to design parts and assemblies. Software to compute engineering problems.