# INTRODUCTION TO ENGINEERING DESIGN

## Course Syllabus

<table>
<thead>
<tr>
<th>Course Number:</th>
<th>ST00023</th>
<th>OH LAP Credit:</th>
<th>Yes</th>
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<tbody>
<tr>
<td>OCAS Code:</td>
<td>8709</td>
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<tr>
<td>Course Length:</td>
<td>80 Hours</td>
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<td>Career Cluster:</td>
<td>Science, Technology, Engineering and Mathematics</td>
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<td>Career Pathway:</td>
<td>Engineering and Technology</td>
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<td>Career Major(s):</td>
<td>PLTW Pre-Engineering (Comprehensive High Schools), PLTW Pre-Engineering</td>
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## Pre-requisite(s):  
Introduction to Engineering Design is a course that teaches students problem-solving skills using a design development process. Models of product solutions are created, analyzed and communicated using solid modeling computer design software.

## Textbooks:  
Project Lead the Way Curriculum

## Course Objectives:

### A. Demonstrate Knowledge of Design Process

1. Introduction to the Design Process
   a. Basic design tools  
   b. Introduction to research  
   c. Modeling  
2. Introduction to Technical Sketching and Drawing
   a. Basic line conventions  
   b. Pictorial sketches  
   c. Introduction to multiview drawings  
3. Measurements and Statistics
   a. History of measurement  
   b. English and metric linear measurements  
   c. Dial caliper measurement  
   d. Applied statistics  
4. Puzzle Cube
   a. Puzzle design challenge  
   b. Puzzle part combinations

### B. Design Exercises

1. Geometric Shapes and Solids
   a. Geometric shapes  
   b. Geometric solids  
   c. Calculating area  
   d. Calculating properties  
   e. CAD fundamentals  
2. Dimensions and Tolerances
   a. Dimensioning conventions  
   b. Tolerancing
3. Advanced Modeling Skills
   a. Parameters
   b. Auxiliary views
   c. Section views
   d. Feature-based solid modeling
   e. Assembly modeling
   f. Assembly drawing standards
   g. Exploding assemblies
   h. Assembly animation
4. Advanced Designs
   a. Advanced designs
   b. Design process
   c. Teamwork
   d. Decision matrix
   e. Revision blocks
   f. Assembly drawing standards

C. Reverse Engineering
   1. Visual Analysis
      a. Visual design elements
      b. Visual design principles
      c. Composition
   2. Functional Analysis
      a. Identifying subsystems
      b. System analysis
   3. Structural Analysis
      a. Structural connections
      b. Precision measurement
      c. Material analysis
      d. Property analysis
      e. Finite analysis
   4. Product Improvement by Design
      a. Researching product history and evolution
      b. Product innovation
      c. Problem identification
      d. Writing a design brief
      e. Brainstorming
      f. Design critique
      g. Technical report

D. Open-Ended Design Problems
   1. Marketing and Graphic Design
      a. Marketing
      b. Packaging design
      c. Advertising
      d. Graphic design
   2. Engineering Design Ethics
      a. Human impacts
      b. Product lifecycle
      c. Design for disassembly
      d. Environmental protection agency
      e. Occupational safety and health administration
3. Design Teams
   a. Teamwork
   b. Project planning
   c. Assessment
   d. Meetings
   e. Virtual teams

1PLTW objective

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures:
1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.

Description of Classroom, Laboratories, and Equipment:
Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/College Credit: The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility: The student must maintain a grade point average of 2.0 or better.