

(8600650) Engineering Design and Development

Version: 2024

Course Attributes

- **Course Number:** 8600650
- **Grade Level:** 3
- **Course Length:** 1 Hours

Course Structure

Engineering Design and Development

The outline below shows the structure of this Course, including all its requirements and optional components.

Parent

8600650 Engineering Design and Development

0 Child Components - 0 Required

Standards and Benchmarks

National Standards:

8600650 Engineering Design and Development

The purpose of this course is to serve as a capstone course to provide students with the opportunity to develop a solution to a design problem from start to finish. Students work in teams to design, engineer, create a prototype, perform product testing, and then produce a finished product. This would involve using ALL of the knowledge previously learned, not only in technology education, but across the curriculum. Students will be expected to create and deliver a formal report on the project.

CTE-TECED.912.8600650.1 - Identify, define, and justify a technical design problem for resolution.

Identify, define, and justify a technical design problem for resolution.

CTE-TECED.912.8600650.1.1

Brainstorm problem statements for unique innovations or inventions.

CTE-TECED.912.8600650.1.2

Write a concise problem statement using technical writing skills.

CTE-TECED.912.8600650.1.3

Document research that justifies using the problem statement for the engineering design and development project.

CTE-TECED.912.8600650.2 - Conduct research and investigation into the stated problem.

Conduct research and investigation into the stated problem.

CTE-TECED.912.8600650.2.1

Use a list of specifications and constraints identified in a decision matrix to develop a list of alternative solutions to the stated problem.

CTE-TECED.912.8600650.2.2

Research and identify patents related to their identified problem.

CTE-TECED.912.8600650.2.3

Conduct research to investigate and determine the merit of the alternative solution based on past solutions to the problem.

CTE-TECED.912.8600650.2.4

Explain the feasibility of the solution based on his or her research.

CTE-TECED.912.8600650.2.5

Develop research strategies for the solution, including the use of surveys, phone interviews, and personal contact with experts related to the field of the technical problem.

CTE-TECED.912.8600650.2.6

Create a matrix table to analyze the data found from the patent research.

CTE-TECED.912.8600650.2.7

Write a fictional scenario for an innovation of interest.

CTE-TECED.912.8600650.2.8

Conduct research and perform a trend analysis on a technical problem.

CTE-TECED.912.8600650.3 - Perform and graphically represent an evaluation of proposed design solutions using specific criteria, including product specifications.

Perform and graphically represent an evaluation of proposed design solutions using specific criteria, including product specifications.

CTE-TECED.912.8600650.3.1

Create a description of the product specifications for the design solution.

CTE-TECED.912.8600650.3.2

Objectively evaluate proposed design solutions using specific criteria.

CTE-TECED.912.8600650.3.3

Select the best design solution option using a decision matrix.

CTE-TECED.912.8600650.3.4

Graphically represent the results of the design solution evaluation.

CTE-TECED.912.8600650.4 - Design a solution to the problem and create a working prototype for testing.

Design a solution to the problem and create a working prototype for testing.

CTE-TECED.912.8600650.4.1

Sketch all parts of the design solution including an isometric view of the assembled product.

CTE-TECED.912.8600650.4.2

Create a set of working drawings for their design solution.

CTE-TECED.912.8600650.4.3

Interpret and apply the feedback they receive from experts to improve the design solution.

CTE-TECED.912.8600650.4.4

Refine the design solution, if necessary, based upon expert feedback.

CTE-TECED.912.8600650.4.5

Create a detailed set of instructions for production and assembly of a testable prototype based on the information gained through their research.

CTE-TECED.912.8600650.4.6

Identify methods and sources for obtaining materials and supplies.

CTE-TECED.912.8600650.4.7

Compile a materials list that includes vendors and cost for all necessary materials and equipment to build the prototype.

CTE-TECED.912.8600650.4.8

Build a working prototype that can be tested.

CTE-TECED.912.8600650.5 - Evaluate and select appropriate testing methodologies for testing the product, conduct product testing, refine the design as needed, and document the process and results.

Evaluate and select appropriate testing methodologies for testing the product, conduct product testing, refine the design as needed, and document the process and results.

CTE-TECED.912.8600650.5.1

Select and describe a valid testing method that will be used to accurately evaluate the design solution's ability to solve their problem.

CTE-TECED.912.8600650.5.2

Prepare a description of the testing method that will be used to valid the designed solution.

CTE-TECED.912.8600650.5.3

Create a valid justification for the selected testing method.

CTE-TECED.912.8600650.5.4

Devise a list of testing criteria that will be used to evaluate the success or failure of the prototype testing.

CTE-TECED.912.8600650.5.5

Create a detailed set of instructions for testing the prototype that will be valid, repeatable, and reliable.

CTE-TECED.912.8600650.5.6

Apply the appropriate statistical analysis tools to the test results to ensure validity.

CTE-TECED.912.8600650.5.7

Identify, define, and implement necessary modifications to the design based upon the test results and expert feedback.

CTE-TECED.912.8600650.5.8

Evaluate and explain the effectiveness of solving the design problem as defined.

CTE-TECED.912.8600650.6 - Create and deliver a formal presentation of the solution to the problem.

Create and deliver a formal presentation of the solution to the problem.

CTE-TECED.912.8600650.6.1

Gather data and information compiled throughout the project and create a technical research paper, presentation, or three panel display of the design solution.

CTE-TECED.912.8600650.6.2

Create a website, if appropriate, in order to depict all aspects of the design solution.

CTE-TECED.912.8600650.6.3

Choose one of the formats used to depict the design solution, such as technical research paper, PowerPoint, three panel display, or website, if created, for the presentation of the solution to the problem.

CTE-TECED.912.8600650.6.4

Orally present a technical presentation on the design solution.

Related CTE Program

0821010102:

Engineering Pathways

The purpose of this course is to serve as a capstone course to provide students with the opportunity to develop a solution to a design problem from start to finish. Students work in teams to design, engineer, create a prototype, perform product testing, and then produce a finished product. This would involve using ALL of the knowledge previously learned, not only in technology education, but across the curriculum. Students will be expected to create and deliver a formal report on the project.

0821010102:

Engineering Pathways

The purpose of this course is to serve as a capstone course to provide students with the opportunity to develop a solution to a design problem from start to finish. Students work in teams to design, engineer, create a prototype, perform product testing, and then produce a finished product. This would involve using ALL of the knowledge previously learned, not only in technology education, but across the curriculum. Students will be expected to create and deliver a formal report on the project.

State Adopted Instructional Materials

[Author(s)], ([Copyright]), [Title] ([Edition] ed.), [Publisher].

CPALMS Educational Resources

Click [HERE](#) to access more than [XXXX] CPALMS-approved educational resources aligned to the standards and benchmarks in this CTE program.

(9410140) Robotic Applications Capstone

Version: 2024

Course Attributes

- **Course Number:** 9410140
- **Course Number:** 3
- **Grade Level:** 1 Hours
- **Course Length:**

Course Structure

Robotic Applications Capstone

The outline below shows the structure of this Course, including all its requirements and optional components.

Parent

9410140 Robotic Applications Capstone

0 Child Components - 0 Required

Standards and Benchmarks

National Standards:

9410140 Robotic Applications Capstone

This course provides students with extended content and skills essential to the design and operation of autonomous robotic systems in the context of a capstone project.

CTE-TECED.912.9410140.1 - Identify, define, and justify a technical design problem for resolution.
Identify, define, and justify a technical design problem for resolution.

CTE-TECED.912.9410140.1.1

Brainstorm and identify a specific problem for a unique robotic solution.

CTE-TECED.912.9410140.1.2

Write a concise problem statement using technical writing skills.

CTE-TECED.912.9410140.1.3

Document research that justifies using the problem statement for the robotics project.

CTE-TECED.912.9410140.2 - Conduct research and investigation into the stated problem.

Conduct research and investigation into the stated problem.

CTE-TECED.912.9410140.2.1

Use a list of specifications and constraints identified in a decision matrix to develop a list of alternative solutions to the stated problem.

CTE-TECED.912.9410140.2.2

Conduct research to investigate and determine the merit of his or her alternative solution based on past solutions to the problem.

CTE-TECED.912.9410140.2.3

Explain the feasibility of his or her solution based on his or her research.

CTE-TECED.912.9410140.2.4

Develop research strategies for his or her solution, including the use of surveys, phone interviews, and personal contact with experts related to the field of his or her technical problem.

CTE-TECED.912.9410140.3 - Design a solution to the problem and create a working prototype for testing.

Design a solution to the problem and create a working prototype for testing.

CTE-TECED.912.9410140.3.1

Sketch all parts of their design solution including an isometric view of the assembled product.

CTE-TECED.912.9410140.3.2

Create a set of working drawings for their design solution.

CTE-TECED.912.9410140.3.3

Interpret and apply the feedback they receive from experts to improve their design solution.

CTE-TECED.912.9410140.3.4

Refine their design solution, if necessary, based upon expert feedback.

CTE-TECED.912.9410140.3.5

Document the project's progress in their engineering notebooks.

CTE-TECED.912.9410140.3.6

Create a detailed set of instructions for producing a testable prototype based on the information gained through their research.

CTE-TECED.912.9410140.3.7

Identify methods and sources for obtaining materials and supplies.

CTE-TECED.912.9410140.3.8

Compile a materials list that includes vendors and cost for all necessary materials and equipment to build their prototype.

CTE-TECED.912.9410140.3.9

Write a step-by-step procedure for the assembly of their prototype.

CTE-TECED.912.9410140.3.10

Build a working prototype that can be tested.

CTE-TECED.912.9410140.4 - Create and deliver a formal presentation in a suitable form of the solution to the problem.

Create and deliver a formal presentation in a suitable form of the solution to the problem.

CTE-TECED.912.9410140.4.1

Create deliverables to include design brief, presentation, display (e.g., poster, three panel display), and 3D virtual model.

CTE-TECED.912.9410140.4.2

Orally present an effective technical presentation on the design solution.

CTE-TECED.912.9410140.5 - Perform and graphically represent an evaluation of proposed design solutions using specific criteria, including product specifications.

Perform and graphically represent an evaluation of proposed design solutions using specific criteria, including product specifications.

CTE-TECED.912.9410140.5.1

Create a description of the product specifications for the design solution.

CTE-TECED.912.9410140.5.2

Objectively evaluate proposed design solutions using specific criteria.

CTE-TECED.912.9410140.5.3

Select the best design solution option using a decision matrix.

CTE-TECED.912.9410140.5.4

Graphically represent the results of the design solution evaluation.

CTE-TECED.912.9410140.6 - Evaluate and select appropriate testing methodologies for testing the product, conduct product testing, refine the design as needed, and document the process and results.

Evaluate and select appropriate testing methodologies for testing the product, conduct product testing, refine the design as needed, and document the process and results.

CTE-TECED.912.9410140.6.1

Select and describe a valid testing method that will be used to accurately evaluate their design solution's ability to solve their problem.

CTE-TECED.912.9410140.6.2

Prepare a description of the testing method that will be used to validate the designed solution.

CTE-TECED.912.9410140.6.3

Create a valid justification for the selected testing method.

CTE-TECED.912.9410140.6.4

Devise a list of testing criteria that will be used to evaluate the success or failure of their prototype testing

CTE-TECED.912.9410140.6.5

Identify, define, and implement needed modifications to their testing method based on expert feedback and their ongoing research.

CTE-TECED.912.9410140.6.6

Document their project's progress.

CTE-TECED.912.9410140.6.7

Create a detailed set of instructions for testing the prototype that will be valid, repeatable, and reliable.

CTE-TECED.912.9410140.6.8

Evaluate and explain the effectiveness of their design at solving the problem they have defined.

CTE-TECED.912.9410140.6.9

Document the test results and project progress.

Related CTE Program

0615030330:

Applied Robotics

This course provides students with extended content and skills essential to the design and operation of autonomous robotic systems in the context of a capstone project.

State Adopted Instructional Materials

[Author(s)], ([Copyright]), [Title] ([Edition] ed.), [Publisher].

CPALMS Educational Resources

Click [HERE](#) to access more than [XXXX] CPALMS-approved educational resources aligned to the standards and benchmarks in this CTE program.