INTERMEDIATE COMPUTER AIDED DESIGN 20

Students can pursue an emphasis on any 1 of 3 disciplines: Architecture, Engineering Design, or Animation

Description

This course expands on the fundamental skills learned in CAD 10. Students will explore the intermediate level application of Architecture, Animation, or Engineering concepts. Students may concentrate study in any one of the 3 areas. Examples of activities include: residential and commercial building design, photorealistic rendering, digital sculpting, applying sound to computer animations, using motion capture software and human actors to animate characters, and running computer simulations to test the functionality of their designs, printing plastic components and models using the 3D printer. *(Software: Inventor, Revit, 3ds Max, Mudbox, Motion Builder, iPi Motion Capture)*

Course Overview

Course Objectives

Students should be able to:

- effectively communicate design ideas through hand drawn sketches, dimensioned plans and rendered images and animation techniques.
- brainstorm several solutions to a problem and evaluate alternatives to discover the best solution.
- list the training, education and certification requirements for the CAD related career of their choice.
- clearly communicate design ideas through oral and written presentation.
- demonstrate a basic knowledge of the standard drafting conventions for both mechanical and architectural drawings.
- demonstrate proficiency in basic 3D modeling techniques.
- synthesize mathematical data, social concerns, financial constraints, and the principles of design to create a product that is balanced and effective.
- demonstrate the ability to organize files into efficient folder systems on a variety of storage

Essential Questions

- How is computer technology used to create designs and to effectively communicate ideas?
- How do I balance function and aesthetics to create designs that are both effective and attractive designs?
- How are designs driven by cost, environmental, social, and manufacturing concerns?
- How do I choose the construction/ manufacturing system most appropriate for my design parameters?
- How can I use lighting and materials to enhance the appearance of rendered images?
- What various types of career options are related to design?

Standards

Connecticut Technology Education Standards have been met in the following areas:

- ***Essential Knowledge and Skills***
- ***Computer Aided Drafting and Design (CADD)***
- ***Pre-Engineering Technology***
- ***Communications***

Assessments

Architecture

- Formative Performance Assessments
- Summative Performance Assessments

Engineering Design

- Formative Performance Assessments
- Summative Performance Assessments

Animation

- Formative Performance Assessments
- Summative Performance Assessments

devices.

- employ critical thinking skills independently and in teams to solve problems and make decisions.
- employ leadership skills to accomplish organizational goals and objectives.
- identify and demonstrate positive work behaviors and personal qualities needed to be employable.
- identify and describe various types of hardware and software.
- demonstrate use and application of alternate view applications and functions.
- apply effects, materials, and lighting to enhance the realism of renderings.
- maintain a portfolio to document knowledge, skills, materials and experience in CAD.

Content Outline

Architecture Emphasis

I. Unit 1 – Review & Fundamentals
II. Unit 2 – The Design Process
III. Unit 3 – Historical Architectural Styles
IV. Unit 4 – Construction Systems
V. Unit 5 – Intermediate Architectural Modeling
VI. Unit 6 – Intermediate Set of Plans
VII. Unit 7 – Final Summative Project

Engineering Design Emphasis

I. Unit 1 – Review & Fundamentals
II. Unit 2 – The Design Process
III. Unit 3 – Intermediate Parametric Modeling
IV. Unit 4 – Creating Dimensioned Plans
V. Unit 5 – Creating and Testing Prototypes
VI. Unit 6 – Final Summative Project

Animation Emphasis

I. Unit 1 – Review & Fundamentals
II. Unit 2 – The Design Process
III. Unit 3 – Intermediate 3D Modeling
IV. Unit 4 – Intro to Lighting Techniques
V. Unit 5 – Intermediate Animation Techniques
VI. Unit 6 – Intro to Special Effects
VII. Unit 7 – Video Editing & Sound FX
VIII. Unit 8 – Final Summative Project

Pacing Guide - Architecture Emphasis									
1st Marking Period		2nd Marking Period		3rd Marking Period			4th Marking Period		
September	October	November	December	January	February	March	April	May	June
Unit 1 Review & Fundamentals 6 weeks	Unit 2 The Design Process 3 weeks	Unit 3 Historical Architectural Styles 3 weeks	Unit 4 Construction Systems 4 weeks	Unit 5 Intermediate Modeling 8 weeks		Unit 6 Intermediate Plan Set 6 weeks		Unit 7 Final Summative Project 6 weeks	

Pacing Guide – Engineering Design Emphasis									
1st Marking Period		2nd Marking Period		3rd Marking Period			4th Marking Period		
September	October	November	December	January	February	March	April	May	June
Unit 1 Review & Fundamentals 6 weeks	Unit 2 The Design Process 3 weeks	Unit 3 Intermediate Parametric Modeling 8 weeks	Unit 4 Creating Dimensioned Plans 6 weeks	Unit 5 Creating and Testing Prototypes 7 weeks		Unit 6 Final Summative Project 6 weeks			

Pacing Guide - Animation Emphasis									
1st Marking Period		2nd Marking Period		3rd Marking Period			4th Marking Period		
September	October	November	December	January	February	March	April	May	June
Unit 1 Review & Fundamentals 6 weeks	Unit 2 The Design Process 3 weeks	Unit 3 Intermediate 3D Modeling 6 weeks	Unit 4 Intro to Lighting Techniques 2 weeks	Unit 5 Intermediate Animation Techniques 6 weeks		Unit 6 Intro to Special Effects 5 weeks	Unit 7 Video Editing & Sound FX 2 weeks	Unit 8 Final Summative Project 6 weeks	

Architecture Emphasis

Unit 1 - Review & Fundamentals, 6 weeks top

Standards

Pre-Engineering Technology

ENG.02 Use the design process to solve problems by creating and refining prototypes.

ENG.02.01

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.

CADD.02.04, CADD.02.05

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.

CADD.05.09, CADD.05.11, CADD.05.12, CADD.05.13, CADD.05.14, CADD.05.16, CADD.05.17

CADD.06 Demonstrate use and application of alternate view applications and functions.

CADD.06.01

CADD.08 Explain and Utilize the concepts of sketching and the sketching process used in preliminary design and development.

CADD.08.01, CADD.08.02

Unit Objectives

Students will be able to:

- apply intermediate sketching techniques to express their design concepts.
- express their designs through various types of plan drawings.
- accurately communicate size and location through ANSI dimensioning conventions.
- create residential and commercial floor plans utilizing accepted room planning strategies.

Essential Question

- How can I effectively communicate my design ideas to others?

Focus Questions

- What methods have I learned to effectively communicate design ideas so far?
- What sketching techniques can I utilize to increase the aesthetics of my drawings?
- What is ANSI?
- How should rooms and spaces be arranged in relation to one another?

Assessments

- 1&2 point perspective hand sketches with shading
- dimensioned Floor Plan Challenge
- Room planning sketches

Skill Objectives

Students will:

- use various types of shading to enhance the aesthetics of their design sketches.
- create fully dimensioned floor plans & elevations using ANSI dimensioning standards.
- design floor layouts using bubble diagrams based on accepted room planning strategies for residential and commercial applications.

Unit 2 – The Design Process, 3 weeks top

Standards

Computer Aided Drafting and Design

CADD.01 Demonstrate an understanding of the historical and current events related to CADD and the impact on society.
CADD.01.02, CADD.01.04

CADD.04 Identify, describe, and utilize the basic hardware and operating systems used in CADD.
CADD.04.05, CADD.04.06

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.01, CADD.05.06, CADD.05.11, CADD.05.12

CADD.08 Explain and Utilize the concepts of sketching and the sketching process used in preliminary design and development.
CADD.08.01, CADD.08.02, CADD.08.03

Unit Objectives

Students will be able to:

- explain the 6 steps of the Design Process.
- apply the Principles of Design.
- prepare and conduct an effective oral & visual presentation.

Essential Question

- What steps should be taken in an effective design process?

Focus Question

- What techniques can be used to create aesthetically pleasing and effective designs?

Assessments

- Design Cycle Quiz
- Massing model project
- Principles of design presentation

Skill Objectives

Students will:

- create architectural models using massing that demonstrate understanding of the principles of design.
- create a presentation on the principles of design using their massing renders.

Unit 3 – Historical Architectural Styles, 3 weeks top

Standards

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.

CADD.02.09

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.

CADD.05.14, CADD.05.15

CADD.06 Demonstrate use and application of alternate view applications and functions.

CADD.06.03, CADD.06.04, CADD.06.05

Unit Objectives

Students will be able to:

- list and describe the major styles of architecture in the ancient world.
- design a structure that incorporates a major style of architecture.

Essential Question

- How has architecture evolved into many forms and styles?

Focus Questions

- How were buildings constructed through history?
- What are the dominant aspects of historical styles of architecture?
- How has culture and geography affected architecture?

Assessments

- Presentation on major historical architecture styles
- Small House incorporating elements of an ancient style

Skill Objectives

Students will:

- create a presentation on one historical architectural style explaining how geography and culture both shaped and was shaped by that style.
- incorporate elements of a major architectural style into their own residential design.

Unit 4 – Construction Systems, 4 weeks top

Standards

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.
CADD.02.05, CADD.02.06, CADD.02.08

CADD.03 Utilize measurement and annotation systems as they apply to CADD technology design.
CADD.03.03, CADD.03.04

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.01, CADD.05.12

CADD.09 Identify various symbols to interpret and read technical drawings.
CADD.09.01, CADD.09.03

CADD.10 Maintain a portfolio to document knowledge, skills, materials and experience in CADD.
CADD.10.02

Unit Objectives

Students will be able to:

- describe the function of residential stick framing components.
- explain basic building codes.
- explain considerations of planning renovations vs. new construction.

Essential Questions

- How are structures constructed with integrity?
- What role does the government play in building construction?

Focus Questions

- What construction techniques are commonly used?
- What safety features are included in architecture?
- How are buildings constructed to be strong?

Assessments

- Identify elements stick framing quiz
- *Balsa wood framing model*
- Building code quiz

Skill Objectives

Students will:

- use cutting and gluing tools to create a balsa model of a platform framed structure.
- list the building codes that must be considered when adding a permanent structure to a property.
- plan a renovation of a school space.
- research the building codes involved in a school renovation.
- design for specific construction techniques.

Unit 5 – Intermediate Architectural Modeling, 8 weeks top

Standards

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.
CADD.02.07, CADD.02.12

CADD.03 Utilize measurement and annotation systems as they apply to CADD technology design.
CADD.03.04, CADD.03.07, CADD.05.06

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.12, CADD.05.13, CADD.05.14, CADD.05.16

CADD.06 Demonstrate use and application of alternate view applications and functions.
CADD.06.02, CADD.06.04, CADD.06.06

CADD.08 Explain and Utilize the concepts of sketching and the sketching process used in preliminary design and development.
CADD.08.01

CADD.10 Maintain a portfolio to document knowledge, skills, materials and experience in CADD.
CADD.10.01

Unit Objectives

Students will be able to:

- list and describe the basic roof types.
- modify basic walls.
- model more complex styles.
- create shafts for multistory stairwells.
- design and construct custom component files.
- create custom materials in preparation for rendering.

Essential Question

- How is computer technology used to create designs and to effectively communicate ideas?

Focus Questions

- How can I take advantage of CAD tools to increase the complexity of my designs?
- How can I take advantage of CAD tools to increase the complexity of my designs?

Assessments

- Quiz on roof types
- Create a split level home with a combination roof
- Fully furnish and render one room of the home

Skill Objectives

Students will:

- utilize the split tool to create a wall with multiple heights.
- modify the profile of walls to create archways and portals.
- modify basic roof settings to create more complex styles.
- build custom furniture and fixtures.
- utilize the material editor to create custom materials.

Unit 6 – Intermediate Set of Plans, 6 weeks top

Standards

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.
CADD.02.09

CADD.03 Utilize measurement and annotation systems as they apply to CADD technology design.
CADD.03.05, CADD.03.06, CADD.03.07

CADD.04 Identify, describe, and utilize the basic hardware and operating systems used in CADD.
CADD.04.05, CADD.04.06

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.16

CADD.06 Demonstrate use and application of alternate view applications and functions.
CADD.06.04, CADD.06.05

Unit Objective

Students will be able to:

- use critical thinking and problem solving skills to create architectural drawings from an existing design.

Essential Question

- How is computer technology used to create designs and to effectively communicate ideas?

Focus Questions

- How are designs communicated in accepted industry standards?
- What are the standard types of drawings used to communicate?

Assessments

- Given a premade floor plan, elevation, and 3D CAD model of a house students generate a dimensioned:
  - site plan
  - Foundation Plan
  - Floor Plans
  - Elevation

Skill Objectives

Students will:

- create a Site Plan.
- create a Foundation Plan.
- create a Floor Plan.
- create an Elevation.
- create a Design Presentation.

Unit 7 – Final Summative Project, 6 weeks top

Standards

Essential Knowledge and Skills

EKS.01 Complete required training, education, and certification to prepare for employment in a particular career field.
EKS.01.01, EKS.01.02

EKS.09 Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.
EKS.09.02, EKS.09.03,bEKS.09.04, EKS.09.05

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.
CADD.02.07, CADD.02.09, CADD.02.12

CADD.03 Utilize measurement and annotation systems as they apply to CADD technology design.
CADD.03.04, CADD.03.07

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.01, CADD.05.06, CADD.05.13, CADD.05.14, CADD.05.15, CADD.05.16

CADD.06 Demonstrate use and application of alternate view applications and functions.
CADD.06.05, CADD.06.06

CADD.08 Explain and Utilize the concepts of sketching and the sketching process used in preliminary design and development.
CADD.08.01, CADD.08.02, CADD.08.03

CADD.10 Maintain a portfolio to document knowledge, skills, materials and experience in CADD.
CADD.10.01, CADD.10.03

Unit Objectives

Students will be able to:

- synthesize the content of the previous units into a final building design of their choosing
- work independently to complete a summative project incorporating all previously learned skills and knowledge
- utilize multimedia technology to communicate their solution to an architectural challenge

Essential Question

- What standard design techniques should be executed for any architecture project?

Focus Questions

- As an architect, how do I ensure my designs are functional, aesthetic, and satisfy my customer's requests?
- How should architects assess and improve their own work?

Assessments

- Mock Client Interview
- Self-chosen project with renderings & dimensioned plans
- Presentation assessment

Skill Objectives

Students will:

- utilize the principles of design and architectural styles to create design sketches to communicate 3 different design iterations to a client (teacher).
- discuss design variables with a client (teacher) in order to reach an optimal solution.
- create a building design and set of dimensioned plans.
- put together a design presentation to share with the class.

Engineering Design Emphasis

Unit 1 - Review & Fundamentals, 6 weeks **top**

Standards

Essential Knowledge and Skills

EKS.03 Demonstrate mathematics knowledge and skills required to pursue the full range of post-secondary education and career opportunities.
EKS.03.01, EKS.03.02

EKS.05 Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).
EKS.05.02, EKS.05.03, EKS.05.04, EKS.05.05, EKS.05.07

EKS.08 Identify and demonstrate positive work behaviors and personal qualities needed to be employable.
EKS.08.01, EKS.08.02

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.
CADD.02.01 through .12

CADD.03 Utilize measurement and annotation systems as they apply to CADD technology design.
CADD.03.01 through .08

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.01 through .17

CADD.07 Create assemblies and views in 3-D format.
CADD.07.01 & .02

CADD.08 Explain and Utilize the concepts of sketching and the sketching process used in preliminary design and development.
CADD.08.01 through .04

Unit Objectives

Students will be able to:

- apply intermediate sketching techniques.
- identify and choose types of views/plans.
- use standard dimensioning.
- use sketch & assembly constraints.

Essential Question

- How do engineers develop and communicate their ideas?

Focus Questions

- What tools are there in a CAD program to help me test concepts and modify designs?
- What are effective ways to generate concepts?
- What factors and features in a design require precise documentation and attention?

Assessments

- 1&2 point perspective hand sketches with shading
- Dimensioned orthographic Challenge
- Basic 2D CAD sketch with constraints
- Basic CAD assembly with animation

Skill Objectives

Students will:

- make concept sketches that communicate ideas.
- create a fully dimensioned orthographic drawing with a shaded isometric view.
- create parametric sketches and constrained articulating assemblies.

Unit 2 – The Design Process, 3 weeks top

Standards

Pre-Engineering Technology

ENG.02 Use the design process to solve problems by creating and refining prototypes.

ENG.02.02 ENG.02.05 ENG.02.06

ENG.07 Identify and demonstrate the use of various software programs used in the engineering field.

ENG.07.04

Unit Objectives

Students will be able to:

- explain the 6 steps of the Design Process.
- apply the Principles of Design.
- prepare and conduct an effective oral & visual presentation.

Essential Question

- How is computer technology used to create designs and to effectively communicate ideas?

Focus Questions

- What is the project approach used to create a design or improve an existing design?
- What metrics are used for quantifying design efficacy?

Assessments

- Design Cycle Quiz
- design exercise employing the principles of design

Skill Objectives

Students will:

- develop a concept using the 6 step process.
- sketch product concepts exemplifying the principles of design.

Unit 3 - Intermediate Parametric Modeling, 8 weeks top

Standards

Computer Aided Drafting and Design

CADD.06 Demonstrate use and application of alternate view applications and functions.

CADD.06.03 CADD.06.04

CADD.07 Create assemblies and views in 3-D format.

CADD.07.01

Pre-Engineering Technology

ENG.02 Use the design process to solve problems by creating and refining prototypes.

ENG.02.10

Unit Objectives

Students will be able to:

- design a product using a basic sweep.
- design a product using a basic loft.
- understand assemblies and their structure.
- understand constraints.
- know the steps to animate components.
- use the 'Design Accelerator' to create a power transmission mechanism.
- use Dynamic Simulation to test a mechanism.
- design for Rapid Prototyping/3D Printing.

Essential Questions

- How is computer technology used to create designs and to effectively communicate ideas?

Focus Questions

- What techniques are used to create 3D shapes?
- How are 3D models made to articulate and move?
- How are moving 3D models tested for efficacy?
- How are models designed for various types of production and fabrication?

Assessments

- Basic Sweep Project
- Basic Lofting Project
- Create an assembly model and drawing (construct a piston engine)
- Constrain a model for desired motion (piston engine)
- Create a dynamic simulation with trace function proof
- Construct a CAD part for 3D print

Skill Objectives

Students will:

- identify sweeps and lofts and their uses.
- build assemblies and modify them using CAD.
- constrain moving parts of assemblies.
- animate assemblies.
- create pulley/belt, roller chain, gear power transmission assemblies.
- test, fix, and retest mechanisms in 'dynamic simulation environment'.
- create a part for 3D printing.

Unit 4 - Creating Dimensioned Plans, 6 weeks top

Standards

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.

CADD.02.09, CADD.02.05

CADD.03 Utilize measurement and annotation systems as they apply to CADD technology design.

CADD.03.03, CADD.03.06, CADD.03.07

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.

CADD.05.01, CADD.05.12, CADD.05.14, CADD.05.16

Unit Objectives

Students will be able to:

- use CAD to create orthographic views, isometric views and drawings.
- use CAD to create part drawings having Sectional, Auxiliary, and Detail views.

Essential Question

- How are engineering drawings produced in a way that is universally understood?

Focus Questions

- What is the standard 'format' for engineering drawings?
- What are the ways to most effectively describe a part or a design?

Assessments

- Standard 4 view part drawing with hidden lines of mechanism assembly
- Detail, sectional, auxiliary views of mechanism assembly

Skill Objectives

Students will:

- identify the structure and views of an Orthographic Drawing, Isometric drawing.
- identify Sectional Views, auxiliary views, and detail views and their uses**.**

Unit 5 - Creating and Testing Prototypes, 7 weeks top

Standards

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.

CADD.02.07

CADD.06 Demonstrate use and application of alternate view applications and functions.

CADD.06.03, CADD.06.04, CADD.06.06

CADD.07 Create assemblies and views in 3-D format.

CADD.07.01

Pre-Engineering Technology

ENG.02 Use the design process to solve problems by creating and refining prototypes.

ENG.02.10, ENG.02.11

Unit Objectives

Students will be able to:

- describe Lab safety procedures.
- explain the importance of basic tools, bench work and machine processes.
- describe the process of 3D Printing.
- analyze a problem or improve function of a mechanism or process using the engineering cycle.

Essential Question

- How are prototypes made, and what is their purpose?

Focus Questions

- What is done for safety in the lab?
- What are the basic tools used in the workshop during prototyping?
- What engineering procedures are used in engineering?
- What are typical effective ways of creating prototypes and for testing concepts?

Assessments

- Drill press & bandsaw safety quiz
- Proper use of bench tools and power tools to demonstration
- Optimizing a design for 3D printing
- Build, test, and modify a trebuchet to optimize range
- Trebuchet engineering report

Skill Objectives

Students will:

- use established safety procedures while creating and testing prototypes.
- safely demonstrate basic bench work and power tools.
- prepare CAD files for 3D printing and operate the printer.
- write an Engineering Report.

Unit 6 - Final Summative Project, 6 weeks top

Standards

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.
CADD.02.09, CADD.02.05

CADD.03 Utilize measurement and annotation systems as they apply to CADD technology design.
CADD.03.03, CADD.03.06, CADD.03.07, CADD.03.08

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.14, CADD.05.16

CADD.06 Demonstrate use and application of alternate view applications and functions.
CADD.06.05

CADD.07 Create assemblies and views in 3-D format.
CADD.07.02

Pre-Engineering Technology

ENG.07 Identify and demonstrate the use of various software programs used in the engineering field.
ENG.07.04

Unit Objectives

Students will be able to:

- explain the skills necessary to complete a successful Mock Client Interview.
- synthesize the content of the previous units into a final building design of their choosing.
- utilize multimedia technology to communicate their solution to an architectural challenge.

Essential Question

- How is any engineering project approached and executed?

Focus Question

- How should engineers assess and improve their own work?

Assessments

- Mock Client Interview
- Self-chosen, teacher approved Project

Skill Objectives

Students will:

- successfully implement all skills covered in course in different context.
- work independently and as a team to complete a summative project incorporating all previously learned skills and knowledge.

Animation Emphasis

Unit 1 - Review & Fundamentals, 6 weeks **top**

Standards

Essential Knowledge and Skills

EKS.03 Demonstrate mathematics knowledge and skills required to pursue the full range of post-secondary education and career opportunities.
EKS.03.01, EKS.03.02

EKS.05 Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).
EKS.05.02, EKS.05.03, EKS.05.04, EKS.05.05, EKS.05.07

EKS.08 Identify and demonstrate positive work behaviors and personal qualities needed to be employable.
EKS.08.01, EKS.08.02

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.
CADD.02.01 through .12

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.01 through .17

CADD.08 Explain and Utilize the concepts of sketching and the sketching process used in preliminary design and development.
CADD.08.01 through .04

Unit Objectives

Students will be able to:

- apply Intermediate Sketching Techniques.
- apply the Principles of Design.
- understand basic scene Composition.
- create basic cartoon character Designs.
- create Storyboards.

Essential Question

- How is computer technology used to create animations and to effectively communicate a story?

Focus Questions

- What sketching techniques can I utilize to increase the aesthetics of my drawings?
- How can I utilize computer technology to design 3D models for use in animated movies and video games?

Assessments

- 1&2 point perspective hand sketches with shading
- Character sketching
- Storyboard of complete scene

Skill Objectives

Students will:

- sketch scenes and characters in perspective.
- sketch scene compositions that use principles of design.
- sketch storyboards with camera and audio details included.

Unit 2 – The Design Process, 3 weeks top

Standards

Computer Aided Drafting and Design

CADD.01 Demonstrate an understanding of the historical and current events related to CADD and the impact on society.

CADD.01.04

CADD.03 Utilize measurement and annotation systems as they apply to CADD technology design.

CADD.03.07

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.

CADD.05.06

CADD.08 Explain and Utilize the concepts of sketching and the sketching process used in preliminary design and development.

CADD.08.01, CADD.08.02, CADD.08.03

Unit Objectives

Students will be able to:

- explain the 6 steps of the Design Process.
- apply the Principles of Design.
- prepare and conduct an effective oral & visual presentation.

Essential Question

- What steps should be taken in an effective design process?

Focus Question

- What techniques can be used to create aesthetically pleasing and effective designs?

Assessments

- Design Cycle Quiz
- Character sketch, vehicle sketch, and set sketch demonstrating the principles of design

Skill Objectives

Students will:

- create architectural models using massing that demonstrate understanding of the principles of design.
- create a presentation on the principles of design using their massing renders.

Unit 3 – Intermediate 3D Modeling, 6 weeks top

Standards

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.

CADD.02.07, CADD.02.12

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.

CADD.05.15

CADD.06 Demonstrate use and application of alternate view applications and functions.

CADD.06.06

Unit Objectives

Students will be able to:

- explain how to use splines to create 2D and 3D models.
- explain how to use lofts to create 3D models.
- utilize low polygon modeling techniques to create models.
- modify standard material parameters to create custom materials.
- utilize basic uvw mapping techniques to apply material maps to complex models.
- import low poly models into a digital sculpting program to sculpt and paint details.

Essential Question

- How is computer technology used to create designs and to effectively communicate ideas?

Focus Questions

- What advanced modeling tools can I use to create increasingly complex designs?
- How do transfer files between software packages to maximize the quality of my models?
- How can I add details to my simple 3D models to create more interesting productions?
- How can I create and apply custom built material maps to increase aesthetics and realism?

Assessments

- Simple environment model with basic props
- Low Polygon character model
- Simple Vehicle Model

Skill Objective

Students will:

- utilize environment concept sketches to create a 3D digital set for an animated scene.
- apply custom materials to environment models and props using basic UVW mapping tools.
- create a basic character model based on a 2D sketch utilizing low polygon modeling techniques.
- utilize Autodesk Mudbox to sculpt and paint a better quality character from a low polygon model.
- create a 3D model of a vehicle based on a 2D sketch utilizing low polygon modeling techniques.
- utilize Autodesk Mudbox to sculpt and paint a high quality, detailed vehicle from a low polygon model.

Unit 4 – Intro to Lighting Techniques, 2 weeks top

Standards

Communications

AVC.03 Demonstrate the use of appropriate communication equipment for the delivery of a message.

AVC.03.10

Unit Objectives

Students will be able to:

- create and modify standard lights to illuminate 3d models for rendering.
- use standard 3 point lighting techniques to create rendered images.
- increase the realism of rendered images and video using photometric lighting.

Essential Question

- What advanced software tools are available to aid me in designing more elaborate, creative products?

Focus Question

- How can I use lighting and materials to enhance the realism of rendered images?

Assessments

- 3 point still life rendering
- Walkthrough rendering

Skill Objectives

Students will:

- create and customize Mental Ray shaders to produce higher quality rendered images.
- modify Mental Ray renderer settings to optimize render quality.

Unit 5 - Intermediate Animation Techniques, 6 weeks top

Standards

Communications

AVC.03 Demonstrate the use of appropriate communication equipment for the delivery of a message.

AVC.03.16

Unit Objectives

Students will be able to:

- utilize basic character animation tools to create custom movement cycles.
- use motion capture technology to record and translate human movement into digital animation information.
- apply and edit motion capture data to create realist character movement.
- utilize helper rigs to animate a face.

Essential Question

- What intermediate level software tools are available to aid me in designing more elaborate, creative products?

Focus Questions

- How can I increase the realism of my character's movements?
- What animation tools exist to help increase my productivity?

Assessments

- Rigged character model
- Biped walk cycle
- Animated character with Mo Cap data

Skill Objectives

Students will:

- link a low polygon character mesh to a biped bone structure using Physique.
- use 3dsMax character animation tools to apply a walk cycle to a standard biped model.
- use motion capture technology to record and process a human actor's movement.
- apply the motion capture data using MotionBuilder and edit the bone rig to create simple character movement.

Unit 6 – Intro to Special Effects, 5 weeks top

Standards

Communications

AVC.03 Demonstrate the use of appropriate communication equipment for the delivery of a message.

AVC.03.17, AVC.03.18

Unit Objectives

Students will be able to:

- apply various render effects to enhance the excitement of their animation.
- configure various video post effects.
- use particle systems to simulate materials and physics.

Essential Question

- What advanced software tools are available to aid me in designing more elaborate, creative products?

Focus Questions

- How can I create common visual effects used in the film and game industry?
- How do I use special effects strategically to enhance the production value of an animation without overdoing it?

Assessments

- Fire and explosion effect
- Sun glare render
- Water effect

Skill Objectives

Students will:

- create fire and explosions using the atmospheric apparatus effects.
- create sun glare using lens effect glow.
- apply space warps to particle systems to simulate physics.
- create flowing water using particles and the blobmesh modifier.

Unit 7 – Video Editing & Sound FX, 2 weeks top

Standards

Communications

AVC.03 Demonstrate the use of appropriate communication equipment for the delivery of a message.

AVC.03.01, AVC.03.03, AVC.03.06, AVC.03.08

Unit Objectives

Students will be able to:

- select equipment required for specific types of audio productions.
- demonstrate how to record and mix audio.
- demonstrate how audio is synchronized with other audio or video.

Essential Question

- What video and audio editing tools are available to aid in designing more elaborate, creative products?

Focus Questions

- What methods are employed to load sound effects and music to improve animations?
- What is the importance of a title screen and credits to in movie project?

Assessment

- Animated scene with sound

Skill Objectives

Students will:

- mix video with sound effects, music, or narrations to create an animated scenes.
- splice video clips together to create animated scenes.
- apply sound effects.
- apply ambient sound and background music.
- insert a title screen and credits.

Unit 8 – Final Summative Project, 6 weeks top

Standards

Essential Knowledge and Skills

EKS.01 Complete required training, education, and certification to prepare for employment in a particular career field.
EKS.01.01

EKS.09 Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.
EKS.09.03, EKS.09.05

Computer Aided Drafting and Design

CADD.02 Analyze the use of current CADD design technology.
CADD.02.01, CADD.02.07

CADD.05 Utilize Proper projection techniques to develop orthographic and pictorial drawings.
CADD.05.14, CADD.05.15, CADD.05.16

CADD.10 Maintain a portfolio to document knowledge, skills, materials and experience in CADD.
CADD.10.01, CADD.10.02, CADD.10.03

Unit Objectives

Students will be able to:

- explain the skills necessary to complete a successful Mock Job Interview.
- explain the skills necessary to complete a successful Mock Client Interview.
- work independently and as a team to complete a summative project incorporating all previously learned skills and knowledge.

Essential Question

- How can I best prepare myself for a career in 3D modeling or animation?

Focus Questions

- What are the steps to obtain a career in design?
- How can I best prepare myself for a career in 3D modeling or digital animation?
- As a digital artist, how do I ensure my designs are functional, aesthetic, and satisfy my customer's requests?
- How can I effectively work as a member of a team to satisfy the client?

Assessments

- Mock Job Interview
- Mock Client Interview
- Student Chosen Team Project

Skill Objectives

Students will:

- apply learned interview strategies complete a successful mock job interview.
- apply learned skills to interview a mock client in order to extract information for planning an animation production.
- work as a team to complete a summative project incorporating all previously learned skills and knowledge.