



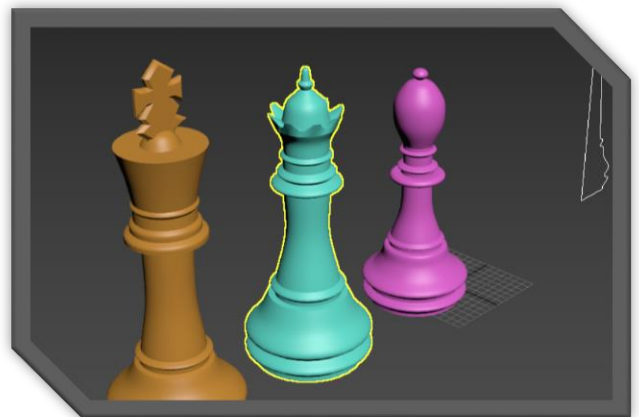
Computer Graphics 1

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State College Area High School

Course Description:

This semester course offers a fantastic way to be introduced to a variety of STEM engineering machines and tools, and computer graphic imaging

software packages, and concepts. These software packages are used for 2D and 3D model animation, and image design. Software packages introduced in this course include: Adobe Photoshop, Premiere, and After Effects. Autodesk's 3D Studio is used for 3D modeling and animation. Makerware, and Cura software is used for creating 3D prints on our in classroom 3D printers, and Photoshop and Illustrator are used to create print and laser engraved projects. Solidworks will be introduced for future CAD skills. Throughout the course, you will be involved with hands-on experiences, creating desktop video with Adobe Premiere, Gaming level design with 3D Studio and Unity3D, original images for print using Adobe Photoshop, and Photograph repairs and enhancements using Photoshop. Concepts of STEM technology will be learned while each student works on his or her own high-end PC within the classroom. Each student will develop several 3D prints and laser engraved projects using our Epilog laser. The goal is to enhance and develop skills for all State High graduates as they enter an increasingly technological world.



Student Materials:

- Pencil
- Binder or Folder

Post-Secondary connections:

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| <ul style="list-style-type: none"> • Architectural & Mechanical Engineering • Drafting/CAD • Designers • Video/Film • Video Game Design | <ul style="list-style-type: none"> • Multimedia & Computer Animation • Computer Science • Industrial Design • Information Systems |
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Technology Course content and unit activities:

Quiz 1 - Introduction to modeling terms and concepts, and additive manufacturing (3D printing) terms and concepts – General Pre-test (No grade) - 1 days, Post-Test (30 points)

Projects/Units:

Intro to 3D Studio Max (as a modeling and animation program) Ball, Box, and Cylinder with modifiers: Squash, Twist, and Bend. – 3 days (50 pts)

Concepts:

- Intro to the Graphical User Interface (GUI)
- Viewports and the Cartesian coordinate system
- Standard OS, and shortcut tools (i.e. Select, move, zoom)
- Object creation

- Object modification
- Naming and sizing objects
- Intro to timing of animated modifiers
- Rendering an image (file formats)

2. Ball in Box, with variations of design and animation – 3D Studio – 2 days (50 pts.)

Concepts:

- Control object motion using the “Track View”
- Control timing of animated objects
- Pivot points

3. Modeling a Chess Set – 3D Studio – 1 ½ week (100 pts.) Concepts:

- Convert 2D shapes to 3D shapes
- Sublevels of shapes (splines and meshes)
- Expand on concepts of shape modification

4. Modeling a Rook – Solidworks – 2 days (100 points) Concepts:

- CAD design
- Tools – fillet, chamfer, revolve, extrude boss, extrude cut
- Creating sketches and features

5. Introduction to Additive Manufacturing (3D printing) – Chess Set – 3 days (mixed in with other content) (50 pts.)

Concepts:

- Preparing a file for print (.STL) file type.
- Use of shells, infill density, and layer resolution
- Heated bed vs. non-heated bed • Use of supports and/or a raft
- 3D printer types

6. Creating a virtual game level and/or Architectural walk-through environment –3D Studio – 2 Weeks (100 pts)

Concepts:

- Materials and textures
- Named group sets
- Use of cameras and lights
- Using the walk-through assistant
- Rendering in common, shareable formats

Quiz 2 – Modeling terms and concepts, and additive manufacturing (3D printing) terms and concepts – General Post-test (50 pts)

7. Introduction to Photo manipulation using Adobe Photoshop 1 week (100 pts)

Concepts:

- Common picture fixes
- Useful enhancements
- Creating original graphics with effects
- Use of layers

8. Mouse pad, Poster or T-shirt design – Adobe Photoshop – 1 ½ weeks (100 pts)

Concepts:

- Intro to a digital still camera and scanner
- Create and use layers
- Image size relationships
- Aesthetics of an image
- Filters and effects

9. Wrench and Glasses/Pencil Box Desing – AutoCad – 1 weeks (75 pts. each)

Concepts:

- Use of layers
- Annotating dimensions
- Drawing geometric lines, arcs, circles
- Line thickness (cutting vs. etching)
- 2D subtractive manufacturing

10. Laser Engraver/Cutter project - Adobe Photoshop – 3 days (75 pts)

Concepts:

- Raster graphics vs. vector graphics
- CNC control of a machine using graphics
- Connection to additive manufacturing

11. Special Effect Video Graphics with Adobe Photoshop to After Effects – 1 ½ weeks (100 pts)

Concepts:

- Setting up a Comp
- Controlling layers
- Use of effects over Time
- Animating layers using keyframes

12. Introduction to Video Game Design Unity3D - 1 week (100 pts.)

Concepts:

- Creating models, lights, and using sounds
- Programming in Java or C#
- Tying code to the modeled environment.

13. Culminating Video of Project Highlights - Non-linear editing– Adobe Premiere – 1 week (100 pts)

Concepts:

- Use of screen grab utilities
- Converting sound
- Use of transitions
- Creating fades and blends
- Working with file formats and screen size
- Using credits and titles
- Animating artwork
- Creating buttons
- Application of filters and processes on clips to achieve a desired effect
- Movie types – .avi, .swf, .mov.

Standards Used:

Standards for Technological Literacy:

STL 1	Students will develop an understanding of the characteristics and scope of technology.
STL 2	Students will develop an understanding of the core concepts of technology.
STL 3	Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.
STL 4	Students will develop an understanding of the cultural, social, economic, and political effects of technology.
STL 5	Students will develop an understanding of the effects of technology on the environment.
STL 6	Students will develop an understanding of the role of society in the development and use of technology.
STL 7	Students will develop an understanding of the influence of technology on history.
STL 8	Students will develop an understanding of the attributes of design.
STL 9	Students will develop an understanding of engineering design.
STL 10	Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
STL 11	Students will develop the abilities to apply the design process.
STL 12	Students will develop the abilities to use and maintain technological products and systems.
STL 13	Students will develop the abilities to assess the impact of products and systems.
STL 14	Students will develop an understanding of and be able to select and use medical technologies.
STL 15	Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.
STL 16	Students will develop an understanding of and be able to select and use energy and power technologies.
STL 17	Students will develop an understanding of and be able to select and use information and communication technologies.
STL 18	Students will develop an understanding of and be able to select and use transportation technologies.
STL 19	Students will develop an understanding of and be able to select and use manufacturing technologies.
STL 20	Students will develop an understanding of and be able to select and use construction biotechnologies.

Grading Policy:

Assignments and projects must be turned in on time. A failure to do so will result in a 10% penalty for every class period assignment or projects are late. Due dates can be found in Google Classroom (or Canvas).

Student Expectations:

- Maintain a safe working environment in the engineering lab.
- Welcome team input and respect ideas of other team members.
- Conform to reasonable standards of socially acceptable behavior.
- Respect the rights, person, and property of others.
- Respond positively and promptly to those adults charged with the responsibility of monitoring student behavior.
- Student handbook found online <http://www.scasd.org/Page/10408>

My teaching philosophy:

I believe all students need to be technologically literate in today's world. With technology and engineering industries growing rapidly, technological literacy and being able to take a hands-on approach to problem solving is a growing need. In my class, you'll see students brainstorming, collaborating, designing, researching, building, and testing to find the best possible solution to all kinds of problems. It is this approach to learning that can improve the world around us.