

MECHANICAL ENGINEERING COURSE OUTLINE

Course Length: 180 Hours, 2 Semesters

Grade Level: 10-12

Prerequisite: Architectural Drafting

Method of Instruction: Textbook, demonstration, overheads, and discussions.

Method of Grading: Accumulation of points from assignments and activities, teacher made rubrics for activities.

Course Description: A third-year drafting course designed to teach advanced drafting skills, basic design and engineering skills, presentation skills, along with the knowledge necessary for understanding the more complex ideas behind drafting communication. Drawings include a mixture of both Architectural and Mechanical concepts.

Course Outcomes:

1. Describe in graphic form, the shape and size of an object.
2. Create drawings utilizing both conventional hand drawn and computer-aided drafting.
3. Correctly use the tools and equipment used in the drafting industry.
4. Complete assigned tasks within established time schedules.

Course Content:

I. 3D Modeling

- Review of advanced CAD techniques used to create solid models.
- Display 3D objects from any viewpoint

II. Motorized Design Challenge

- K'Nex model design and assembly
- 3D CAD assembly model
- Design Presentation
- Obstacle course competition

III. Catapult/Trebuchet Design Challenge

- Model design and assembly
- 3D CAD assembly model
- Design Presentation
- Competition

IV. Dream Home Design

- 3D Home Architect
- Room designs
- Interior decoration
- 3D Modeling

V. All Terrain Attack Vehicle

- K'Nex model design and assembly
- 3D CAD assembly model
- Cost analysis
- Sales Brochure
- PowerPoint Design Presentation

VI. Golf Course Clubhouse Design

- Clubhouse design
- Design Presentation

VII. Golf Course Improvement Project

- Back 9 Hole Course design
- Design Presentation
- Model

1st Quarter

2nd Quarter

3rd Quarter

4th Quarter

Resources and Textbooks:

Madsen, Shumaker, Turpin, and Stark. Engineering Drawing and Design, 2nd Edition. Delmar Publishers, 1994

Terence Shumaker, and David Madsen. AutoCad: and its applications, 2004. The Goodheart-Willcox Company, 1998.

AutoCad 2004 Computerized Drafting Software

3D Home Architect Computerized Drafting Software

Girard High School

Name _____ SS# / /

School _____ Instructor _____

RATING SCALE:

3 Skilled-Works independently
2 Limited Skill-Requires assistance to perform task
1 Skill Underdeveloped-Received instruction but has not developed skill
0 No Exposure-No instruction or training in this area

DIRECTIONS: Evaluate the student by checking the appropriate Number to indicate the degree of competency reached. Rate each task to reflect employability readiness.

A. CAREER DEVELOPMENT SKILLS

(Time Management)

- 3 2 1 0 _____ 1. Set priorities or the order in which several tasks will be accomplished.
- 3 2 1 0 _____ 2. Identify and eliminate time traps.

(Materials Management)

- 3 2 1 0 _____ 1. Locate information and select the materials, tools, equipment, or other resources to perform the activities needed to accomplish a specific task.
- 3 2 1 0 _____ 2. Perform routine tasks related to equipment operations and maintenance.

(Communication Skills)

- 3 2 1 0 _____ 1. Prepare and deliver a presentation appropriate to subject matter, purpose, and audience.
- 3 2 1 0 _____ 2. Incorporate visual media into a presentation.

(Teamwork Skills)

Participates in team tasks:

- 3 2 1 0 _____ 1. Establish team goals.
- 3 2 1 0 _____ 2. Establish team standards.
- 3 2 1 0 _____ 3. Receive and give information.
- 3 2 1 0 _____ 4. Process information.
- 3 2 1 0 _____ 5. Complete team task on time.

Mechanical Engineering

ENROLLMENT DATE ___/___/___	COMPLETION DATE ___/___/___	HOURS COMPLETED _____
I certify that the student received training in the areas indicated.		
Student Signature _____	Date ___/___/___	
Instructor Signature _____	Date ___/___/___	
Administrator Signature _____	Date ___/___/___	

(Work Ethics)

Apply rules and regulations in a given occupational area, including:

- 3 2 1 0 _____ 1. Punctuality and dependability.
- 3 2 1 0 _____ 2. Responsibility for position.
- 3 2 1 0 _____ 3. Accuracy

(Mathematics)

- 3 2 1 0 _____ 1. Convert common units of measurement within and/or across measurement systems (metric/English, ect)
- 3 2 1 0 _____ 2. Construct and interpret tables, charts, maps, and/or graphs.

(Writing)

- 3 2 1 0 _____ 1. Check, edit, and revise for correct information, appropriate emphasis, grammar, spelling, and punctuation.

(Computer Literacy)

- 3 2 1 0 _____ 1. Compose, organize, and edit information using a computer.
- 3 2 1 0 _____ 2. Access, navigate, and use on-line services.

(Human Relation Skills)

- 3 2 1 0 _____ 1. Demonstrate ability to work with various class members in groups to accomplish production tasks.
- 3 2 1 0 _____ 2. Demonstrate critiquing ability with various class members for a variety of projects.

B. CLASS SPECIFIC SKILLS

(3D Modeling)

- 3 2 1 0 _____ 1. Describe the nature and function of rectangular 3D coordinate systems
- 3 2 1 0 _____ 2. Describe the “right-hand rule” of 3D visualization.
- 3 2 1 0 _____ 3. Construction extruded and wireframe 3D objects.
- 3 2 1 0 _____ 4. Display 3D objects from an viewpoint using 3D orbit.
- 3 2 1 0 _____ 5. Demonstrate the use of surfacing commands such as 3dface, rulesurf, edgesurf, and revsurf to solid surface an object.
- 3 2 1 0 _____ 6. Demonstrate the use of Layers, colors, and Linetypes during the drawing process.

(Engineering Design Projects)

- 3 2 1 0 _____ 1. Design and construct 3D model for design idea.
- 3 2 1 0 _____ 2. Demonstrate the ability to reproduce 3 dimensional objects into 3D CAD models.
- 3 2 1 0 _____ 3. Construct Exploded 3D CAD assembly model.
- 3 2 1 0 _____ 4. Recognize external factors that impact design function.
- 3 2 1 0 _____ 5. Interpret gear ratios as they apply to speed and power.
- 3 2 1 0 _____ 6. Analyze performance deficiencies to improve product design.
- 3 2 1 0 _____ 7. Present design ideas formally to a group of peers.

(Dream Home Design)

(All Terrain Attack Vehicle)

(Golf Course Clubhouse Design)

- 3 2 1 0 _____ 1. Identify the primary features included in a foundation plan.
- 3 2 1 0 _____ 2. Discuss the difference between a foundation plan and a basement plan.
- 3 2 1 0 _____ 3. Design and draw a foundation plan for a typical residential structure.

(Sill and Floor Construction)

- 3 2 1 0 _____ 1. Recognize platform and balloon framing.
- 3 2 1 0 _____ 2. Plan the appropriate floor support using joists or trusses for a structure.

(Sill and Floor Construction Continued)

- 3 2 1 0 _____ 3. Determine proper joist sizes using a typical span data chart.
- 3 2 1 0 _____ 4. Describe the components of a floor system.
- 3 2 1 0 _____ 5. Demonstrate an understanding of principles involved in post

and beam construction.

(Wall and Ceiling Construction)

- 3 2 1 0 _____ 1. Name the members of a typical frame wall.
- 3 2 1 0 _____ 2. Explain methods of frame wall construction.
- 3 2 1 0 _____ 3. Interpret information shown on a ceiling joist span data chart.
- 3 2 1 0 _____ 4. Sketch the various types of exterior walls used in residential construction.

(Doors and Windows)

- 3 2 1 0 _____ 1. Recognize the functions that doors and windows perform.
- 3 2 1 0 _____ 2. Compare the types of doors used in a residential dwelling.
- 3 2 1 0 _____ 3. Draw proper door and window symbols on a typical floor plan.
- 3 2 1 0 _____ 4. Interpret the information shown in a window or door detail.

(Stairs)

- 3 2 1 0 _____ 1. Define common stair terminology.
- 3 2 1 0 _____ 2. Discuss the appropriate use of the various stair designs.
- 3 2 1 0 _____ 3. Draw structural details for a stair.
- 3 2 1 0 _____ 4. Perform stair calculation for a residential stairway.

(Fireplaces and Chimneys)

- 3 2 1 0 _____ 1. Compare the various types of fireplaces appropriate for a modern residence.
- 3 2 1 0 _____ 2. Identify the parts of a standard masonry fireplace and chimney.
- 3 2 1 0 _____ 3. Apply the appropriate principles to design a typical fireplace.

(The Floor Plan)

- 3 2 1 0 _____ 1. List the information required on a typical floor plan.

