# Engineering Design Course No. 21006 Credit: 1.0

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| --- | --- | --- | --- |
| **Student name:**  |  | **Graduation Date:** |  |

Pathways and CIP Codes: **Engineering & Applied Mathematics (14.0101)**

Course Description: A **technical level** course offering students experience in solving problems by applying a design development process. Often using solid modeling computer design software, students develop, analyze, and test product solutions models as well as communicate the features of those models.

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

## Benchmark 0: The following competency is to be taught with in ALL technical level courses offered in your school's approved pathway.

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 0.1 | Demonstrate an understanding of industry standards for personal safety including the safe use of tools, equipment, and hazardous materials. |  |

## Benchmark 1: Engineering Design Process & Problems Solving

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Identify and demonstrate knowledge in Engineering Design in:  |  |
|  | * Historic influences
 |  |
|  | * Architectural styles
 |  |
|  | * Form and function
 |  |
|  | * Engineering achievements
 |  |
|  | * Evolution of technology
 |  |
|  | * History-design and its influences on products.
 |  |
| 1.2 | Explore careers opportunities in engineering fields to include:  |  |
|  | * Educational requirements
 |  |
|  | * Opportunities for employment
 |  |
|  | * Job requirements.
 |  |
| 1.3 | Gain knowledge of the design process and implement the process during design challenges using:  |  |
|  | * Teamwork
 |  |
|  | * Teamwork; Collaboration
 |  |

## Benchmark 2: Principles of Design, Drawings & CAD

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Identify and demonstrate knowledge in the use of technology to include:  |  |
|  | * Software
 |  |
|  | * Hardware
 |  |
|  | * Printing.
 |  |
| 2.2 | Demonstrate proper sketching techniques in the creation of Orthographic and isometric drawings. |  |
| 2.3 | Identify major geometric terms and shapes as well as demonstrate proper drafting techniques in constructing geometric forms to include:  |  |
|  | * Polygons
 |  |
|  | * Triangles
 |  |
|  | * Circle
 |  |
|  | * Ellipse.
 |  |
| 2.4 | Identify and demonstrate proper use of drafting equipment such as a T-Square, Compass, Divider, Triangles, and Templates. |  |
| 2.5 | Demonstrate understanding of Orthographic views by constructing:  |  |
|  | * One view drawings
 |  |
|  | * Two view drawings
 |  |
|  | * Three view drawings
 |  |
|  | * Multi-View drawings
 |  |
| 2.6 | Demonstrate proper ANSI dimensioning practices on Orthographic, section, auxiliary, and assembly’s drawings and apply size and location dimensions and proper tolerance. |  |
| 2.7 | Understand and use proper drafting techniques when constructing pictorial drawings:  |  |
|  | * Axonometric
 |  |
|  | * Isometric; Diametric
 |  |
|  | * Diametric
 |  |
|  | * Trimetric
 |  |
|  | * Perspective
 |  |
|  | * Oblique.
 |  |
| 2.8 | Use proper techniques when creating Auxiliary drawings to include:  |  |
|  | * Cutting Plane
 |  |
|  | * Section lining
 |  |
|  | * Assembly section.
 |  |
| 2.9 | Demonstrate proper techniques used in creating drawings on CAD. |  |
| 2.10 | Demonstrate understanding of the terminology and commands:  |  |
|  | * Cartesian Coordinate System
 |  |
|  | * 2-D Orthographic
 |  |
|  | * 3-D model
 |  |
|  | * Working Drawings
 |  |
|  | * Design Concept
 |  |
|  | * Parametric models
 |  |
|  | * Mass Properties.
 |  |

## Benchmark 3: Assembly design

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Demonstrate assembly skills to solve a variety of design problems and create:  |  |
|  | * Sub-assemblies
 |  |
|  | * Drive constraints
 |  |
|  | * Design modifications
 |  |
| 3.2 | Understand manufacturing materials and processes creating solid models and assembly models with:  |  |
|  | * CNC product
 |  |
|  | * 3-D Parametric Modeling
 |  |
|  | * Laser product.
 |  |
| 3.3 | Recognize different machine processes used in manufacturing a product and explain the need for product efficiency throughout the manufacturing processes. |  |

## Benchmark 4: Presenting solutions

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Complete a presentation to include documentation that explains Engineering Design practices and product design. |  |
| 4.2 | Demonstrate the use of: |  |
|  | * Visual aids in presentation
 |  |
|  | * Technical Writing skills
 |  |
|  | * Communication techniques.
 |  |
| 4.3 | Create a Portfolio showing evidence of the skill and understanding of Engineering Design. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

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