

KCKPS CTE CURRICULUM PACING GUIDE

ENGINEERING DESIGN & DEVELOPMENT

KSDE Course Code	21007	KSDE Course Name	Engineering Design & Development
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CIP Code	14.0101	KSDE Pathway	Engineering & Applied Mathematics
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Infinite Campus Course Numbers	
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Prerequisites	Successful completion of EES or IED, POE and DE or CEA. EDD teacher recommendation
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Courses That Follow	None
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Buildings Offered	Harmon, Schlagle
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KCKPS Course Description

Engineering Design and Development students will develop a project for a new product aimed at solving a specific problem. They will work from the beginning of the process where they research to prove that the problem is real, through patent research on similar ideas, and brainstorming multiple Products/solutions to the problem. They will prove the solution they choose is the best then develop and test their new product. They will present their research and product at the Greater KC Engineering Fair at the end of the year.

Kansas Department of Education Course Competencies

[Link to Career Cluster on KSDE](#)

This course utilizes the approved competencies provided on the KSDE website. The competencies identified by KSDE provide the foundation for what students should know and/or be able to do by the end of the course.

Common District Summative Assessment

PACING GUIDE AT A GLANCE

Unit	Unit Name	Length (Taught in one Semester; ~ 90 minuter per period))
CO - Component 0	Project Management	1 week: 5 class periods
C1 - Component 1	Researching a Problem	1 week: 5 class periods
C2 - Component 2	Design a Solution	1 ½ weeks: 8 class periods
C3 - Component 3	Creating a Prototype and Testing Plan	2 weeks: 10 class periods
C4 - Component 4	Evaluate & Reflect on the Design Process	1 week: 5 class periods
C5 - Component 5	Presentation of the Design Process	1 week: 5 class periods

KSDE COURSE COMPETENCIES

Competency	Unit Taught
1. Develop a problem statement from research.	C0, C1
2. Justify a problem through academic research.	C1
3. Justify a problem through market research.	C1
4. Research and document prior solution attempts.	C1
5. Analyze prior solution attempts with a matrix.	C1
6. Develop and document design requirements based on research.	C1
7. Brainstorm and document concepts that solve a problem.	C1
8. Build a mock-up that communicates a solution.	C3

9. Use a matrix to justify the best solution.	C2
10. Create a set of technical drawings that fully explain a design.	C3
11. Identify and apply STEM Principles to a design.	C2, C3
12. Document the Viability of a Design.	C2, C3
13. Document a prototype build procedure.	C3
14. Build a testable prototype.	C3
15. Develop and document ways to test design requirements.	C3
16. Test a prototype and document an analysis of the results.	C3
17. Document an external evaluation of a prototype.	C4, C5

UNIT 1

Project Management

5 blocks

Unit Overview

Because of the open-ended nature of the course, this unit sets the stage for creating and managing teams while working towards finding a design problem and developing a problem statement.

Unit Competencies

- Develop a problem statement from research.

Unit Resources

Primary Resources

These resources are available in PLTW teacher course

- Forming teams
- Team roles and responsibilities
- Team evaluation Rubric
- Contacting experts
- Professional correspondence & log
- Material request letter sample

Supplemental Resources

EDD Planning and Project TimeLine - In EDD Teacher course
[Young scientist Challenge](#)

Unit Vocabulary

Project management, Gantt Chart, Open- ended Design, Rule of Thirds, Flow charts,

UNIT 2

Researching a Problem

5 blocks

Unit Overview

Requires students to identify a problem on which they will design a solution for the remainder of the course following an engineering design process

Unit Competencies

- Develop a problem statement from research.
- Justify a problem through academic research.
- Justify a problem through market research.
- Research and document prior solution attempts.
- Analyze prior solution attempts with a matrix.
- Develop and document design requirements based on research.
- Brainstorm and document concepts that solve a problem.

Unit Resources

Primary Resources

- PLTW Teacher Course
- Design Process
- Creating Gantt Charts in Excel
- Working with experts and mentors
- How to write in Engineering notebook for EDD course

Supplemental Resources

- Engineering abbreviations and symbols
- Engineering formula sheet
- [Richie Parker - NASAR CAD Designer - Inspirational](#)

Unit Vocabulary

Ethical, Viable design, concepts, Preliminary design review, Prototype, collaboration, Teamwork

UNIT 3

Design a Solution

8 blocks

Unit Overview

Based on the design requirements that were identified, students will develop multiple solution possibilities and select the best solution to pursue.

Unit Competencies

- Use a matrix to justify the best solution.
- Identify and apply STEM Principles to a design.
- Document the Viability of a Design.

Unit Resources

Primary Resources

- [Decision Matrix](#)

Supplemental Resources

- [IDEO Design Process](#)
- [Scrum Planning to manage student Progress](#)

Unit Vocabulary

Decision Matrix, Consequences, Qualitative, Quantitative, Design brief, Project charter

UNIT 4

Creating a Prototype and Testing Plan

10 blocks

Unit Overview

Students will create a mock-up and test it based on an approved testing plan to determine the effectiveness of the solution created.

Unit Competencies

- Create a set of technical drawings that fully explain a design.
- Identify and apply STEM Principles to a design.
- Document the Viability of a Design.
- Document a prototype build procedure.
- Build a testable prototype.
- Develop and document ways to test design requirements.
- Test a prototype and document an analysis of the results.

Unit Resources

Primary Resources

- [Decision Matrix](#)

Supplemental Resources

- [Testing an Idea](#)

Unit Vocabulary

Experts, Tradeshow,

UNIT 5

Evaluate & Reflect on the Design Process

5 blocks

Unit Overview

Students reflect and document feedback from mentors, experts and from people who will be affected by the product and get ready for next steps.

Unit Competencies

- Document an external evaluation of a prototype.

Unit Resources

Primary Resources

- Google form
- Rubric for judges

Supplemental Resources

- Highly recommended for students to submit through Innovative Portal which means they need to write in a word document Elements A - L to systematically document their findings and solution to the problem
- Writing in APA style: [Cite Fast online tool](#)

Unit Vocabulary

UNIT 6

Presentation of the Design Process

5 blocks

Unit Overview

At the conclusion of the design process, students will be asked to present and defend the process and decisions made by the design team.

Unit Competencies

- Document an external evaluation of a prototype.

Unit Resources

Primary Resources

- Engineering Showcase
- Innovative Portal
- Teachers and peer review of solution

Supplemental Resources

- Be in contact with KC Stem Alliance
- Kansas City Engineering ecosystem

Unit Vocabulary