Computer Aided Drafting (CAD) IV: Advanced Computer Aided Design for Architecture, Engineering, and 3D Animation

Full Year

Fairfield Ludlowe High School - Fairfield Warde High School

COURSE DESCRIPTION

Advanced design using various Computer Aided Design (CAD) programs specializing in the areas of: Architecture, Animation, and Engineering. Students will utilize CAD professional level software to construct 3D computer models of houses, simple parts and mechanisms, and textured 3D models which could be used as assets in games or animations. Activities will include: hand sketching, creating 3D computer models, rendering still images and video, using a 3D printer to create actual parts made of plastic, and creating a basic keyframe animation.

COURSE OBJECTIVES

Students will be able to:

Unit 1: ARCHITECTURE

- create hand drawings of two dimensional primitives.
- create simple orthographic drawings of 3 dimensional objects.
- apply information in creative ways to satisfy client needs create terrain- to simulate an actual building site
- build CAD Models in 3D from 2D sketches
- add basic elements to a building model like doors and windows and change their types to match a desired aesthetic style
- insert and modify furniture and fixtures as component files.
- create site features like driveways and walkways
- add landscaping elements to create a more attractive site
- create new materials and apply them to surfaces to simulate actual building and site materials
- create dimensioned floor plan drawings
- create elevation drawings with appropriate labeling
- add camera views and adjust them for optimal viewing angles
- render realistic still images of their CAD model.
- set up sheet views with the proper scale for printing

Unit 2: ENGINEERING

- create hand drawings from two dimensional primitives.
- list the common types of lines used in mechanical drawings.
- create simple orthographic and isometric drawings of 3 dimensional objects
- create fully constrained 2D CAD sketches.
- manipulate 2D sketches using editing tools and transforms.
- create 3D part models from 2D sketches.
- create fully constrained 3D part assemblies.
- test digital prototypes by applying basic physics simulations in CAD
- export CAD models for 3D printing
- create dimensioned drawings from part files and assembly files.
- correctly apply basic ANSI dimensioning standards
- create video animations showing the functionality of assembly files and simulations.

Unit 3: ANIMATION:

- use basic 2D primitives to draw character concept sketches
- create a basic storyboard to plan out a short animation
- communicate their ideas in a team environment.
- model an idea using 3D modeling software
- create basic primitive shapes and prepare them for modeling.
- create an original low polygon character model.
- create a basic set for the character to exist within
- apply premade materials to 3D objects to give them color and shading properties.
- use the internet and computer software to create and apply their own custom PBR textures.
- utilize keyframe animation techniques to produce a short animation.
- load in an HDRI to create lighting and shadows create camera views.
- adjust exposure values to balance lighting.
- modify render engine settings to balance quality and efficient render times.
- create high quality rendered still images.
- export image sequences.
- combine image sequences into quality rendered video files

Unit 4 - CAPSTONE PROJECT

- use a variety of communication tools and strategies to effectively convey their design concepts to an audience.

UNITS OF STUDY

Unit 1

- Unit 1.A.-Architecture - The architectural design process
- Unit 1.B.-Engineering - The engineering design process
- Unit 1.C.-Animation - Practicing Sketching and storyboarding

Unit 2

- Unit 2.A.-Architecture - Advanced 3D modeling
- Unit 2.B.-Engineering - Advanced 3D modeling
- Unit 2.C.-Animation - Advanced 3D modeling

Unit 3

- Unit 3.A.- Architecture - Advanced Working Drawings
- Unit 3.B.- Engineering - Advanced Working Drawings
- Unit 3.C. -Animation - Advanced Rendered Images and Video

Unit 4 - Capstone Project with Portfolio Completion (All)

COURSE POLICIES AND REQUIREMENTS

GRADING: Generally….See district policy (Policy 6146.1AR)

Grading Communication

- Specific grading expectations and practices will be communicated to all students and families at the start of the school year via a consistent format.
- If students or parents have questions about grading practices, they should follow the district's established chain of command structure (see district website) with the first contact being to the teacher and then to the school administration.
- Buildings will send out reminders of the importance of checking students' grades in the Grading Portal with directions.
- Teachers will notify guardians when students fall into the F range after October 1st.

Grade Reporting

- For a processed piece or "chunked" assignment that is part of a larger task, feedback and the grade shall be shared before the next step in the process, so long as students have submitted their work at those checkpoints, on time.
- Grades for summative assessments shall be entered within 10 school days from the date of submission or the date it was due, whichever is later.
- Grades for formative assessments shall be entered within 5 school days from the date of submission or the date it was due, whichever is later, and prior to any subsequent assessment.

Guidelines for Late Work :

- Teachers will accept late work for both summative and formative tasks beyond the due date.
- Teachers will not accept late work beyond the deadline for late work. The deadline is defined as the next class period from the due date of the assignment or the alternative date that the teacher and student may agree upon depending on individual circumstances.
- Teachers may reduce the total points students can achieve as a penalty for late work up to the deadline. Students will earn a zero (0) if the assignment is not submitted or is submitted after the deadline.
- Late work only consists of assignments with an expected due date. Assessments, such as tests, quizzes and in class assignments, must be taken on the scheduled date except in cases of make-up assessments due to an excused absence.

REASSESSMENT GUIDELINES:

Eligibility of assessments	Teachers of the same course will determine which summative assessments are eligible. Students can select any part of a project to reassess. Reassessments may not be allowed one week before the end of a term.
Process	Students have two class periods in which to indicate they would like to take a reassessment. Teachers will make clear to students their preferred method for students to request reassessment (*e.g.* email or filling out a simple form/spreadsheet).
Frequency	Students will have the opportunity to reassess on two summatives per year but not more than one per term (quarter).
Assessment Format	Based on discussion between the student and teacher, students will revise portions of the original assessment in which they did not show proficiency.
Gradebook impact	Original and reassessment scores will be averaged in the gradebook.

MATERIALS:

- As provided by the course.

EXPECTATIONS OF STUDENTS:

- Be Tech and Learning Ready: Come prepared with all necessary materials, including your charged device and any required software.
- Prioritize Safety: Follow all safety guidelines and procedures, especially when working with tools, equipment, or hazardous materials.
- Participate Actively: Engage in class discussions, ask questions, and contribute to group projects. Actively participate in lab activities by following instructions, working collaboratively, and cleaning up your workspace.
- Respect the Digital Realm: Treat all digital resources and equipment with care. Avoid actions that could harm or disrupt the learning environment.
- Embrace Digital Citizenship: Use technology ethically and responsibly. Be mindful of copyright laws and online etiquette.

EXTRA HELP:

- Students should seek out extra help when needed. The teacher is available for extra help before and after school as well as during prep periods.