SAN LEANDRO UNIFIED SCHOOL DISTRICT
COURSE PROPOSAL

SECTION A. COVER PAGE

1. Course Title:
CAD Solid Modeling with SolidWorks

7. Action
☐ New Course
☒ Course Revision
☐ Title Change Only

2. Date Submitted: 10/13/14

8. Grade Level
☒ 9 ☒ 10
☒ 11 ☒ 12

3. Transcript Title/Abbreviation(s)

9. Prerequisites (Please list.)
☐ Required

☒ Recommended
Graphic Arts, Intro or Intermediate Comp. Sci.

4. Transcript Course Code/Course Number :

10. Seeking Program Distinction?
☐ YES (Check one below.) ☒ NO
☐ Honors ☐ AP ☐ Other

5. Subject Area
Career Technical Education

11. Is this a CTE course?
☒ YES
☐ NO
If YES, complete Section C

6. Department
CTE

12. Previously approved by UC?
☐ YES ☒ NO
Year approved
Year removed

13. UC ELIGIBILITY
Already eligible? ☐ YES ☐ NO
a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐

Proposing eligibility? ☒ YES ☐ NO
a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☒
Please mark one for approved eligibility or proposed eligibility.

14. Unit Value/Course Credit/Length of Course
☐ 0.5 (semester or half-year
☒ 1.0 (one year equivalent)
☐ 2.0 (two-year equivalent)
☐ Other

15. School Contact:
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Position:Teacher

16. Signatures:
Department Chair
Principal:

DISTRICT OFFICE USE ONLY
Date approved by Board Curriculum Committee 10-27-14
Date approved by Board

SECTION B. COURSE CONTENT

17. Course Description

This course offers a step-by-step instruction in the use of the principal operations of the SolidWorks CAD system. It is designed to provide a fundamental understanding of CAD procedures through hands-on microcomputer experience. Students will learn how to model and design three-dimensional solid objects using gold-standard industry software used for rapid prototyping and production, as well as animation and computer-generated scenery. Students will engage in individual and group assignments and projects using demonstrations, presentations, and written expositions. Students will keep a learning journal to keep track of their learned skills and progress.

18. Course Goals and/or Major Student Outcomes

a) Develop an understanding for design intent (materials, manufacturing, and assembly considerations).

b) Create and modify 2D sketches using lines, arcs, and geometric relationships.

c) Create and modify 3D features based on 2D sketches (extrude, revolve, sweep, and loft).

d) Create assemblies from existing and custom-designed parts.

e) Generate 2D technical drawings that properly display manufacturing specifications.

f) Create and maintain part, assembly, and drawing templates.

g) Other advanced topics, such as: Sheet metal construction, injection molds, rendering, and animation.

h) Collaboration with Machine Technology students to design and produce prototypes based on student-generated concepts.

19. Course Objectives (standards)

1. Critical Competence:

1-1. ability to apply the knowledge of mathematics, science, English, and engineering graphics.

1-2. ability to use the techniques, skills, and engineering tools necessary for engineering graphics.

2. Creative competence:

2-1. ability to experiment in engineering graphics designs and analyze and interpret data from same.

2-2. ability to identify, formulate, and solve engineering graphics design problems.

3. Communicative Competence:

3-1. ability to interpret information in written, verbal, and visual forms from others.

3-2. ability to communicate effectively with individuals and in groups.

4. Cultural Competence:

4-1. ability to function as part of a multi-disciplinary engineering team.

4-2. ability to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

20. Course Outline

Lecture and discussion topics: Introductions, Objectives, Course Syllabus, Cartesian Coordinate System, Exploring the Ins and Outs of 3D, The Power of the Virtual Prototype, Getting started with SolidWorks.

Unit 1

1. Learn, perform and demonstrate SolidWorks procedures

Learning Activities

1. Participate in a demonstration of SolidWorks application procedures.

2. Perform SolidWorks program/file manipulation.

Lab: *Active Learning exercise – Using the Interface*

Exercise 1 – Starting and Exiting the Program

Exercise 2 – Searching for a File or Folder

Exercise 3 – Opening an Existing File

Exercise 4 – Saving and Copying a File

Exercise 5 – Resizing Windows and SolidWorks Windows

Exercise 6 – Toolbars and Mouse Buttons

Exercise 7 – Context-sensitive Shortcut Menus and Getting Online Help.

Unit 2

Lecture and discussion topics: The SolidWorks Model, Parts, Assemblies and Drawings, Describing the Base Feature, More to Explore and Modifying a Part.

2. Learn, perform, and demonstrate beginning or basic SolidWorks 2d sketch.

Learning Activities

1. Participate in a demonstration of SolidWorks document/sketch.

2. Create, sketch, and modify a 2d figure.

Lab: *Active Learning Exercise – Creating a Basic Part*

Exercise 1 – Creating a New Part Document

Exercise 2 – Overview of the SolidWorks Window

Exercise 3 – Sketch a Rectangle

Exercise 4 – Adding Dimensions and Changing the Dimension Values

Exercise 5 – Extrude the Base Feature

Exercise 6 – View Display and Saving the Part

Exercise 7 – Round the Corners of the Part (Fillet)

Exercise 8 – Hollow out the Part (Shell)

Exercise 9 – Extruded Cut Feature

Exercise 10 – Open a Sketch, Sketch the Circle and Dimension the Circle

Exercise 11 – Extrude the Sketch and Rotate the View.

Unit 3

Lecture and discussion topics: Base Features, Modeling More Parts.

3. Create, convert, modify, and calculate material and base feature.

Learning Activities

1. Convert dimensions of a part.
2. Calculate and modify the part.
3. Calculate modification, material volume and base feature.

Lab: *Active Learning Exercise – Create and Modifying a Part*

Exercise 1 – Converting Dimensions

Exercise 2 – Calculating the Modification

Exercise 3 – Modifying the Part

Exercise 4 – Calculating Material volume

Exercise 5 – Calculating the volume of the Base Feature.

Unit 4

Lecture and discussion topics: 3D Model Documents, Features and Assembly Basics.

1. **4. Create a 3D document using basic features and assembly basics.**

Learning Activities

1. Participate in a demonstration of creating and developing a model 3D document and assembly.
2. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Creating an Assembly*

Exercise 1 – Modifying Feature Size

Exercise 2 – Designing a Fastener

Exercise 3 – Creating an Assembly

Exercise 4 – Component Patterns

Exercise 5 – Size, Fit and Function

Exercise 6 – The Hole Wizard and Fastener Selection.

Unit 5

Lecture and discussion topics: Toolbox Basics, Adding and Modifying Toolbox Parts.

1. **5. Use the Toolbox and Toolbox parts to enhance model.**

Learning Activities

1. Participate in a demonstration of using the Toolbox basic and parts.
2. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Adding Toolbox Parts*

Exercise 1 – Open Toolbox Browser, In the Design Library Task Pane

Exercise 2 – Selecting Appropriate Hardware

Exercise 3 – Placing Hardware

Exercise 4 – Specifying the Properties of the Toolbox Part

Exercise 5 – Placing Washers and Screws

Exercise 6 – Thread Display

Exercise 7 – Modifying Toolbox Parts.

Unit 6

Lecture and discussion topics: Drawing Basics, Concepts, Layout and Creating Detailed Drawings of Parts and Assemblies, Engineering Drawings, General Drawing Rules, Views, Dimensions.

1. **6. Create a basic drawing and an engineering drawing following basic format and procedures.**

Learning Activities

1. Participate in a demonstration of basic and engineering drawings.
2. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Creating Drawings*

Exercise 1 – Create a Drawing Template

Exercise 2 – Add a Sheet to an Existing Drawing

Exercise 3 – Add a Sheet to an Existing Assembly Drawing

Exercise 4 – Creating a Parametric Note.

Unit 7

Lecture and discussion topics: eDrawings, Isometric views, Three standard views, Dimensions.

1. **7. Create, explore, and email eDrawings.**

Learning Activities

1. Participate in a demonstration of eDrawings
2. Explain, differentiate and demonstrate understanding of isometric views, standard views, dimensions.
3. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Creating an eDrawing*

Exercise 1 – Creating an eDrawing

Exercise 2 – Exploring eDrawings

Exercise 3 – Emailing eDrawings.

Unit 8

Lecture and discussion topics: Families of Parts, Design Tables.

1. **8. Learn the families and parts of a design table; create own design table.**

Learning Activities

1. Participate in a demonstration of a design table.
2. Create a design table using the parts and families of a design table.
3. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Creating a Design Table*

Exercise 1 – Creating a Design Table

Exercise 2 – Configurations

Exercise 3 – Assemblies

Exercise 4 – Excel Spreadsheet Families of Parts.

Unit 9

Lecture and discussion topics: Revolved, Swept and Loft Features.

9. Learn and demonstrate understanding of Revolved, Swept and Loft Features.

Learning Activities

1. Participate in a demonstration of Revolved, Swept and Loft Features.
2. From the design table created or a new one, sketch and create a sweep path, use the revolve features and create a loft path and direction using one or more loft types..
3. Perform the lab activities as listed.

Assessment Activities

1. Write an essay explaining how to enhance a design table using the Revolved, Swept and Loft Features

2. Complete individual or group presentation using various media on creating a design table.

3. Perform the lab activities as listed.

4. Complete learning journal.

Lab: *Active Learning Exercise – Creating Revolve, Sweep and Loft Features*

Exercise 1 – Revolve Feature

Exercise 2 – Create an Assembly

Exercise 3 – Create a Design Table

Exercise 4 – Sketch a Sweep Section

Exercise 5 – Create the Sweep Path

Exercise 6 – Loft Section

Exercise 7 – Loft Path and Direction

Exercise 8 – Different loft Types.

Unit 10

Lecture and discussion topics: Review progress and difficulties, applications, Visualization. What you need to know to pass the Certified SolidWorks Associate exam.

1. **Create and develop a complete SolidWorks project incorporating all the concepts, steps, and procedures learned in this course.**

Learning Activities

1. Use learning journal to complete a SolidWorks project incorporating all the concepts, steps, and procedures learned in this course.

2. Work individually or in groups to evaluate project by section.

Lab: All exercises are due by the end of this Unit. Study and practice for CSWA Exam

Exercise 1 – CSWA practice exam #1

Exercise 2 – CSWA practice exam #2

21. Instructional Materials:
Board approved required text

- **Title:** Basic Technical Drawing
- **Edition:** 1995
- **Publication Date:** 1995
- **Publisher:** Glencoe/McGraw-Hill
- **Author(s):** Spencer, Dygdon & Novak

Supplementary materials

Engineering Design with SolidWorks 2013 (Planchard & Planchard; 2013. SDC Publications)

SolidWize (www.solidwize.com)

ToolingU (www.toolingu.com)

EDU Factor (www.edufactor.org)

Immerse2Learn (www.immerse2learn.com)

22. Key Assignments

Students will engage in individual and group assignments and projects using demonstrations, presentations, and written expositions. Students will keep a learning journal to keep track of their learned skills and progress. There will be a comprehensive assignment at the end of the course incorporating all the concepts, steps, and procedures learned in this course which will be presented to the class and a group of 3D technology people.

1. Complete and present a graphic organizer and visual schematic representation using various forms of media as if to teach the key concepts of each lesson to another or to the class.

2. Write a presentation paper on key concept/s of each unit. Complete and present this project to class in various forms of media.

3. LAB ACTIVITIES

Unit 1 Lab: *Active Learning exercise – Using the Interface*

Exercise 1 – Starting and Exiting the Program

Exercise 2 – Searching for a File or Folder

Exercise 3 – Opening an Existing File

Exercise 4 – Saving and Copying a File

Exercise 5 – Resizing Windows and SolidWorks Windows

Exercise 6 – Toolbars and Mouse Buttons

Exercise 7 – Context-sensitive Shortcut Menus and Getting Online Help.

Unit 2 Lab: *Active Learning Exercise – Creating a Basic Part*

Exercise 1 – Creating a New Part Document

Exercise 2 – Overview of the SolidWorks Window

Exercise 3 – Sketch a Rectangle

Exercise 4 – Adding Dimensions and Changing the Dimension Values

Exercise 5 – Extrude the Base Feature

Exercise 6 – View Display and Saving the Part

Exercise 7 – Round the Corners of the Part (Fillet)

Exercise 8 – Hollow out the Part (Shell)

Exercise 9 – Extruded Cut Feature

Exercise 10 – Open a Sketch, Sketch the Circle and Dimension the Circle

Exercise 11 – Extrude the Sketch and Rotate the View.

Unit 3 Lab: *Active Learning Exercise – Create and Modifying a Part*

Exercise 1 – Converting Dimensions

Exercise 2 – Calculating the Modification

Exercise 3 – Modifying the Part

Exercise 4 – Calculating Material volume

Exercise 5 – Calculating the volume of the Base Feature.

Unit 4 Lab: *Active Learning Exercise – Creating an Assembly*

Exercise 1 – Modifying Feature Size

Exercise 2 – Designing a Fastener

Exercise 3 – Creating an Assembly

Exercise 4 – Component Patterns

Exercise 5 – Size, Fit and Function

Exercise 6 – The Hole Wizard and Fastener Selection.

Unit 5 Lab: *Active Learning Exercise – Adding Toolbox Parts*

Exercise 1 – Open Toolbox Browser, In the Design Library Task Pane

Exercise 2 – Selecting Appropriate Hardware

Exercise 3 – Placing Hardware

Exercise 4 – Specifying the Properties of the Toolbox Part

Exercise 5 – Placing Washers and Screws

Exercise 6 – Thread Display

Exercise 7 – Modifying Toolbox Parts.

Unit 6 Lab: *Active Learning Exercise – Creating Drawings*

Exercise 1 – Create a Drawing Template

Exercise 2 – Add a Sheet to an Existing Drawing

Exercise 3 – Add a Sheet to an Existing Assembly Drawing

Exercise 4 – Creating a Parametric Note.

Unit 7 Lab: *Active Learning Exercise – Creating an eDrawing*

Exercise 1 – Creating an eDrawing

Exercise 2 – Exploring eDrawings

Exercise 3 – Emailing eDrawings.

Unit 8 Lab: *Active Learning Exercise – Creating a Design Table*

Exercise 1 – Creating a Design Table

Exercise 2 – Configurations

Exercise 3 – Assemblies

Exercise 4 – Excel Spreadsheet Families of Parts.

Unit 9 Lab: *Active Learning Exercise – Creating Revolve, Sweep and Loft Features*

Exercise 1 – Revolve Feature

Exercise 2 – Create an Assembly

Exercise 3 – Create a Design Table

Exercise 4 – Sketch a Sweep Section

Exercise 5 – Create the Sweep Path

Exercise 6 – Loft Section

Exercise 7 – Loft Path and Direction

Exercise 8 – Different loft Types.

FINAL PROJECT

1. **Create and develop a complete SolidWorks project incorporating all the concepts, steps, and procedures learned in this course.**

23. Instructional Methods and/or Strategies

Classroom instructor will engage students in reading, writing, Iistening, and speaking. Connections to previously learned material or currently being learned material in Graphic arts and Computer Science, as well as Algebra and Geometry will be incorporated. Connections to actual workplace activities and career opportunities and projections will be emphasized in all discussions. The following tools will be utilized.

1. Classroom lecture and discussion.

2. Instructor demonstration of methods.

3. Lab work on assigned projects.

4. Collaboration with Machine Technology students to design and produce prototypes based on student-generated concepts (i.e. project-based learning).

5. Individualand group expository writing on related CAD and SolidWorks topics and projects learned.

6. Individual and group demonstration using various forms of media on CAD and SolidWorks skills learned.

7. Skill and progress journal

24. Assessment Methods and/or Tools

* Course Purpose

Course Goals and/or Major Student Outcomes:

a) Develop an understanding for design intent (materials, manufacturing, and assembly considerations).

b) Create and modify 2D sketches using lines, arcs, and geometric relationships.

c) Create and modify 3D features based on 2D sketches (extrude, revolve, sweep, and loft).

d) Create assemblies from existing and custom-designed parts.

e) Generate 2D technical drawings that properly display manufacturing specifications.

f) Create and maintain part, assembly, and drawing templates.

g) Other advanced topics, such as: Sheet metal construction, injection molds, rendering, and animation.

h) Collaboration with Machine Technology students to design and produce prototypes based on student-generated concepts.

Course Objectives :
1. Critical Competence:

1-1. ability to apply the knowledge of mathematics, science, English, and engineering graphics.

1-2. ability to use the techniques, skills, and engineering tools necessary for engineering graphics.

2. Creative competence:

2-1. ability to experiment in engineering graphics designs and analyze and interpret data from same.

2-2. ability to identify, formulate, and solve engineering graphics design problems.

3. Communicative Competence:

3-1. ability to interpret information in written, verbal, and visual forms from others.

3-2. ability to communicate effectively with individuals and in groups.

4. Cultural Competence:

4-1. ability to function as part of a multi-disciplinary engineering team

4-2. ability to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

* Course Outline

Unit 1

Lecture and discussion topics: Introductions, Objectives, Course Syllabus, Cartesian Coordinate System, Exploring the Ins and Outs of 3D, The Power of the Virtual Prototype, Getting started with SolidWorks.

1. Learn, perform and demonstrate SolidWorks procedures

Learning Activities

1. Participate in a demonstration of SolidWorks application procedures.

2. Perform SolidWorks program/file manipulation.

Lab: *Active Learning exercise – Using the Interface*

Exercise 1 – Starting and Exiting the Program

Exercise 2 – Searching for a File or Folder

Exercise 3 – Opening an Existing File

Exercise 4 – Saving and Copying a File

Exercise 5 – Resizing Windows and SolidWorks Windows

Exercise 6 – Toolbars and Mouse Buttons

Exercise 7 – Context-sensitive Shortcut Menus and Getting Online Help.

Unit 2

Lecture and discussion topics: The SolidWorks Model, Parts, Assemblies and Drawings, Describing the Base Feature, More to Explore and Modifying a Part.

2. Learn, perform, and demonstrate beginning or basic SolidWorks 2d sketch.

Learning Activities

1. Participate in a demonstration of SolidWorks document/sketch.

2. Create, sketch, and modify a 2d figure.

Lab: *Active Learning Exercise – Creating a Basic Part*

Exercise 1 – Creating a New Part Document

Exercise 2 – Overview of the SolidWorks Window

Exercise 3 – Sketch a Rectangle

Exercise 4 – Adding Dimensions and Changing the Dimension Values

Exercise 5 – Extrude the Base Feature

Exercise 6 – View Display and Saving the Part

Exercise 7 – Round the Corners of the Part (Fillet)

Exercise 8 – Hollow out the Part (Shell)

Exercise 9 – Extruded Cut Feature

Exercise 10 – Open a Sketch, Sketch the Circle and Dimension the Circle

Exercise 11 – Extrude the Sketch and Rotate the View.

Unit 3

Lecture and discussion topics: Base Features, Modeling More Parts.

3. Create, convert, modify, and calculate material and base feature.

Learning Activities

4. Convert dimensions of a part.
5. Calculate and modify the part.
6. Calculate modification, material volume and base feature.

Lab: *Active Learning Exercise – Create and Modifying a Part*

Exercise 1 – Converting Dimensions

Exercise 2 – Calculating the Modification

Exercise 3 – Modifying the Part

Exercise 4 – Calculating Material volume

Exercise 5 – Calculating the volume of the Base Feature.

Unit 4

Lecture and discussion topics: 3D Model Documents, Features and Assembly Basics

2. **4. Create a 3D document using basic features and assembly basics**

Learning Activities

3. Participate in a demonstration of creating and developing a model 3D document and assembly.
4. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Creating an Assembly*

Exercise 1 – Modifying Feature Size

Exercise 2 – Designing a Fastener

Exercise 3 – Creating an Assembly

Exercise 4 – Component Patterns

Exercise 5 – Size, Fit and Function

Exercise 6 – The Hole Wizard and Fastener Selection.

Unit 5

Lecture and discussion topics: Toolbox Basics, Adding and Modifying Toolbox Parts.

2. **5. Use the Toolbox and Toolbox parts to enhance model**

Learning Activities

3. Participate in a demonstration of using the Toolbox basic and parts.
4. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Adding Toolbox Parts*

Exercise 1 – Open Toolbox Browser, In the Design Library Task Pane

Exercise 2 – Selecting Appropriate Hardware

Exercise 3 – Placing Hardware

Exercise 4 – Specifying the Properties of the Toolbox Part

Exercise 5 – Placing Washers and Screws

Exercise 6 – Thread Display

Exercise 7 – Modifying Toolbox Parts

Unit 6

Lecture and discussion topics: Drawing Basics, Concepts, Layout and Creating Detailed Drawings of Parts and Assemblies, Engineering Drawings, General Drawing Rules, Views, Dimensions.

2. **6. Create a basic drawing and an engineering drawing following basic format and procedures.**

Learning Activities

3. Participate in a demonstration of basic and engineering drawings.
4. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Creating Drawings*

Exercise 1 – Create a Drawing Template

Exercise 2 – Add a Sheet to an Existing Drawing

Exercise 3 – Add a Sheet to an Existing Assembly Drawing

Exercise 4 – Creating a Parametric Note.

Unit 7

Lecture and discussion topics: eDrawings, Isometric views, Three standard views, Dimensions.

2. **7. Create, explore, and email eDrawings.**

Learning Activities

4. Participate in a demonstration of eDrawings
5. Explain, differentiate and demonstrate understanding of isometric views, standard views, dimensions.
6. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Creating an eDrawing*

Exercise 1 – Creating an eDrawing

Exercise 2 – Exploring eDrawings

Exercise 3 – Emailing eDrawings.

Unit 8

Lecture and discussion topics: Families of Parts, Design Tables.

2. **8. Learn the families and parts of a design table; create own design table.**

Learning Activities

4. Participate in a demonstration of a design table.
5. Create a design table using the parts and families of a design table.
6. Perform the lab activities as listed.

Lab: *Active Learning Exercise – Creating a Design Table*

Exercise 1 – Creating a Design Table

Exercise 2 – Configurations

Exercise 3 – Assemblies

Exercise 4 – Excel Spreadsheet Families of Parts.

Unit 9

Lecture and discussion topics: Revolved, Swept and Loft Features.

9. Learn and demonstrate understanding of Revolved, Swept and Loft Features.

Learning Activities

4. Participate in a demonstration of Revolved, Swept and Loft Features.
5. From the design table created or a new one, sketch and create a sweep path, use the revolve features and create a loft path and direction using one or more loft types..

1. Perform the lab activities as listed.

Assessment Activities

5. Write an essay explaining how to enhance a design table using the Revolved, Swept and Loft Features
6. Complete individual or group presentation using various media on creating a design table.
7. Perform the lab activities as listed.
8. Complete learning journal.

Lab: *Active Learning Exercise – Creating Revolve, Sweep and Loft Features*

Exercise 1 – Revolve Feature

Exercise 2 – Create an Assembly

Exercise 3 – Create a Design Table

Exercise 4 – Sketch a Sweep Section

Exercise 5 – Create the Sweep Path

Exercise 6 – Loft Section

Exercise 7 – Loft Path and Direction

Exercise 8 – Different loft Types.

Unit 10

Lecture and discussion topics: Review progress and difficulties, applications, Visualization. What you need to know to pass the Certified SolidWorks Associate exam.

2. **Create and develop a complete SolidWorks project incorporating all the concepts, steps, and procedures learned in this course.**

Learning Activities

3. Use learning journal to complete a SolidWorks project incorporating all the concepts, steps, and procedures learned in this course.
4. Work individually or in groups to evaluate project by section.

Lab: All exercises are due by the end of this Unit. Study and practice for CSWA Exam

Exercise 1 – CSWA practice exam #1

Exercise 2 – CSWA practice exam #2

Key Assignments

Students will engage in individual and group assignments and projects using demonstrations, presentations, and written expositions. Students will keep a learning journal to keep track of their learned skills and progress. There will be a comprehensive assignment at the end of the course incorporating all the concepts, steps, and procedures learned in this course which will be presented to the class and a group of 3D technology people.

1. Complete and present a graphic organizer and visual schematic representation using various forms of media as if to teach the key concepts of each lesson to another or to the class.

2. Write a presentation paper on key concept/s of each unit. Complete and present this project to class in various forms of media.

3. LAB ACTIVITIES

Unit 1 Lab: *Active Learning exercise – Using the Interface*

Unit 2 Lab: *Active Learning Exercise – Creating a Basic Part*

Unit 3 Lab: *Active Learning Exercise – Create and Modifying a Part*

Unit 4 Lab: *Active Learning Exercise – Creating an Assembly*

Unit 5 Lab: *Active Learning Exercise – Adding Toolbox Parts*

Unit 6 Lab: *Active Learning Exercise – Creating Drawings*

Unit 7 Lab: *Active Learning Exercise – Creating an eDrawing*.

Unit 9 Lab: *Active Learning Exercise – Creating Revolve, Sweep and Loft*

FINAL PROJECT

2. **Create and develop a complete SolidWorks project incorporating all the concepts, steps, and procedures learned in this course.**

Instructional Methods and/or Strategies

Classroom instructor will engage students in reading, writing, listening, and speaking. Connections to previously learned material or currently being learned material in Graphic arts and Computer Science, as well as Algebra and Geometry will be incorporated. Connections to actual workplace activities and career opportunities and projections will be emphasized in all discussions. The following tools will be utilized.

1. Classroom lecture and discussion.

2. Instructor demonstration of methods.

3. Lab work on assigned projects.

4. Collaboration with Machine Technology students to design and produce prototypes based on student-generated concepts (i.e. project-based learning).

5. Individual and group expository writing on related CAD and SolidWorks topics and projects learned.

6. Individual and group demonstration using various forms of media on CAD and SolidWorks skills learned.

7. Skill and progress journal

Assessment Methods and/or Tools

Assessments will include written and oral presentations using various forms of media. Demonstration of knowledge of creating and manipulating 2D and 3D designs using Solidworks and all of its components is a key assessment in this course. Completion of assigned key projects and lab activities to their specifications will also be evaluated. A comprehensive 3D design project at the end of the course will also be included in the final mark for this course.

Unit 1: SolidWorks procedures

Assessment Activities

1. Complete and print a sample new file using Solid Works.
2. List and use Solid Works shortcut menu

3. Use and present Getting OnlineHelp with a particular question.
4. Complete individual or group presentation using various media on Getting Started with Solid Works.
5. Complete learning journal.

Unit 2:Basic 2D Sketch

Assessment Activities

1. Create a new 2D sketch/model.
2. Modify and change dimension values of the sketch.
3. Further explore and modify parts of the sketch.
4. Complete individual or group presentation using various media on the Solid Works Model.
5. Complete learning journal.

Unit 3: Base Features: 2D to 3D

Assessment Activities

1. Create a new SolidWorks part.
2. Show and demonstrate conversion of the part dimensions.
3. Show and demonstrate calculation of material volume and base feature.
4. Complete individual or group presentation using various media on Conversions, Dimensions, and Base Feature.
5. Complete learning journal.

Unit 4 3D Assembly Basics

Assessment Activities

1. Create a new 3D model with basic assembly features.
2. Complete individual or group presentation using various media on their own 3D Model.
3. Complete learning journal.

Unit 5 Solidworks Toolbox

Assessment Activities

1. Perform and demonstrate the use of the Toolbox and modification of Toolbox parts.
2. Complete individual or group presentation using various media on using the Toolbox and adding Toolbox parts.
3. Complete learning journal.

Unit 6 Basic and Engineering Drawings

Assessment Activities

1. Perform and demonstrate the steps in creating a basic and an engineering drawing.
2. Complete individual or group presentation using various media on using the Toolbox and adding Toolbox parts.
3. Complete learning journal

Unit 7 eDrawings

Assessment Activities

1. Write an essay explaining, differentiating, and illustrating isometric views, standard views, dimensions and their differences.
2. Complete individual or group presentation using various media on using the Toolbox and adding Toolbox parts.
3. Perform the lab activities as listed.
4. Complete learning journal.

Unit 8 **Design Tables and Bill of Materials**

Assessment Activities

1. Write an essay explaining how a design table is created and its importance in engineering design.
2. Complete individual or group presentation using various media on creating a design table.
3. Perform the lab activities as listed.
4. Complete learning journal.

Unit 9 **Swept and Loft Features**

Assessment Activities

1. Write an essay explaining how to enhance a design table using the Revolved, Swept and Loft Features
2. Complete individual or group presentation using various media on creating a design table.
3. Perform the lab activities as listed.
4. Complete learning journal.

Unit 10 Comprehensive 3D Design Project

Assessment Activities

1. Write an essay explaining how to enhance a design table using the

Revolved, Swept and Loft Features

2. Complete individual or group presentation using various media on creating a design table.
3. Perform the lab activities as listed.

Furthermore, all project-based assignments will be based on the competency and performance objectives as previously identifed in the section on course outcomes:1. Critical Competence:

1-1. ability to apply the knowledge of mathematics, science, English, and engineering graphics.

1-2. ability to use the techniques, skills, and engineering tools necessary for engineering graphics.

2. Creative competence:

2-1. ability to experiment in engineering graphics designs and analyze and interpret data from same.

2-2. ability to identify, formulate, and solve engineering graphics design problems.

3. Communicative Competence:

3-1. ability to interpret information in written, verbal, and visual forms from others.

3-2. ability to communicate effectively with individuals and in groups.

4. Cultural Competence:

4-1. ability to function as part of a multi-disciplinary engineering team.

4-2. ability to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

25. Grading Policy

Attendance = 10%	Classwork = 75%
Exams = 15%	

24. Grading Policy

A = >90%	B = 89% - 80%	C = 79% - 70%
D = 69% - 60%	F = <60%	

SECTION C

26. Context for Course (optional)

REQUIRED FOR CTE COURSES

NOTE: In order to understand the context for a new course, sometimes it is helpful to understand the broader educational program and/or reform efforts of the school. How does this course fit into broader departmental and/or pathway structure? How does it fit into the overall school restructuring plans? Is the course intended to be a core course or supplemental? What are the student/school/community needs met by this course?

The drafting program at this school was dormant for a number of years, a casualty of staffing and resource shortages. When voters passed a bond measure in 2006, one of the eventual beneficiaries of that funding was our CTE Department, including a state-of-the-art Computer Aided Design computer lab (and workspace for traditional pencil-and-paper drafting). In the one previous year that drafting was offered since the program reboot (prior to its present redesign), there was a mid-semester faculty change and the curriculum was a patchwork despite the best efforts of the licensed architect instructor. Thus, it was with a blank slate -- but an eye toward imparting professional-grade, modern skills, and collaborating with Machine Technology and Wood Technology -- that this course has been reimaged.

SolidWorks is *the* gold-standard for 3D modeling -- being able to use the software adeptly is a highly desirable skill for engineers, rapid prototypers, machinists, industrial maintenance technicians, medical device researchers, industrial designers, architectural fabricators, and countless others. Simply put, being able to design an object in SolidWorks is the crucial first step in the process of creating a real, tangible, precise object out of a idea dreamed up in someone's head.

CAD Solid Modeling with SolidWorks is supplemental to the overarching college preparatory curriculum of SLHS, but ideally, would be compulsory for students in advanced Machine- or Wood Technology, because those students would then be able to fully utilize their professional-grade computer controlled machines (3-axis Computer Numeric Controlled router in Wood Tech, CNC mill and CNC router in Metal Tech) which use the output generated by SolidWorks to produce finished parts.

This course meets two specific needs for students: It offers college- and professional grade instruction on software used by over two million designers and engineers in over 180,000 organizations, and it gives students another option for computer-based learning (distinct from computer science, business applications, video editing, or desktop publishing). The school is served by this class by presenting an opportunity for students from different disciplines -- CAD students with Metal Tech, CAD students with Wood Tech -- for student collaboration in project-based learning (students working together to design, alone to plan and fabricate, and together to present their product to a jury). And finally, the community at-large is served by the vocational education of future designers and fabricators into an industry experiencing steady growth in business and jobs, nationwide.

27. History of Course Development (optional)

REQUIRED FOR CTE COURSES

NOTE: Likewise, it is sometimes helpful know the origins of a course and who was involved in its development. Was this course modeled after another course at another school? If so, is that course UC approved? How does the course being submitted differ from the course after which it was modeled? Has this course received any special recognitions, designations or awards? Has it been articulated to local community colleges or universities?

This course is modeled on MACH20 at Laney College in Oakland, "CAD Solid Modeling with SolidWorks".

There are few differences, principal among them being that a prime objective of Laney's MACH20 is that students take and pass a professional certification exam (the Certified SolidWorks Associate exam) conducted by the software publisher. While such a certification would certainly be valuable to high school students interested in pursuing educational or professional pathways which involve 3D modeling (such as machining, engineering, prototyping, etc), it is difficult to assert the primacy that successful test preparation requires when high school students have myriad other demands on their time (academic and otherwise). Further, there is the considerable cost associated with the exam ($99) which would present an undue hardship on many families of our students, the majority of which receive subsidized lunches.

The remaining differences between this CAD Solid Modeling course and the Laney course have to do with additional material that our school's analogue covers: Specifically, they are different in basic concepts from traditional (architectural) drafting, such as floor plans and elevations, plus other lessons which teach students to conceptualize in three dimensions.

Although this course is not yet articulated to Laney (or Diablo Valley College), the process is underway to achieve both.