# Engineering Design Course No. 21006 Credit: 1.0

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

Pathways and CIP Codes:Engineering & Applied Mathematics (14.0101); Automation Engineering (15.0406)

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 and 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:

CTE Pathways Help Desk

(785) 296-4908

[pathwayshelpdesk@ksde.org](mailto:pathwayshelpdesk@ksde.org)



900 S.W. Jackson Street, Suite 102

Topeka, Kansas 66612-1212

[https://www.ksde.org](https://www.ksde.org/)

The Kansas State Department of Education does not discriminate on the basis of race, color, national origin, sex, disability or age in its programs and activities and provides equal access to any group officially affiliated with the Boy Scouts of America and other designated youth groups. The following person has been designated to handle inquiries regarding the nondiscrimination policies: KSDE General Counsel, Office of General Counsel, KSDE, Landon State Office Building, 900 S.W. Jackson, Suite 102, Topeka, KS 66612, (785) 296-3201.