

Course Purpose: What is the purpose of this course? Please provide a brief description of the goals and expected outcomes. (How these will be accomplished should be reserved for the Course Outline, Key and Written assignments, Assessments, and/or Instructional Methods.) NOTE: More specificity than a simple recitation of the State Standards is needed.

This course is a technical, aesthetic and historical exploration of three-dimensional design through the creation of digital modeling and animation artworks. By using 3d modeling tools, the course emphasizes artistic perception and creative expression through 2-dimensional image making, digital animation, and 3d printed sculpture.

This process-focused course will build the students' perceptual skills and visual arts vocabulary in 2-dimensional design principles to their application in 3-dimensional space. Two-dimensional works will focus on the application of artistic processes and skills to communicate meaning in original works of art; Developing and applying drawing and design skills through sketchbook activities, design and composition concepts, and digital manipulation skills using a variety of traditional and digital tools. Three-dimensional artworks will focus on analyzing the sculptural nature of 3D modeling, explore the elements of contemporary 3d digital design, and analyze the role and development of 3D design in past and present cultures throughout the world. Students will create their own interpretations of traditional and contemporary 3-dimensional artwork which may serve as functional pieces and/or works of fine art.

3D Modeling for Design is a 3rd year class in a sequence of animation and design courses. Students enter this class having taken a sequence of animation courses (Introduction to 2D Animation and Intermediate 2D Animation) or the students have completed a sequence of design courses (Design A/B and Art Design Advanced). Many students have also completed Introduction to Engineering, a Project Lead the Way course. 3D Modeling for Design is for students who are interested in the fields of animation, illustration, character modeling, design for video games, motion graphics, industrial design, and architecture.

The Purpose of the Course

The purpose of 3D Modeling for Design is to expand the students' knowledge of the elements of art, principles of design, and principles of animation as they relate to 3D digital art. Although computers are used as the primary media to create expressive works, the emphasis in this class is building core knowledge about the language of visual arts, developing the students' historical knowledge and cultural context, aesthetic awareness as it applies to traditional and digital 3-dimensional art forms. This course also connects and applies art knowledge, skills, and processes within and across other disciplines and careers such as three dimensional medical imaging.

The students' individual voice or style is developed throughout the year by completing design challenges of increasing complexity and skill that reflect their point of view. A central theme in this class is the role and development of the visual arts; exploring how technological developments have impacted and influenced the making of art throughout time. Students research, identify and analyze how these technological developments have shaped the making of art, the evolution of concepts, and how viewers experience art. Students also report on how new technology might affect the visual arts and speculate on how advances in technology might change the definition and function of the visual arts and. Additionally, students build a broad understanding of careers in the arts and related fields that focus on digital art and animation.

Textbook/ Supplemental Materials

Cinema 4D Resources

- Alley, Tony. *Exploring 3D Modeling with Cinema 4D R9*. Clifton Park, NY: Delmar Learning, 2006.
- Call, Anson. *Cinema 4D R10 Handbook*. Boston, MA: Charles River Media, 2007.
- Koenigsmarck, Arndt Von. *Cinema 4D 10 Workshop*. Amsterdam: Elsevier Focal, 2007.
- Koenigsmarck, Arndt Von. *Cinema 4D 11 Workshop*. Amsterdam: Focal, 2008.
- McQuilkin, Kent, and Anne Powers. *Cinema 4D: The Artist's Project Sourcebook*. Waltham, MA: Focal, 2011.
- Osipa, Jason. *Stop Staring: Facial Modeling and Animation Done Right*. Indianapolis, IN: Wiley/Sybex, 2007.
- Sondermann, Horst. *Light Shadow Space: Architectural Rendering with Cinema 4d*. Vienne: Springer, 2008.
- Tickoo, Sham. *Maxon Cinema 4D R14 Studio: A Tutorial Approach*. CADCIM Technologies. 2013.

Zbrush Resources

- Keller, Eric. *Introducing ZBrush 4*. Indianapolis, IN: Wiley, 2011.
- Kingslien, Ryan. *ZBrush Studio Projects: Realistic Game Characters*. Indianapolis, IN: Wiley Pub., 2011.
- Robson, Wayne. *Essential ZBrush*. Plano, TX: Wordware Pub., 2008.
- Scherer, Manuel. *ZBrush 4 Sculpting for Games: Beginner's Guide: Sculpt Machines, Environments, and Creatures for Your 5 Game Development Projects*. Birmingham, [UK: Packt Pub., 2011.
- Spencer, Scott, Eric Keller, and Paul Gaboury. *ZBrush Digital Sculpting Human Anatomy*. Indianapolis, IN: Wiley Pub., 2010.
- Spencer, Scott. *ZBrush Character Creation: Advanced Digital Sculpting*. Indianapolis: Wiley, 2011.
- Wise, Daryl. *Secrets Of Zbrush Experts*. Clifton Park, NY: Delmar, 2011.

DVD Resources

- Sims, Aaron. *Creature Design with Aaron Sims*. Prod. The Gnomon Workshop, 2007. DVD.
- Welsh, Jason. *Pixologic Zbrush 3.1*. Virtual Training Company, 2008. DVD.
- Brown, John. *Sculpture with John Brown: Vol 1. The Character Armature*. The Gnomon Workshop, 2007. DVD.
- Brown, John. *Sculpture with John Brown: Vol 2. Character Maquettes*. The Gnomon Workshop, 2007. DVD.
- Infinitieskills. *Learning Cinema 4D Special Effects Techniques - Training DVD*. 2012. DVD.

Drawing and Design Resources

- Bancroft, Thomas. *Creating Characters with Personality*. Watson-Guptill Publications. 2006.
- Curedale, Rob. *Design Thinking: Process and Methods Manual*. Design Community College Inc. 2013.
- Davenne, Christine. *Cabinet of Curiosity*. Abrams Publishing. 2011.
- Ehrenberg, Rachel. "The 3D Printing Revolution: Dreams Made Real, One Layer at a Time." *Science News*. 2013: 20-25. Print.
- Elkins, James. *Art Critiques: A Guide*, 2nd ed. New Academia Publishing. 2009.
- Greenberg, Saul, and Marquardt, Nicolai. *Sketching User Experiences: The Workbook*. Morgan Kaufmann. 2011
- Hart, John. *The Art of the Storyboard: A Filmmaker's Introduction 2nd ed*. Focal Press. 2008.
- Hallgrimsson, Bjarki. *Prototyping and Model making for Product Design (Portfolio skills)*. Laurence King Publishing. 2012.
- Hatch, Mark. *The Maker Movement Manifesto: Rules for Innovation in the New World of Crafters*,

- Hackers, and Tinkerers.* McGraw-Hill. 2013
- Henry, Kevin. *Drawing for Product Designer/Portfolio Skills Product Design*. 2012.
- Hudson, Jennifer. *Process: 50 Product Designs from Concept to Manufacture*. London: Laurence King Pub., 2011.
- Martin, Bella. *Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. Rockport Publisher. 2012.
- Robertson, Scott. *How to Draw: Drawing and Sketching Objects and Environments from your Imagination*. Design Studio Press. 2013.
- Roselien, Steur. *Sketching: The Basics*. BIS Publishers. 2011.
- Parada, Andres. *Product Sketches: From Rough to Refined*. BIS Publishers. 2013.
- Whitlatch, Terryl, and Gilbert Banducci. *Animals Real and Imagined: The Fantasy of What Is and What Might Be*. Culver City, CA: Design Studio, 2010.
- Wilkinson, Karen. *The Art of Tinkering*. Weldon Owen Publications. 2013
- Van Wulfen, Gijs. *The Innovation Expedition: A Visual Toolkit to Start Innovation*. BIS Publishing. 2013.
- Various authors. *The Big Book of Character Design: A Compilation of Contemporary Character Culture*. 2012.

Web Resources

- The Artist Classroom: Feldman Model of Analyzing Artwork
<http://artistclassroom.weebly.com/feldman-approach.html>
- Drawing & Composition for visual storytelling.
<http://www.floobynooby.com/IPUB/comp1.html>
- The Future Channel for information about math concepts
<http://thefutureschannel.com>
- The Guardian Article about Cabinet of Curiosities
<http://www.theguardian.com/artanddesign/2014/jan/13/cabinet-curiosities-taxidermy-retro-museums>
- Greyscale Gorilla for digital tutorials
www.greyscalegorilla.com
- Institute of Design at Stanford for information about Design Thinking strategies
www.ds.school.stanford.edu
- Lynda.com for digital tutorials
www.lynda.com
- Museum of Modern Art for information about surrealism
https://www.moma.org/learn/moma_learning/themes/surrealism/surrealist-landscapes
- MOMA exhibition about the Wunderkammer for information about the history of the Wunderkammer
<http://www.moma.org/interactives/exhibitions/2008/wunderkammer/>
- School of Visual Arts, *Tall Tales: A Modern Totem Pole*. for information about contemporary totems
<http://design.sva.edu/talltales>
- The Surrealist Manifesto for information about surrealists
http://www.ubu.com/papers/breton_surrealism_manifesto.html
- ThingLink for display of student research
www.thinglink.com
- When Reality Fades Away: Surrealism Invades 3d Art for information about surrealists
<http://www.cgtrader.com/blog/when-reality-fades-away-surrealism-invades-3d-art>

Course Outline: A detailed descriptive summary of all topics covered. All historical knowledge is expected to be empirically based, give examples. Show examples of how the text is incorporated into the topics covered. A mere listing of topics in outline form is not sufficient (i.e. textbook table of contents or California State Standards).

Unit One: 3D Totems- An Introduction to the Elements of Art and Principles of Design

This lesson focuses on developing artistic perceptual skills and visual arts vocabulary. The teacher introduces student to traditional artwork made in the form a totem found in various cultures and also analyze artwork from the exhibition titled “Tall Tales: A Modern Totem Pole.” The focus of the conversation is analyzing how the elements and principles have been used to create expressive content. They discuss how totems from various cultures have similar and dissimilar themes. Students then demonstrate the understanding of vocabulary through drawing a series of small 2” X 2” compositions that illustrate the elements of art and principles of design. These sketches are then transformed into a stacked totem-like sculpture using the software Cinema 4D and printed using a 3d printer. At the end of this unit, students will know how to:

The Visual Arts (“f”) topics

- Discuss a series of their original works of art, using the appropriate vocabulary of art.
- Describe the use of the elements of art to express mood found in works of art.
- Create original works of art of increasing complexity and skill that reflect complex ideas, such as distortion, color theory, arbitrary color, scale, and expressive content.
- Investigate and discuss universal concepts expressed in works of art from diverse cultures.
- Identify the intentions of artists creating contemporary works of art and explore the implications of those intentions.

CTE Topics

- Articulate the characteristics of various art forms from past and present cultures and analyze similar themes used by various cultures.
- Know the appropriate skills and vocabulary of the art form.
- Understand and analyze the elements of the art form.
- Students analyze how change happens at different rates at different times; understand that some aspects can change while others remain the same; and understand that change is complicated and affects not only technology and politics but also values and beliefs.
- Know policies, procedures, and regulations regarding health and safety regarding the 3D printing equipment.
- Understand critical elements of health and safety of practices related to storing, cleaning, and maintaining tools, equipment, and supplies related to the 3D printer and wash tank.

Unit Two: Blobatar Unit

This lesson focuses on how shape symbolism can create the emotional impact and personality characteristics of an animated character. Students discuss familiar characters from movies and those from the early 20th century. They analyzing and breaking down the basic shapes found in these works. Artwork discusses includes: Otto Messmer’s *Felix the Cat*, Walt Disney Studios, UPA, Studio Ghibli, and Pixar. Stop motion animations like; *Wallace and Gromit* and *The Nightmare Before Christmas*, will also be discussed. They will discuss how the important developments of early animation studies have impacted work made today. Students complete sketchbook assignments that focus on color theory and shape symbolism. Students practice drawing shapes to express emotion, draw concept sketches, complete preliminary art in Photoshop, build clay models of the characters, and finally model a simple character made of “blobs” that embody a particular emotion. Cinema 4D is used to model the 3d character. At the end of this unit, students will know how to:

The Visual Art (“f”) Topics

- Analyze and discuss complex ideas, such as distortion, color theory, arbitrary color, scale, expressive content in works of art.
- Analyze their own work of art as to personal direction and style.
- Describe the use of the elements of art to express mood.
- Identify contemporary artists worldwide who have achieved regional, national, or international recognition and discuss ways in which their work reflects, plays a role in, and influences present-day.

CTE Topics

- Know universal cultural concepts and identify cultural similarities and differences found in artwork from various animation studios.
- Use technical applications in the creative process of building an original expressive character.

Unit Three: The Production Pipeline - Character Development, Design, and Modeling

The focus of this unit is for students to understand industry standard production processes for product creation. Students research a number of visual arts careers that use 3D modeling and research artists working in these fields. They explore the process of developing a work of art from ideation to final product (the Project Pipeline). To accomplish this, a story synopsis is provided to the class that outlines a setting, a story synopsis, and a specific cast of characters. Students select a character to visually and conceptually develop, sketch, pitch to the class, and critique. A clay model is sculpted as a visual prototype and the final character is modeled in Cinema 4d and zBrush. The topic of copyright is discussed in this unit. At the end of this unit, students will know how to:

The Visual Art ("f") Topics

- Create original works of art of increasing complexity and skill that reflect their points of view.
- Demonstrate in their own works of art a personal style and an advanced proficiency in communicating an idea.

CTE Topics

- Know the personal qualifications, aptitudes, knowledge, and skills necessary to succeed in careers.
- Understand the scope of career opportunities and know the requirements for education, and licensure.
- Understand the concept and application of ethical and legal behavior consistent with workplace standards, including the adherence to the copyright and intellectual guidelines.
- Identify contemporary artists worldwide who have achieved regional, national, or international recognition and discuss ways in which their work reflects, plays a role in, and influences present-day culture.

Unit Four: Sculpting the Human Figure

This unit's focus is on understanding the human figure. Students analyze how artists across time have represented it using a variety of media. The discussion focuses on how technology has influenced the ways artists have represented the human figure throughout time. Contemporary 3D modelers that focus on the human figure are contrasted with artwork from Greek and Roman antiquities, the Renaissance, and modernist sculpture. Artists discussed include Scott Eaton, Marc Quinn, and Sophie Robinson. The students create multimedia presentations about their research, present it to the class, and post it on a website. They will complete a portfolio of life drawings and finally use zBrush to sculpt a posed human figure in a personal style. At the end of this unit, students will know how to:

The Visual Art ("f") Topics

- Analyze the works of a well-known artist as to the art media selected and the effect of that selection on the artist's style.
- Identify contemporary artists worldwide who have achieved regional, national, or international

recognition and discuss ways in which their work reflects and influences present-day culture.

CTE Topics

- Deliver multimedia presentations that include images, text, and video.
- Understand the application of research and analysis skills to the create of content.

Unit Five: The Human Figure in Motion - Walk Cycle

The unit focuses is on understanding the movement of the human figure. Students study early forms of animation including the Egyptian tomb of Khnumhoptep and Niankhkhnum, the Thaumatrope, Zoetrope and Kineograph (flipbook). Students practice drawing a walk cycle and build simple Thaumatrope animation. Students are introduced to the work of Eadweard Muybridge and early stop frame animation in films like *King Kong*, *Jason and the Argonauts*, and *The Making of ParaNorman*. Students discuss the evolution of stop frame animation. They analyze and discuss how 3D printing technology in the movie, *ParaNorman*, was used to create the models and how it improved the expressive qualities of the animation. Students then study the human figure in motion and produce a portfolio of figure drawings from life. The students storyboard a 15 second movie that involves the movement of a human figure. They produce a series of reference photos using high speed photography. These photos are used as reference for keyframing a mannequin in a 15 second animation made in Cinema 4D. Students learn the 12 Principles of Animation. Using these principles, students then animate the character developed for Unit 3. At the end of this unit, students will know how to:

The Visual Art ("f") Topics

- Analyze the artworks as to the art media selected and the effect of that selection on the style.
- Describe the relationship involving the art maker (artist), the making (process), the artwork (product), and the viewer.
- Speculate on how advances in technology might change the definition and function of the visual arts.

CTE Topics

- Understand how technology can reinforce, enhance, or alter products and performances.
- Use a variety of strategies (e.g., personal experience, discussion, research) to comprehend, interpret, evaluate, and appreciate source and technical documents and materials.

Unit Six: Virtual Kinetic Sculpture - A Response to Technology

The focus of this unit is to learn about kinetic sculpture and use advanced animation tools to create a virtual sculpture. Students study the history of kinetic sculpture. Historical artists like Alexander Calder and Jean Tinguely, and contemporaries like Li Mee Young, Theo Jansen, Paul Grundbacher, and David C. Roy are introduced as examples of sculptures that move through 3-dimensional space. Students also examine public installations about the environment like: *Field* by Richard Box, the work of Janet Echelman, Gabriel Dawe, and Ron Arad's *Curtain Call*. Using the 12 basic principles of animation learned in Unit 5, students will work in teams to create a proposal for a public artwork that moves. They research a local, site location and develop a large-scale kinetic sculpture for that location. Students employ the principles of Animation to create their 3D models in Cinema 4d. The content of the sculpture must address the student's ideas about how technology is shaping the environment. The students present their ideas to a panel of professionals in the community. At the end of this unit, students will know how to:

The Visual Art ("f") Topics

- Investigate and report on the essential features of modern or emerging technologies that affect or will affect visual artists and the definition of the visual arts.
- Construct a rationale for the validity of a specific work of artwork that falls outside their own conceptions of art.

- Understanding the cultural dimensions of the visual arts.

CTE Topics

- Understand the historical contributions and cultural dimensions of the visual arts.
- Participate in interactive teamwork to solve design challenges.
- Understand the characteristics and benefits of teamwork, leadership, and citizenship in the community.

Unit Seven: Toy Design and Product Design Unit

The focus of this unit is to develop a product design and work with a group of student engineers to manufacture the design. Students write their own synopsis of a toy they would like to build. The ideas are pitched to the class, students then create orthographic sketches and final orthographic illustrations in Illustrator. Student draft illustrations (blueprints) to scale and share them with a team of student engineers. They build a model in Cinema 4d or zBrush. Google Drive is used as a planning and sharing tool. The design/engineering team problem solves how to assemble to toys, move parts, and rotate components. They work together to determine the material usage and cost of the final product. Students design packaging for the toy and a final 2-dimensional poster with original 3d fonts is created and printed. Students present the process portfolio of their work at a public exhibition. At the end of this unit, students will know how to:

The Visual Art ("f") Topics

- Create original works of art of increasing complexity and prepare portfolios of their original works of art.
- Assemble and display objects or works of art as a part of a public exhibition at the local library.
- Demonstrate a personal style and an advanced proficiency in communicating an idea.

CTE Topics

- Use models, simulations, and other tests to determine optimal design solutions from a variety of options. Prototyping construction methods with the engineer to determine what methods will work best for their toy design.
- Construct and read drawings and models made to scale.
- Understand the use of contracts in the arts industry and the principles and responsibilities of working as an independent contractor, including budgeting, project planning, advertising, and marketing strategies.
- Understand past, present, and future technological advances as they relate to a chosen pathway.
- Understand the characteristics of teamwork and leadership in the workplace.
- Understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others.
- Compare and contrast the roles of creators, performers, and others involved in the production and presentation of the arts.

Unit Eight: Industrial Design-Functional Forms inspired by Forms in Nature

The focus of his industrial design unit is developing ideas for functional objects. Students examine a range of objects including: vehicle design, furniture design, sculptural jewelry, and shoe design. Students select an area of interest and identify a problem with a product they would like to redesign. Students learn how to draw objects using 2 and 3-point perspective and spend several days in the maker studio prototyping solutions using wood, foam, paper, tape, glue, and other quick prototyping materials. They finalize their designs based on the prototypes and then create a 3D model in Cinema 4D. The students work closely with a panel of industrial designers from the area throughout the project. Prototypes are printed using the 3D printer. The panel judges student presentations and final product. At the end of the unit, students will know how to:

The Visual Art ("f") Topics

- Plan and create works of art that reflect complex ideas.
- Assemble and display objects or works of art as a part of a public exhibition.
- Demonstrate in their own works of art a personal style and an advanced proficiency in communicating an idea.

CTE Topics

- Collaborate with industry experts for specific technical knowledge and skills.
- Know the skills required to design, edit, and produce a production for printed presentation.
- Use a variety of strategies interpret, evaluate, and appreciate source and technical materials.

Unit Nine: Wunderkammer Unit - A Contemporary Collection

The focus of this unit is for students to explore the history of collecting objects and develop visual metaphors of their own. This class project expands the students' understanding of the museum as a place of spectacle, wonder, and repository of unusual objects. Students begin by researching the history of the Wunderkammer, or Cabinet of Curiosity. They explore how this cultural phenomenon, in fashion during the colonial period, developed into the contemporary museum. They will read articles about how artists still work with this curatorial strategy. The students visit 2 local museums and a local store that sells unusual objects (a kind of cabinet of curiosity). Students then create an unusual object that acts as a visual metaphor for a social problem or current event. Students curate these objects into a class WunderKammer. At the end of this unit, students will know how to:

The Visual Art ("f") Topics

- Research the methods art historians use to determine the time, place, context, value, and culture that produced a given work of art.
- Describe the relationship involving the art maker (artist), the making (process), the artwork (product), and the viewer in the context of a museum.
- Compare and contrast works of art, probing beyond the obvious and identifying psychological content found in the symbols and images.
- Use innovative visual metaphors that represent a social issue, current event, or idea about today's world.

CTE Topics

- Understand digital applications appropriate to specific media and projects.

Unit Ten: Virtual Museum Project

Students study the 4 aesthetic theories; Imitationalism, Instrumentalism, Emotionalism, and Formalism. They research various artworks made using 3D modeling software. Building on what they have learned throughout the year, the students work in design teams to create a virtual museum of artworks curated into a 4 distinctive galleries that represent the aesthetic theories. Each student curate their research, include their own work made this year, and create a new work for one of the galleries in the museum.

The Visual Art ("f") Topics

- *Assemble* and display objects or works of art as a part of a public exhibition.
- Demonstrate in their own works of art a personal style and an advanced proficiency in communicating an idea, theme, or emotion.
- Identify contemporary artists worldwide who have achieved regional, national, or international recognition and discuss ways in which their work reflects, plays a role in, and influences present-day culture.
- Research the methods art historians use to determine the time, place, context, value, and culture that

- produced a given work of art.
- Apply various art-related theoretical perspectives to their own works of art.

CTE Topics

- Know how technology and the arts are interrelated in the development of presentations and productions.
- Articulate the characteristics of various art forms from past and present cultures and analyze similar themes used by various cultures in a variety of arts settings.
- Understand the historic impact of the arts and technology on society.

Unit Eleven: Surrealistic Illustration, Animation, and the 3D scanner

The unit focuses on exploring visual metaphors through surrealistic image making. Students learn how to use the 3D scanner of their faces. Students plan and create a fine arts piece that will be placed in the Virtual Museum created in Unit 10. They print for an exhibition as in a public space. Student may work independently or in teams to create the work. Students use Cinema 4d or zBrush to build the images. At the end of this unit, students will know how to:

The Visual Art ("f") Topics

- Compare how distortion is used in photography or video with how the artist uses distortion in painting or sculpture.
- Identify the intentions of artists creating contemporary works of art and explore the implications of those intentions.
- Use innovative visual metaphors in creating works of art.
- Plan and create works of art that reflect complex ideas, such as distortion, color theory, arbitrary color, scale, expressive content, and real versus virtual.
- Assemble and display objects or works of art as a part of a public exhibition.

CTE Topics

- Analyze the way in which technical design (e.g. color theory, lighting, graphics, typography, posters, sound, costumes, makeup) contributes to a performance or presentation.
- Understand the influence of current and emerging technology on selected segments of the economy.

Unit Twelve: The Reel and Print Portfolio

The unit focuses on gathering work for public sharing. As a final assessment, students assemble a reel (an animated digital portfolio) and a print portfolio of their year's work. Students create storyboards to outline the order in which footage is presented. Students use iMovie to assemble the portfolio and print 2-dimensional examples of their work. Students write criteria for successful works, define how their work has grown over time, write an artist statement, and complete a résumé. Students build portfolio websites of their work, include the reel, and present their work at an exhibition event.

The Visual Art ("f") Topics

- Develop written criteria for the selection of a body of work from their portfolios that represents significant achievements.
- Select three works of art from their art portfolio and discuss the intent of the work and the use of the media.
- Prepare portfolios of their original works of art for a variety of purposes (e.g., review for post-secondary application, exhibition, job application, and personal collection).

CTE Topics

- Know important strategies for self-promotion in the hiring process, such as job applications, résumé writing, interviewing skills, and preparation of a portfolio.

Key Assignments: *Detailed descriptions of all Key Assignments which should incorporate activities and projects, as well as, short answers and essay questions. How do assignments incorporate topics? Include all assignments that students will be required to complete. Assignments should be linked to components mentioned in the course outline. It is not appropriate or necessary to include instructions given to students regarding the execution of assignments (formatting, timeliness, etc.). Do not include exams or assessments in this section.*

The following is a list of the Key Assignments that outline how the Visual Art and CTE standards are met throughout the year. The first 7 assignments listed are general activities complete over the course of the entire year and may or may not be connected to an individual unit. This is followed by a list of sequential instructional units that outline the process, product, and outcome of each unit of study.

Weekly Sketchbook Assignments (each week)

Students complete weekly homework sketchbook assignments that build drawing skills, visual arts vocabulary, build knowledge of color theory, artistic perception, and help them develop concepts for class projects. Weekly assignments might also include visual research of a topic, and/or written investigations of an aesthetic theory or movement, and reflection about an artist's work or concept. Investigations into careers in the field of 3D design will be explored. These assignments are integrated into a particular unit of study and build on the concepts taught during that unit of instruction. The outcome of the weekly sketchbook assignments are for students to develop the habit of drawing to explore ideas, develop observational drawing skills, use drawing as a means of research/information gathering, and as a form of communication.

Digital Tutorials (Units 1,2, 4, 5, 6, 9,10, and 11)

Students complete simple digital tutorials for each of the units that teach them how to use the software. Similar to classroom demonstrations of art materials, these tutorials are most often 1-2 class period long and primarily focus on specific software tools to create a product, not the unit content itself. Students complete 8 digital tutorials throughout the year. The outcome of the tutorials is for students to gain the technical skills to successfully complete a subsequent design challenge.

Google Drive Notes (used for lecture notes and peer feedback)

Students keep class notes using the online program, Google Drive. A Cornell Notes template is provided to the class for in class note taking. These notes are used to keep information about a given software, class lectures, or research they have completed. Information gained from Sustained Silent Reading materials is gathered in Google Drive. Group work is also developed and shared using Google Drive. These notes are shared with the teacher for review and editing. The outcome of this activity is for students to learn how technology tools can be used for productive study habits and a collaborative form of communication.

ThingLink and Prezi Activities (Units 1, 4, 9, 10, and 11)

Students use the website, ThingLink.com, as a research and information-sharing tool throughout the year on several units. Students conduct research individually and with design teams, create slide shows, short video clips, and upload original artwork to teach the class and others about aesthetic theory, the history of sculpture, technology, and their own artwork. These activities act as the primary means to share visual and information research. The outcome of these assignments is to develop interactive presentation skills that go beyond a simple PowerPoint presentation. Links to the presentations are posted on a class website.

Oral presentations (Units 3, 6, 7, 9, 10, and 11)

A central feature of college and career readiness is the ability for student to communicate orally. Students

present preliminary sketches, process work and final projects to the teacher, to each other's, and to industry professionals. Students present in both formal and informal ways to large and small groups including: sharing sketchbooks, concept sketches, historical research, and career investigations. The outcome of these tasks is to help students become comfortable in front of others, receive criticism from others, develop brainstorming strategies, and develop organizational strategies for successful communication.

Peer critiques and peer evaluations (all units involve a peer feedback activity) Students learn to objectively critique the work of others using several strategies from the book, *Art Critiques: A Guide*, by James Elkins. These critiques happen at the beginning of a unit, during the progress and end of the unit of study. The outcome of the process and final critiques is for students to develop critical thinking skills necessary for successful employment in the design industry.

Cooperative learning and team organization (Unit 3, 9, and 10)

Students learn the social skills necessary to work effectively with others to produce a product or achieve a common goal. Students produce Gantt workflow charts, create documents shared via Google Drive, define Project Pipeline roles, and develop respectful behaviors.

Unit 1: 3D Totems- An Introduction to the Elements of Art and Principles of Design

ThingLink Activity

The students analyze the works, write descriptions about how the artworks are used as functional, ceremonial, and/or decorative purposes. As a class, the students use *ThingLink.com* to build an interactive, online research "library" of totems found in various cultures throughout the world. Students then explore and analyze the contemporary exhibition called "Tall Tales: A Modern Totem Pole", (<http://design.sva.edu/talltales>). Students write a 4 paragraph essay (using the Feldman Approach) about how the Elements of Art and Principles of Design are found in the works of art (<http://artistclassroom.weebly.com/feldman-approach.html>). The written research is included on a ThingLink.

Sketchbook Activity

Students draw 2"x2" sketches that represent the elements and principles we discussed in class. Pencil, ink, and Copic markers are introduced as various drawing media used in the design industry. These sketches are then used as inspiration for a 3-dimensional model. The drawn images are cut out and arranged as a "stacked" image. Students combine elements and principles to build an interesting composition. A final sketch is made and present to the class in small groups.

Digital Tutorial

Students complete a 2 hour introductory tutorial with the teacher introducing them to the software, Cinema 4D. The focus of the tutorial is developing students' abilities to sculpt geometric forms, combining simple forms to create complex forms, and deforming simple forms by bending, twisting, and melting.

Digital Sculptural Activity

Students build the "stacked" model they sketched and presented. Cinema 4D is used as the modeling software. The sculptures are printed using a 3d printer.

ThingLink Exhibition

Students prepare a process portfolio of their process sketches, digital models and photographs of their final 3d printed sculptures for an online exhibition of their work. The students title their works of art and add the process portfolio to the ThingLink they created at the beginning of the unit.

Silent Sustained Reading Resources

<http://design.sva.edu/talltales> (SSR reading and visual research on contemporary totems).

<http://artistclassroom.weebly.com/feldman-approach.html> (used as a reference for writing about art).

Alley, Tony. *Exploring 3D Modeling with Cinema 4D R9*. Clifton Park, NY: Delmar Learning, 2006. (pgs. 7-

42 introduces basic modeling tools and interface of Cinema 4D).

Unit Outcomes

This first unit is designed to introduce the students to basic visual arts vocabulary, the research methods used in the course, methods of writing about artwork, and the technical terminology and tools needed to make digital 3D works of art.

Unit Two: Blobatar Unit

Visual Investigation

Students analyze familiar characters from movies and those from the early 20th century analyzing, breaking down the basic shapes found in these works. Artwork discussed includes: Otto Messmer's *Felix the Cat*, Walt Disney Studios, UPA, Studio Ghibli, and Pixar. Stop motion animations like; *Wallace and Gromit* and *The Nightmare Before Christmas*, will also be discussed. They discuss how the important developments of early animation studies have impacted work made today. The students read excerpts from the book, *Creating Characters with Personality* by Tom Bancroft, and analyze how the shapes used in a design reflect the personality qualities in a cartoon character.

Clay Experiments

Students prototype 3-dimensional "sketches" in wet clay making "blob-like" objects that embody 5 personality characteristics; jolly, grumpy, playful, obedient, disobedient. This 2 day prototyping activity is meant to get them thinking about how to apply shape symbolism.

Sketchbook Activities

Students draw 10 thumbnail sketches of a "Blobatar", or blob-shaped avatar. The students utilize shape symbolism to represent a mood. Students present their thumbnail sketches in small groups, select a final image, draw an orthographic drawing (front, side, back) view of the sculpture. Students complete sketchbook assignments that focus on color theory (primary, secondary, tertiary, analogous, complementary) and how to apply the psychology of color to create a mood in a piece.

Digital Tutorials

The teacher leads a 1-day tutorial on painting in Adobe Photoshop, a 1-day tutorial activity that demonstrates how to sculpt organic shapes using Cinema 4D (the metaballs tool and deformers are used to create the forms), and a 1-day tutorial on how to create materials and textures in Cinema 4D.

Digital Drawing

Students scan their sketches and paint the final drawings of their character. Students paint three different versions of the character using various color schemes to determine what color schemes elicit their intended mood. They create a character sheet that includes and, orthographic view of the sculpture, a character synopsis, and title.

Digital Sculpting Activity

Students sculpt the Blobatar characters using Cinema 4D. The characters are printed using a 3D printer. The students display their completed drawings and 3D prints.

Silent Sustained Readings and Resources

- Bancroft, Thomas. *Creating Characters with Personality*. Watson-Guption Publications. 2006.
- Hallgrímsson, Bjarki. *Prototyping and Model making for Product Design (Portfolio skills)*. Laurence King Publishing. 2012.
- Hatch, Mark. *The Maker Movement Manifesto: Rules for Innovation in the New World of Crafters, Hackers, and Tinkerers*. McGraw-Hill. 2013
- Roselien, Steur. *Sketching: The Basics*. BIS Publishers. 2011.
- Wilkinson, Karen. *The Art of Tinkering*. Weldon Owen Publications. 2013

Unit Outcomes

The outcomes of this introductory lesson are to develop the artistic perception skills needed to create expressive works of artwork, to make connections between the basic elements of art to complex digital sculpting, and develop a foundational knowledge of how the industry prototypes ideas and develops them

into final designs.

Unit Three: The Production Pipeline - Character Development, Design, and Modeling

Stages of Production Process

The teacher presents the stages of the Production Process, or the Project Pipeline: pre-production, production, and post-production will be discussed. Students take Cornell notes on Google Drive about the stages of the Project Pipeline.

Career and Artist Investigation

Students research the career options in each of the production stages in the Project Pipeline. Pre-production artist include Art Director, Concept Artist, Character Designers, Environment Designer, Storyboard Artist, and Layout Supervisor. Production artist include, Modeling Supervisor, Shade/Texturing Supervisor, Texture Artist, Rigging Supervisor, Lighting supervisor, and Shot Technical Director. Post-Production artists include Compositing supervisor, Editing Assistant, Music Score TD, Marketing TC, and Technical Assistant. Student search for job listing in each of the areas and write report on the salary range, training/school requirements, and experience. Students research, complete an artist profile investigation worksheet about one artist from each of the stages of the Project Pipeline. Students discuss two pieces of artwork created by the artist they researched. The discussion focuses on how the career aspects of the artist, as well as how the use of media 3D computer technology impacts the work.

Sketchbook Activities

Students write a character synopsis for the individual characters they will be animating. Students present the character synopsis to their design team and make revisions. Students create 10 draft sketches of their character using different shape symbolism techniques. We discuss copyright issues related to original designs. The class critiques and finalizes their character design and final orthographic view of the character designs will be drawn. A color scheme is selected for the characters complexion, hair, and clothing.

Clay Prototyping

Students prototype 3-dimensional “sketches” in wet clay. This weeklong prototyping activity is meant to help the student visualize their 2-dimensional drawings in 3d space before moving on to digital modeling.

Digital Tutorial Activity

Students participate in a 2 day digital tutorial about zSphere in zBrush. This tutorial prepare the students to model the character they have designed.

The Project Pipeline:

Students practice the stages of the Project Pipeline to develop a their characters. Students scan the final sketches and create a character turn around drawing (orthographic drawings) in Photoshop. Create a character color palette, build their character in zBrush, digitally paint the sculptures, and create a character poster. The character poster includes the character synopsis and name. A 3D print of the design is made for display.

Character Portfolio:

Students assemble the various works of art they created into a portfolio for exhibition. The portfolio includes products from each of the production phases the student embodied throughout the project, their career investigations, and reflection statement.

Silent Sustained Readings and Resources

The Big book of Character Design: A Compilation of Contemporary Character Culture. 2012.

Keller, Eric. *Introducing ZBrush 4.* INpolis, IN: Wiley, 2011. (pgs. 19-54 introduces the zBrush interface, 148-180 introduces zSpheres and zSketching for the human figure).

Osipa, Jason. *Stop Staring: Facial Modeling and Animation Done Right.* Indianapolis, IN: Wiley/Sybex, 2007.

Storying Board Development <http://www.floobynooby.com/IPUB/comp1.html>

Sculpture with John Brown: Vol 1. The Character Armature. Prod. John Brown. The Gnomon Workshop, 2007. DVD. (Demonstrates how to set up the armature for a figure sculpture).

Sculpture with John Brown: Vol 2. Character Maquettes. Prod. John Brown. The Gnomon Workshop, 2007. DVD.(Demonstrates how to set up proportions and details on the figure for an accurate sculpt of the human figure).

www.lynda.com (Video tutorials about zBrush tools and techniques)

Unit Outcomes

The outcomes from Unit 3 are for students to identify several careers in the visual art's that use 3D modeling, develop a broad understanding of the processes used by the design industry, apply this knowledge of the Project Pipeline in the creating of an original work of art, and display the works in public.

Unit Four: Sculpting the Human Figure

Visual Investigation

Students compare and contrast the 3D artist Scott Eaton, a master zBrush artist who makes 3D figurative models in the style of Greek sculpture, with images of the human figure in Egyptian, Greek, Roman and Renaissance antiquities. We will also analyze the artists, Marc Quinn, Sophie Robinson, and Paul and Laura Carey focusing on how technology has influenced the ways artists represent the human figure throughout time. Students complete a historical research investigation worksheet to help them build an awareness of the development of sculpture over time.

ThingLink Art and Technology Throughout Time

Students create a world map in ThingLink that maps the historical developments of how technology has influenced the way the human figure has been represented. Each student is provided a "mystery" artwork they must research. Their research presentations will be added to the ThingLink map that already includes Scott Eaton, March Quinn, Robinson and the Carey's. Using the research presented by other classmates, students write a 4 paragraph response to the question, "How has technology shaped the ways the human figure has been portrayed over time?"

Figure Studies and Sketchbook Activities

Students spend 10 days in class studying the human figure and bone structures by drawing from life. A live model will be used for figure drawing and skeleton used to draw the bone structures with emphasis placed on accurate proportions. Sketchbook activities focus on drawing the proportions of the human face, hands and feet. Students create a portfolio of 15 human figure/body studies drawn in a wide variety of materials. Two of these studies will be drawings of the human skull. These drawings inform them on the 3D models they create in the zBrush.

Digital Tutorials

Students model in zBrush their figures then learn how to create "bones", or character rig, in a model so they can pose the figure. Students will also complete a 2-day tutorial on how to digitally paint materials onto the surface of a sculpture to mimic traditional sculpting materials like marble, clay, bronze with patina.

Digital Sculpting Activity

Students will select 1 or more of their figure drawings to create a sculpture using zBrush. They may select a full figure, skeleton, or a portion of the figure like a skull. The sculptures are later placed into a virtual museum made in Unit 11. Large format (16" X 20") 2-dimensional posters will be printed and displayed.

Silent Sustained Readings and Resources

Kingslien, Ryan. *ZBrush Studio Projects: Realistic Game Characters*. Indianapolis, IN: Wiley Pub., 2011.

Robson, Wayne. *Essential ZBrush*. Plano, TX: Wordware Pub., 2008. (pgs. 281-290 introduces UV mapping and 227-240 introduces Polypainting in zBrush).

Scherer, Manuel. *ZBrush 4 Sculpting for Games: Beginner's Guide : Sculpt Machines, Environments, and Creatures for Your 5 Game Development Projects*. Birmingham, [UK: Packt Pub., 2011. (pgs 175-208 introduces polygroups when sculpting the human figure).

Spencer, Scott, Eric Keller, and Paul Gaboury. *ZBrush Digital Sculpting Human Anatomy*. Indianapolis, IN: Wiley Pub., 2010. (pgs 33-78 introduces how to sculpt the human skull and facial features).

Spencer, Scott. *ZBrush Character Creation: Advanced Digital Sculpting*. Indianapolis: Wiley, 2011. (pgs 225-250 introduces the transpose and retopology tools used to pose the human figure).

www.greyscalegorilla.com (Video tutorials used to teach zBrush tools).

www.lynda.com (Video tutorials used to teach zBrush tools).

Unit Outcomes

The outcomes of this project are for student to understand the relationship between technological development and art making, explore the human figure through time and cultures, introduce character rigging in zBrush, and practice digital painting skills to mimic traditional sculpture materials.

Unit Five: The Human Figure in Motion - Walkcycle

Visual Research

Students are introduced to the early forms of animation including the Egyptian tomb of Khnumhoptep and Niankhkhnum, the Thaumatrope, Zoetrope and Kineograph (flipbook). Students also study the 12 Principles of Animation and how they relate to the human figure in motion.

Sketchbook and Simple Hands-on Activities

Students practice drawing an 8-frame walkcycle of a simple figure in their sketchbook. The figure must include a bounce, shuffle, or swagger. Then, the students build a Kineograph of their walkcycle. They also build a simple Thaumatrope using cardboard, string, and 2 drawings made in the sketchbook of a person and second object. Student use a contact sheet of photographs of the human figure in motion as reference to draw a series of figures in action. They also analyze the human figure in motion by drawing the human figure from life, producing a portfolio of figure drawings.

Photography Investigation

Students are introduced to the work of Eadweard Muybridge and early stop frame animation in films like *King Kong*, *Jason and the Argonauts*, and *The Making of ParaNorman*. They produce a series of 60 reference photos using high speed photography that used as reference for a 15 second animation in Cinema 4D. A Photoshop contact sheet is made of all their images to see the movement of the figure. The photos will aid the students in keyframing a rigged character.

Ideas in Writing

Students discuss the evolution of stop frame animation with the inclusion of 3d modeling. They analyze and write about how 3D printing technology was used in the movie, *ParaNorman*. Students reflect on how it was used to create the models and how it improved the expressive qualities of the animation.

Digital Tutorials

Students complete a 5-day teacher-led tutorial on creating a digital “bone-structure”, or character rig, for a mannequin. Students complete a 5-day tutorial on keyframing an animated character in Cinema 4D.

These tutorials give the students the skills need to animate their characters completed in Unit 3.

Digital Animation Activity

Project 1: Student use the character rig to keyframe a mannequin based on their series of reference photographs. Project 2: Students use the skills they learned animating the mannequin to create a walk cycle for the characters they developed in Unit 3. The characters must walk, jump, and then pose. A 15 seconds animation will be made for their digital reel in Unit 12.

Silent Sustained Readings and Resources

Hart, John. *The Art of the Storyboard: A Filmmaker's Introduction 2nd ed*. Focal Press. 2008.(pgs 37-69 SSR reading about the development, usage, and components to the Storyboard).

McQuilkin, Kent, and Anne Powers. *Cinema 4D: The Artist's Project Sourcebook*. Waltham, MA: Focal, 2011. (pgs 183-196 introduces animation basics in Cinema 4D).

Unit Outcomes

The outcomes of this project is for students to understand the historical developments of animation and 3d

modeling. The technical skills for rigging a character, and how to keyframe an animation.

Unit Six: Virtual Kinetic Sculpture

Research Activities

Students analyze kinetic sculpture made by historic figures like Vladimir Tatlin, Alexander Calder and Jean Tinguely, and contemporary artists like Li Mee Young, Theo Jansen, Paul Grundbacher, and David C. Roy. They examine public installations about the environment like: *Field* by Richard Box, the work of Janet Echelman, Gabriel Dawe, and Ron Arad's *Curtain Call*. Special attention will be paid to those works that address technology and the environment. Emphasis, balance, repetition, and proportion are central concepts discussed when analyzing the kinetic sculpture. Students review the algebraic formulas behind some of Calder's work, and research how other artists use math to create kinetic sculptures. The students then select a location in town or on campus they would like to place a kinetic sculpture.

Tinker activity.

Drawing Tutorial

The teacher demonstrates to the class how to draw using 1, 2 and 3-point perspective. Students complete several drawing exercises practicing these techniques.

Sketchbook Activities

Project 1: Students will practice using the Law of Levers to design a mobile as practice. Project 2: Students draw thumbnail sketches of 3 different proposed kinetic sculptures. Student use 2 or 3-point perspective to illustrate their ideas. They propose them in small groups and complete a final drawing of their sculpture.

Digital Tutorials

Students complete a 1-day teacher-led tutorial on basic lighting, camera viewers, and overlaying a location photograph into the background of their environment. This tutorial builds on what the students learned in Unit 5. 1 class period is spent introducing MoGraphs, a Cinema 4D plugin that aids in simulating motion and rotation. Some students may elect to use MoGraphs to simulate motion.

Photo Investigation

The students will tour the city exploring the wide range of public artwork on display. The students visit their proposed site, take reference photos, measurements, and begin to discuss how a piece of artwork might engage the space.

Brainstorming Activity and Written Proposal

Students are divided into the design teams. Working together, they brainstorm ideas to the prompt, "What is technology's relationship to the environment?" The students spend 2 class period participating in several brainstorming activities that get to think about an artistic design solution. Student write proposal of their kinetic sculpture and shared with the final 3D model of the sculpture.

Digital Sculpting Activity

Students in groups of 3 or 4 build a 3d model of a kinetic sculpture in Cinema 4D that include animation, basic lighting of the model, moving cameras, and location photographs in the background. Students employ the Principles of Animation to animate their 3D models in Cinema 4D. Several 2-dimensional images are printed for exhibition.

Presentation

Students create a fly-through animation, several large-format color prints of their sculpture and practice presenting to other groups. Then, students present their teams' ideas to a group of professionals that evaluate their project and presentation.

Silent Sustained Readings and Resources

Alley, Tony. *Exploring 3D Modeling with Cinema 4D R9*. Clifton Park, NY: Delmar Learning, 2006. (pgs 107-139 introduces basic spline modeling in Cinema 4D).

Koenigsmarck, Arndt Von. *Cinema 4D 11 Workshop*. Amsterdam: Focal, 2008. (introduces more

advanced animation techniques).

McQuilkin, Kent, and Anne Powers. *Cinema 4D: The Artist's Project Sourcebook*. Waltham, MA: Focal, 2011. (pgs 50-57 and 358-369 introduces MoGraphs for animation).

Tickoo, Sham. *Maxon Cinema 4D R14 Studio: A Tutorial Approach*. CADCIM Technologies. 2013. (chpt. 8 introduces advance animation and keyframing tools in Cinema 4D).

Learning Cinema 4D Special Effects Techniques - Training DVD. Infiniteskills. 2012. (Video tutorials used to teach animation in Cinema 4D).

www.greyscalegorilla.com (Video tutorials used to teach animation tools in Cinema 4D).

Unit Outcomes

The outcomes of this project is for students to utilize drawing skills to propose a public work of art to a group of professionals in the area. Students understand the importance of polished presentation and communication skills, and the importance of high quality visual aids.

Unit Seven: Toy Design and Product Design Unit

Research

Students watch the movie, *Toys Are Us: A Revolution in Plastic*, and several movie clips that focus on toy design found on the www.thefuturechannel.com. Students complete a movie notes worksheet in Google Drive to take notes during the movie and the class discusses how the artists in the video have used the toy as a platform for meaning or individual message. A guest artist/parent toy designer, Jorge Soto, will join us for the discuss. He will share his experience as a designer and discuss the process he goes through in the development of this product line. Discussion questions will include topics about the future of 3D modeling in the toy design industry. Student explore several toys from the past 40 years, including modern day toys. Students will watch the tutorial on SkillShare called, "*Beautiful Plastic: Creating a Great Designer Toy*," by Paul Budnitz. The class will discuss how the mechanics of the toys have changed over time due to computer graphic technologies and how 3d printing technology has made it possible for home designers to produce work.

Tinkering Challenge

Students tinker with a wide variety of toys that have different assemblages. They will deconstruct the toys to investigate how they are built, move, roll, and assemble. They photograph the components and construct a digital "Tinkerboard" in Google Drive that includes their photos and annotations about the toys' construction.

Sketchbook Activities

Students sketch orthographic drawings of joints used in several found toys to inform them about moving structures. They also sketch orthographic views of 3 different toy designs they will make in Cinema 4D. Sketches will share in small group, critiqued and finalized.

Digital Orthographic Illustration

Students use Adobe Illustrator to create a final orthographic view of their toy design. Several color palettes will be selected for their toy.

Digital Sculpting Collaboration Activity

Students will then begin work in the pre-production phase of product development. Teams of students will embody the roles of the pre-production phase while designing a toy robot with movable parts. Packaging will be designed for the toy and a poster with original 3D font will be made. The designs will be presented to the class for feedback.

Presentation

Student then share out their final projects to the class. Groups evaluate the toys using the class rubric. Focused conversation will be on how the groups have employed the principles of design, created a

functioning toy, and the group process.

Silent Sustained Readings and Resources

Henry, Kevin. *Drawing for Product Designer/Portfolio Skills Product Design*. 2012. (pgs 10-23 reading introduces the student sketching for the industrial design field).

Hudson, Jennifer. *Process: 50 Product Designs from Concept to Manufacture*. London: Laurence King Pub., 2011. (Students use this book as a visual reference for ideas).

Robertson, Scott. *How to Draw: Drawing and Sketching Objects and Environments from your Imagination*. 2013. (Students use this book as a visual reference for ideas)

Parada, Andres. *Product Sketches: From Rough to Refined*. 2013. (Students use this book as a visual reference for ideas).

Steur, Roselien. *Sketching: The Basics*. 2011. (pgs 112-146 introduces drawing techniques for adding color to product drawings).

Unit Outcomes

The outcomes of this project is for students to experience working with others to get their designs built.

Unit Eight: Industrial Design-Functional Forms inspired by Forms in Nature

Research

Students research and practice using the Design Thinking Process (Empathy, Define, Ideate, Prototype, Test). The students read several articles about Design Thinking to inform them of the process. They identify a product, process, service, or industry they believe needs improvement and begin to use Design Thinking strategies to solve the problem. The challenge is for students to identify a solution inspired by objects found in nature. The students work closely with a design professional during the ideation process to develop solutions.

Field trip

Students visit the Exploratorium's Tinkering Studio to participate in a workshop. This experience helps students experience prototyping.

Sketchbook and Prototyping Activities

Students will spend 5 days sketching ideas about an identified needs and building prototypes of their ideas using miscellaneous materials. This process helps the student visualize proportions and forms in 3-dimensions before moving on to modeling. Students share their prototypes in small groups.

Digital Orthographic Illustration

Students create final orthographic and ¾ view illustrations of their design solution in Adobe Illustrator.

Digital Sculpting Activity

Students will take their final prototype and model it using Cinema 4D. The prototypes will be printed using a 3d printer. Advanced modeling tools will be used to form complex forms.

Presentation

Student will present their process images, prototypes, and final projects in a public exhibition. A panel of judges evaluate the product using the class rubric. Focused conversations address how the groups have employed the principles of design, created a functioning toy, and the group process.

Silent Sustained Readings and Resources

Curedale, Rob. *Design Thinking: Process and Methods Manual*. Design Community College Inc. 2013.

Ehrenberg, Rachel. "The 3D Printing Revolution: Dreams Made Real, One Layer at a Time." *Science*

- News. 2013: 20-25. Print. (article given as an SSR reading and class discusses creative use of the 3D printer in wide range of fields)
- Greenberg, Saul, and Marquardt, Nicolai. *Sketching User Experiences: The Workbook*. Morgan Kaufmann. 2011. (SSR reading pgs 1-6 discusses the creative process when sketching, 23-43 introduces how to sample images from the natural world to design products).
- Hallgrímsson, Bjarki. *Prototyping and Model making for Product Design (Portfolio skills)*. Laurence King Publishing. 2012. (SSR reading pg. 20-17 introduces how prototypes are used in product design, pgs 79-177 used as a materials reference for prototyping and building techniques).
- Hatch, Mark. *The Maker Movement Manifesto: Rules for Innovation in the New World of Crafters, Hackers, and Tinkerers*. McGraw-Hill. 2013. (SSR reading pg. 11-23 discusses the importance of making in the human experience).
- Henry, Kevin. *Drawing for Product Designer/Portfolio Skills Product Design*. 2012. (sketchbook drawing tutorials pgs 110-116).
- Hudson, Jennifer. *Process: 50 Product Designs from Concept to Manufacture*. London: Laurence King Pub., 2011. (Students use this book as a visual reference for ideas).
- Martin, Bella. *Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. Rockport Publisher. 2012. (Students use this book as a visual reference for ideas).
- Robertson, Scott. *How to Draw: Drawing and Sketching Objects and Environments from your Imagination*. Design Studio Press. 2013. (sketchbook tutorials pgs 30-42 for perspective drawing, pgs 72-74 for drawing ellipses, and pgs 82-96 for drawing complex volumes).
- Roselien, Steur. *Sketching: The Basics*. BIS Publishers. 2011. (sketchbook tutorials pgs 172-178 for drawing product details to prepare for final display).
- Wilkinson, Karen. *The Art of Tinkering*. Weldon Owen Publications. 2013. (SSR reading to introduce the Exploratorium and the importance of tinkering before the students visit the museum pgs 10-22).
- www.ds.school.stanford.edu (The concepts of Design Thinking are explored on this website).

Unit Outcomes

Students understand how to use the Design Thinking processes to design a product for consumer use. They will develop communication skills while working with professionals in the industrial design, furniture and vehicle design, and jewelry design.

Unit Nine: Cabinet of Curiosity Unit - A Contemporary Collection - 1st semester exam

Visual Investigation and ThinkLink

Students explore the history of collecting objects by researching the history of the Wunderkammer, or Cabinet of Curiosity. Divided into teams, student teams discover and present information about this topic. Research teams investigate the Ferrante Imperato's Dell'Historia Naturale-1599, Ole Worm's Olaus Wormius-1600's, Ferrante Imperato's Dell'istoria naturale-1672, Joseph Bonnier de la Mosson-1700's, Box in a Suitcase by Duchamp-1935, the Malplaquet House 1742-present, the animal grottoes by Niccolò Pericoli-1550 and the Temple of Leda's Treasure, and the home of Jacques Garcia. Students collect images and information about these places and create a ThinkLink about the Wunderkammer.

Tinker Challenge - To illustrate their understanding of a Wunderkammer, students create a collection of collages of strange objects. Their cabinet might focus on a particular subject or be constructed out of random cultural artifacts left in world today. The collages are displayed and shared with the class.

Sketchbook Activities

Students develop a collection of ideas for objects they might contribute to a class Wunderkammer.

Students collage to create hybrid creatures, use printed images from the Internet to gain inspiration, sketch objects, and annotate their artwork.

Digital Tutorials

The teacher will lead a digital tutorial on materials, textures, and advanced modeling for objects like feathers and fur. Only student needing these materials to build their objects participate in these tutorials.

Digital Sculpting Activity

Students complete a 3-dimensional model of 2 objects using complex modeling techniques in Cinema 4D or zBrush. The focus of the models is creating objects (curating objects) that tell the viewers something about the world we live in today.

ThingLink Art and The History of the Museum

The students builds a ThingLink with information about the history of the Cabinet of Curiosity and include their own objects for the class Cabinet. Each group contributes their historical investigations and every student contribute 2 original objects.

Silent Sustained Readings and Resources

<http://www.theguardian.com/artanddesign/2014/jan/13/cabinet-curiosities-taxidermy-retro-museums>.

(website used to research the history of the Cabinet of Curiosity).

<http://www.moma.org/interactives/exhibitions/2008/wunderkammer/> (website used to research the history of the Cabinet of Curiosity).

Davenne, Christine. *Cabinet of Curiosity*. Abrams Publishing. 2011. (SSR reading pg. 6-10 to introduce the concepts of the Cabinet of Curiosity. Images from the book used as a visual reference for students to gain ideas).

Unit Outcomes

The outcomes of this unit is for students to gain an understanding of how we came to collect objects in museums and how the Cabinet of Curiosity is used as a means of expression.

Unit Ten: Virtual Museum Project

Visual Investigation

The teacher leads an activity that introduces students to the 4 aesthetic theories; Imitationalism, Instrumentalism, Emotionalism, and Formalism. They take notes on Google Drive. Students draw a large blueprint of a museum with 4 galleries and sort a variety of images of artworks into the galleries. Images include traditional and digital artworks from a wide variety of cultures. They name the museum and each individual gallery. Students research various artworks made using 3D modeling software. Building on what they have learned throughout the year, the students will work in design teams to create a virtual museum of artworks curated into a 4 distinctive galleries that represent the aesthetic theories. Each student will curate their research, include their own work made this year, and create a new work for one of the galleries in the museum.

Digital Tutorials

The teacher demonstrates how to use bump maps for textures and advanced lighting techniques.

Sketchbook Activity

Students complete a 2-point perspective drawing of their museum galleries.

Digital Sculpting Activity

While in design teams, students create a 4 gallery museum. Each gallery represents one of the aesthetic theories discussed in class. The students create a piece of artwork for their museum that can be critiqued using one of the aesthetic theories discussed in class. The artwork may be in-the-round or a relief piece that hangs on a wall.

Writing Activity

Students write a 4 paragraph curatorial statement for their gallery that defines how the works in the gallery represent the aesthetic theory.

Silent Sustained Readings and Resources

Van Wulfen, Gijs. *The Innovation Expedition: A Visual Toolkit to Start Innovation*. BIS Publishing. 2013. (SSR reading pgs 104-110 discusses the power of observation as an innovation tool).

Unit Outcomes

The outcomes of this unit are students will develop a broad understanding of how approach a wide range of artworks with aesthetic questioning strategies (Imitationalism, Instrumentalism, Emotionalism, and Formalism). They use research methods and discussion strategies to reflect on works of art.

Unit Eleven: Surrealistic Illustration, Animation, and the 3D scanner

Lecture

The teacher discusses the Surrealist movement and how these artist used visual metaphors to express the social consciousness of the day. We explore the work of contemporary 3d artist that make surrealistic artwork (<http://www.cgtrader.com/blog/when-reality-fades-away-surrealism-invades-3d-art>). Students respond with discussion and questions. Students then read portions of the Surrealist Manifesto. The class discusses how the manifesto and the artwork are cohesive.

Sketchbook Activities

Student sketch preliminary ideas of visual metaphors that include a self-portrait. They share their sketches in small group, critique, and make final changes to a final sketch. Color pencils are used to develop a color scheme for the illustrations.

Digital Tutorials

Students participate in a 1-day tutorial learning how to use the digital 3d scanner and the 2d scanners. Students are required to include a 3d and 2d scan in their illustration. Later in the unit, the teacher directs a 2-day tutorial on lighting and environment effects tools to demonstrate how to create mood with dramatic lighting effects. Students use these techniques in their final surrealistic illustrations.

Digital Sculpting Activity

Student scan their heads and other items using the 3d and 2d scanners. These scans are used in the making of a surrealistic illustration. Students use the skills they've learned in the previous units to create a "master work." The illustration should demonstrate the broad range of technical skills and a person voice or direction. Student use may use a combination of Cinema 4d, zBrush, Photoshop techniques to create the surrealistic visual metaphor.

Silent Sustained Readings and Resources

Sondermann, Horst. *Light Shadow Space: Architectural Rendering with Cinema 4d*. Vienne:

Springer, 2008.(pg. 50-62, 62-70, 130-140, introduce students to complex lighting in Cinema 4D).

<http://www.cgtrader.com/blog/when-reality-fades-away-surrealism-invades-3d-art> (website used to research the history of the Surrealist movement and it's descendants).

http://www.ubu.com/papers/breton_surrealism_manifesto.html (website used to research the history of the Surrealist movement).

https://www.moma.org/learn/moma_learning/themes/surrealism/surrealist-landscapes (website used to research the history of the Surrealist movement).

Unit Outcomes

The outcomes for this project is for student to demonstrate a personal voice in a visual metaphor. Students demonstrate their advanced 3d sculpting skills, as well as their digital painting and lighting skills.

Unit Twelve: The Reel

Visual Investigation

Students review several professional and student portfolios, demo reels, and artist websites to gain an awareness of the ways artists promote their artwork.

Sketchbook Activities

Students complete a storyboard outlining the order of their reel. Students include standard editorial comments and graphic transitions to visualize how they will communicate in the reel. Storyboards are shared in small group, music discussed, and edited.

Digital Tutorials

The students complete a 1-day tutorial on digital editing using iMovie to assemble the reel with music, transitions, and title page. The teacher reviews www.weebly.com and discusses the components of a successful artist website.

The Reel

Students create an iMovie highlighting their short animations, sketches, digital illustrations, and modeling skills. The reel should demonstrate their use of the 12 Principles of Animation and a broad understanding of drawing techniques used in animation. The reel must contain a title sequence and be set to music that best matches their animation style. Students export the reel as a Quicktime movie and posted on the class website and a student portfolio website.

Webpage Design

Students create an artist's website using www.weebly.com. They include the work they've made this year, resume, artist statement, writing they've completed in the class, and other information they believe best highlights their artwork.

Silent Sustained Readings and Resources

<http://www.floobynooby.com/IPUB/comp1.html> (used as a visual guide to making storyboards).

Unit Outcomes

Students gain the skills and experiences of self-promotion using professional means of sharing their artwork.

Instructional Methods and/or Strategies: *Indicate how the Instructional Methods and/or Strategies support the delivery of the curriculum. What portions of the Course Outline are supported by the methods and strategies?*

The following list of Instructional Methods are designed to give the student a broad range of experiences that meet the Visual Art Standards and provide the college and career readiness experiences outlined by the Career Technical Education Standards. The methods balance the rigorous investigation into the artistic, creative, historical and aesthetic awareness of the visual arts and provide authentic challenges the student might experience in the fields of animation, illustration, character modeling, design for video games, motion graphics, industrial design, and architecture.

- 1. Cornell note taking strategies for class discussions and lecture:** A Cornell Notes Template is provided to the students at the beginning of the year in the Google Drive. Students use the template to take notes about the design process, technical information, take notes from video presentations and lectures. These notes are used to study and as a reference for software questions.
- 2. Direct instruction:** The teacher works 1-on-1 with students as they solve design problems.
- 3. Guided practice using teacher lead digital and traditional art making tutorials:** The teacher uses a projector and document camera to teach drawing techniques, share student work and teach technical skills related to the software. In the drawing studio, the teacher demonstrates to the students how to complete
- 4. Collaborative group work:** Several assignments ask students to solve design challenges in teams. The teams develop workflow charts, assign responsibilities or jobs, critique each other's work and present in groups. The 3D Modeling students collaborate with engineering students to develop 3d printed models of their artwork.
- 5. Small group demonstrations/instruction:** The teacher will often demonstrate techniques to small groups to determine their ability to retain the techniques.
- 6. Investigative/inquiry activities:** Students are challenged with research components to the Design Challenges. Their activities are designed to build the students' awareness of content prior to solving a challenge. This is completed both individually and in groups throughout the year.
- 7. Authentic Experiential learning:** Student learn the product process and then embody these roles in several authentic design challenges. Student learn the value in
- 8. Independent study:** Students develop their own solutions to design challenges. They also develop reels or portfolio of works for summative assessments.
- 9. Collaborative team teaching:** The 3D Modeling and Engineering teachers collaborate on the Toy Design Unit. Teachers collaborate on the launch of the project, critique the works of each group throughout the unit, and evaluate the final products.
- 10. Internet Research:** Students conduct research for a wide variety of project.. Image research and information research is gathered and present in a variety of ways.
- 11. Guest Speakers:** Toy designers, industrial designers, and animators visit classes when available and appropriate. Alumni of the course who are studying 3D Modeling, animation, or industrial design visit the course to discuss their programs of study. College representatives visit the class to discuss careers in the field of 3D modeling.
- 13. Self and peer critiques:** Students critique their work and the work of others to improve their work. Several critiquing strategies are used to develop the students technical, communication, and artistic skills.

Assessments Including Methods and/or Tools: *Indicate the intent of each assessment and a brief description of how each relates to the Course Purpose and goals related to the development of critical thinking and other habits of mind skills.*

The following is a list of formative and summative assessments for each unit of the course. The assessments evaluate a range of skills including: the students aesthetic awareness, creative expression of a particular design challenge, the students' technical abilities in traditional and digital media, the student's knowledge of history and cultural influence, and the students' ability to communicate visually and orally. Assignments listed in the Unit descriptions should be considered formative assessments. The following is a general list of assessment methods followed by a detailed explanation of individual units. The College and Career Readiness Anchor Standards have also been listed.

Evaluation breakdown: Design Challenges and presentations 65%, Test and Quizzes 10%, Weekly Sketchbook Assignments 25%

- 1. In-class Tinker Challenges:** The intent of the Tinker Challenge is for students to develop technical knowledge, artist skill, and brainstorming skills needed to begin a larger design project. Habits of Mind: The Tinker Challenges provide an opportunity for students to "chew" on complex ideas before they apply them to final designs.
- 2. Weekly Sketchbook Assignments:** Weekly assignment are given to develop drawing and observation skills, as well as a means for students to collect research. The teacher shares example of successfully completed assignments and uses a Sketchbook Rubric to assess their products. Habits of Mind: Weekly Sketchbook Assignments develop the habit of drawing regularly and allow students to practice technical drawing skills.
- 3. Written composition, reports, and reflections:** Students experience a wide range of written assessments that ask them to reflect, explain, develop ideas, and communicate to others. A Common Core Writing Rubric is provided for each assignment prior to the task. Habits of Mind: Writing about art, techniques, aesthetic theory, and careers in the arts helps student verbalize conceptual ideas and to improve communication to others.
- 4. Partner and individual quizzes:** The teacher assigns quizzes to individual students and to teams of students. These quizzes are designed to test the students technical skills/awareness, as well as, their aesthetic and historical knowledge of the visual arts. Habits of Mind: Partner quizzes build partnerships with others in the classroom, a valuable skill in the art field, while individual quizzes help build personal responsibility.
- 5. Design Challenge critiques:** Student participate in individual, large group, and small group critiques. Progress critiques aid the student in addressing artistic and technical skills, while summative critiques help student is presentation skills. Habits of Mind: Design Critiques help students share and listen to critical questions and feedback. It offers students an opportunity to elicit feedback about form and concepts and provides a forum for students to share their technical/artist knowledge with one another.
- 6. Unit quizzes:** Unit quizzes focus on assessing the students' technical skills using the software. Habits of Mind: They also assess their artistic, aesthetic and historical awareness. They encourage the students to continue their study of artistic vocabulary and technical terminology.
- 7. Unit projects presentations:** Throughout the year, students make formal presentations to the class and are evaluated using a presentation rubric. Habits of Mind: Either individually or in design teams, design presentations using technology such as; Google Drive, ThingLinks, Prezi, and also present from traditional 2d printed images, preliminary sketches, and technical drawings provide an opportunity for students to practice real world presentation skills needed in today's workplace.
- 8. Continual analysis through self and peer critiques:** Students critique their work and the work of others to improve their work. Several critiquing strategies are used to develop the students technical, communication, and artistic skills. Grades are determined by participation in critique. Habits of Mind: Peer critiques provide opportunities for students to elicit feedback about form and concepts on a 1-1 basis. This can be a safer place to get help from peers than in large-group Design Critiques.
- 9. Mid-term performance exam:** This semester final is designed to the students' artistic and technical development. The exam includes a wide range of questioning strategies including: standardized test methods, performance tasks, and written responses. Habits of Mind: The mid-term examine is a combination of aesthetic awareness through written reflection, artist creative solution to a design challenge, and technical skills assessment.
- 10. Mastery of Technical Skills Checklists:** The teacher provides a Skills Checklist for each unit of study. As the students develops their traditional and digital technical skills, the student and teacher meet to discuss their mastery of

the skills. This might be a drawing portfolio, collection of sketchbook assignments, or a list of tools used in the software program. Habits of Mind: Checklists provide a guidepost for students, an easy measuring still to determine what they should know at the end of a unit.

11. Final Reel and Print Portfolio Presentation: For the final assessment, students develop a movie reel of the concept art, drawings, 3D models, and animations created throughout the year. The reel demonstrates the breadth of accomplishments and/or highlights the students' artistic voice. The reel is posted on the class website and other digital media outlets. Habits of Mind: The reel and portfolio are a professional means to share work with others.

12. Common Core Anchor Standards

Students participate in a number of assessments aligned with the College and Career Readiness anchor standards. 3D modeling for design incorporates both Visual Arts and CTE content to build content knowledge alongside career readiness skills. Below is an overview of the CCR standards covered in 3D Modeling for Design.

Reading

Students read a variety of non-fiction texts such as technical documents, analysis of artistic works found in professional journals, essays, film criticisms, articles about new technologies, websites, and new art practices, and digital media. The Reading Anchor Standards specifically addressed in 3D Modeling for design include R.1, R.7, R.9, and R.10.

Writing

3D Modeling incorporates writing in a variety of contexts for the Design, Media, and Visual Arts industry. Students write several project proposals, character synopsis overviews, critiques, blog posts, and web pages. Students write in both sketchbooks and using online resources like Google Drive, ThingLink, and Evernote. They also write many analytical descriptions of artworks made throughout time. Longer and more formal writing tasks include informative, compare-contrast, and an in-depth research paper (Unit 11). Writing that is specific to the design industry includes a mock journalism article, resumes, and a career investigation are written in units 3, 4, 6, and 11. Students must demonstrate appropriate formatting, command of written and verbal language, and knowledge of audience and purpose. The Writing Anchor Standards specifically addressed in 3D Modeling for design include W.1, W.6, W.7, and W.8.

Listen and Speaking

3D Modeling for Design emphasizes the need to excel in speaking and listening, in addition to writing in order to compete in a media oriented job market. Students develop speaking and presentations skills by addressing a variety of audiences from small groups to community forums. In each unit, students develop listening skills by critiquing peer and professional presentations. Students apply these skills to determine valid arguments in a variety of contexts including classmates' pitches and podcasts, professional videos, and web based sources. The Listen and Speaking Anchor Standards specifically addressed in 3D Modeling for design include SL.2 and SL.5.

Unit One: 3D Totems- An Introduction to the Elements of Art and Principles of Design

A. In-class Tinker Challenge: Students tinker with arranging their elements and principles sketches into stacked pieces of artwork. A tinker challenge rubric will be used to evaluate the in-class challenge to ensure they have included the required components. Tinkering for a class period builds the idea of prototyping, failing, and reworking ideas to create a better final products.

B. Weekly Sketchbook Assignment: A sketchbook rubric will be used to evaluate the application of drawing skills, analysis of the elements of art and principles of design, and craftsmanship of the drawings. A standard sketchbook rubric helps students understand the importance of daily/weekly drawing.

C. Written composition, reports, and reflections: Student write an 4 paragraph analysis of a contemporary totem.

A writing rubric is provided for this assignment that is aligned with the Common Core Anchor Standards for writing. This assessment focuses on the students' analysis of design principles and cultural awareness.

D. Notes Check: Students take Cornell Notes on Google Drive. The teacher will check the quality of notes and meet with students who are struggling with note taking strategies.

E. Design Challenge critiques: An informal progress grade will be given for students that participate during in-progress critiques. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others.

F. Unit quizzes: Student take a short quiz on the visual arts vocabulary and technical terminology learned in this unit. This helps reinforce the vocabulary we will use throughout the course.

G. Mastery of Technical Skills Checklists: Each unit of instruction is accompanied with a Mastery Checklist that lists the technical skills the student must learn before moving on to the next unit. The student and teacher work together to check-off each skill. The significance of this activity is to identify the technical or artistic skills student might need additional help during study session.

H. Project Rubric: A project rubric is provided to the student at the beginning of class. The rubric for this project assesses the student's ability to illustrate the elements and principles in a 3d model.

Unit Two: Blobatar Unit

A. In-class Tinker Challenge: Clay prototypes are made to develop ideas and discussed in small groups. Informal In-class discuss occurs during the activity.

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of drawing skills, analysis of the elements of art and principles of design, as they apply to their Blobatar design.

C. Written composition, reports, and reflections: Students write reflections and notes about the artwork movie clips discussed in class, compose a 2 paragraph character description, and annotate in their sketchbook regarding their Blobatar. A Common Core Writing rubric is used to evaluate writing conventions.

D. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on shape symbolism and sculpting techniques.

E. Unit quizzes: At the end of this unit, the students complete a quiz focusing on Cinema 4d basic modeling tools.

F. Unit projects presentations: We will print and display the process drawings, clay prototypes, and final 3d prints of the Blobatar project. Students will discuss their success in illustrating a particular emotion in the sculptures.

G. Continual analysis through self and peer critiques: Student share out in small groups their process design and make changes as needed. This critique focuses on how well the artist is representing emotion in the Blobatar.

H. Mastery of Technical Skills Checklists: To demonstrate their understanding of 3d modeling, student complete the Mastery Checklist of content learned in the Digital Tutorial #2 (painting in Photoshop and modeling organic shapes in Cinema 4D).

Unit Three: The Production Pipeline - Character Development, Design, and Mode

A. In-class Tinker Challenge: Students tinker with sculpt their character designs in modeling clay before moving onto the computer. A tinker challenge rubric will be used to evaluate the in-class challenge to ensure they have created an interesting and challenging character.

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of drawing skills, visual research and investigation into original character design.

C. Written composition, reports, and reflections: Student write a summary about the Project Pipeline, complete a 1 page paper about an 3d artist and careers in the 3d arts. A writing rubric is provided for this assignment that is aligned with the Common Core Anchor Standards for writing. This assessment focuses on the students' investigation into careers in the field of visual design and artist research.

D. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on Project Pipeline and advanced sculpting tools in zBrush.

E. Partner and individual quizzes: Short, Individual quiz given about Project Pipeline.

F. Design Challenge critiques: An informal progress grade will be given for students that participate during in-progress critiques. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others.

G. Unit quizzes: At the end of this unit, the students complete a quiz focusing on the Project Pipeline and basic modeling in zBrush.

H. Unit projects presentations: We will print and display the process drawings, clay prototypes, and final 3d prints of the Character project. Students will discuss their success of their characters.

I. Continual analysis through self and peer critiques: An informal progress grade will be given for students that participate during an small group critique (4 or 5 students). The intent is for students to receive feedback about the proportions, emotional characteristics, and detailing of the character they are working on.

J. Mastery of Technical Skills Checklists: Mastery Checklist #3 focuses on using tools and techniques to create a cartoon 3d model in zBrush.

Unit Four: Sculpting the Human Figure

A. In-class Tinker Challenge: Students will tinker with proportions of the human figure using a wire armature and clay. A tinker challenge rubric will be used to evaluate the in-class challenge to ensure they have constructed the model correctly and made a human figure in correct proportions. This challenge helps the students visualize the human figure in 3-dimensions before moving on to the computer .

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of drawing skills applied to drawing the hands, feet, and skull.

C. Written composition, reports, and reflections: Each student writes a 3-paragraph analysis of a mystery artwork. The analysis focuses on the historical context of the artwork. A writing rubric is provided for this assignment that is aligned with the Common Core Anchor Standards for writing.

D. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on creating materials, character rigging, and proportion.

E. Partner and individual quizzes: Short, partner quiz given about creating materials and character rigging. The intent of the partner quiz is to build teamwork to solve visual problems.

F. Design Challenge critiques: An informal progress grade will be given for students that participate during in-progress critiques. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others.

G. Unit quizzes: At the end of this unit, the students complete a quiz focusing on Cinema 4d intermediate modeling tools and creating original materials.

H. Unit projects presentations: We will print and display the process portfolio of figure drawings, prints of their original material design sheets, and 2d print of their human figure. Products from Unit 5 will be shown with these items.

I. Continual analysis through self and peer critiques: An informal progress grade will be given for students that participate during an small group critique (4 or 5 students). The intent is for students to receive feedback about the proportions, positioning, and posture of the human figure they are modeling.

J. Mid-term performance exam:

K. Mastery of Technical Skills Checklists: This activity focuses on sculpting tools and techniques in creating a human figure in correct proportions.

Final Reel and Print Portfolio Presentation:

Unit Five: The Human Figure in Motion - Walk Cycle

A. In-class Tinker Challenge: Students will tinker with designing their own Thaumatrope, Zoetrope, and Kineographs. A tinker challenge rubric will be used to evaluate the in-class challenge to ensure they have included the required components.

B. Weekly Sketchbook Assignments: Storyboards are drawn and evaluated using a storyboard rubric.

C. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on the Principles of Design.

D. Partner and individual quizzes: Short, Individual quiz given about Principles of Animation. A second quiz given about keyframing.

E. Design Challenge critiques: An informal progress grade will be given for students that participate during in-progress critiques. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others.

F. Unit quizzes: During this unit, the students complete 2 quizzes focusing on Principles of Animation and character rigging.

G. Unit projects presentations: We will create a class display of work from Units 4 and 5. Movies will be displayed on a large screen beside the 3d and 2d printed materials. Thaumatrope, Zoetrope, and Kineographs will also be

displayed.

H. Continual analysis through self and peer critiques: An informal progress grade will be given for students that participate during an small group critique (4 or 5 students). The intent is for students to receive feedback during the process of the project.

I. Mastery of Technical Skills Checklists: This activity focuses on character rigging and the techniques used to create believable movement in a human walk cycle.

Unit Six: Virtual Kinetic Sculpture

A. In-class Tinker Challenge: Students will assemble a mobile using the Law of Levers to balance the mobile. This 1-day activity is designed to get the students thinking about physics in the real world and how they might apply it to a virtual environment. Participations given for this activity.

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of drawing skills, visual research and investigation into kinetic sculpture, and their ability to draw a final concept design with annotations outlining important information about the mobility of their sculpture.

C. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on advanced animation keyframing and techniques.

D. Partner and individual quizzes: Partner quiz is given about the Principle of Animation.

E. Unit quizzes: At the end of this unit, the students complete a quiz focusing on the Principles of Animation. The combination of these quizzes builds towards independence.

F. Unit projects presentations: Projects will be combined with work in Unit 10.

G. Continual analysis through self and peer critiques: An informal progress grade will be given for students that participate during an small group critique (4 or 5 students).

H. Mastery of Technical Skills Checklists: This checklist activity focuses on using the Principles of Animation in their work.

Unit Seven: Toy Design and Product Design Unit

A. In-class Tinker Challenge: Students tinker with a wide variety of toys that have different assemblages. They will deconstruct the toys to investigate how they are built, move, roll, and assemble. They photograph the components and construct a digital “Tinkerboard” in Google Drive that includes their photos and annotations about the toys’ construction. A tinker challenge rubric will be used to evaluate the in-class challenge to ensure they have included the required components.

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of drawing skills, visual research and investigation into toy design, and their ability to draw a final concept design.

C. Written composition, reports, and reflections: Students write a “pitch” for their toy. The pitch takes the form synopsis, statement of target audience, and a final materials data sheet. A writing rubric is provided for this assignment that is aligned with the Common Core Anchor Standards for writing.

D. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on building hinges, ball-and-socket joints, and shelling a form.

E. Design Challenge critiques: A formal progress grade will be given for students that participate during in-progress critiques. Teacher uses a critique rubric to grade the students’ feedback and participation. The rubric is discussed together. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others. The focus of this critique is on unique toy design.

F. Unit projects presentations: We will print and display the process drawings, prototypes, and final 3d prints of the Toy Design project. Engineering documents like: expanded view sheets, orthographic drawings, and materials spec sheet will also be displayed. Students will discuss the process of working as a team with varying skills.

G. Continual analysis through self and peer critiques: An informal progress grade will be given for students that participate during an small group critique (4 or 5 students). The intent is for students to receive feedback during the process of the toy design unit. The conversation focuses on the visual design of the piece.

Unit Eight: Industrial Design-Functional Forms inspired by Forms in Nature

A. In-class Tinker Challenge: Students will tinker with a wide variety of materials to build prototypes of their product design. They will create a “Tinkerboard”, much like an interior design mood board, that includes their inspirations and sketches for their final designs. A tinker challenge rubric will be used to evaluate the in-class challenge.

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of drawing skills, visual research and investigation into nature as inspiration, and their ability to draw a final concept design.

C. Written composition, reports, and reflections: Students write a “pitch” for their Industrial Design Product. The pitch takes the form synopsis, statement of target audience, and a final materials data sheet. A writing rubric is provided for this assignment that is aligned with the Common Core Anchor Standards for writing.

D. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on drawing and design strategies in the field of industrial design.

E. Design Challenge critiques: A formal progress grade will be given for students that participate during in-progress critiques. Teacher uses a critique rubric to grade the students’ feedback and participation. The rubric is discussed together. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others. The focus of this critique is on the student’s ability to use nature as inspiration for a design solution.

F. Unit quizzes: At the end of this unit, the students complete a quiz focusing on perspective drawing.

G. Unit projects presentations: We will print and display the process drawings, prototypes, and final 3d prints of the Industrial Design project.

H. Continual analysis through self and peer critiques: An informal progress grade will be given for students that participate during an small group critique (4 or 5 students). The intent is for students to receive feedback during the process of the industrial design project. The focus of the critique will be on how the new product design addresses an identified need or problem.

Unit Nine: Cabinet of Curiosity Unit - A Contemporary Collection

A. In-class Tinker Challenge: A tinker challenge rubric will be used to evaluate the in-class collages made to test the students’ understanding of the Cabinet of Curiosity.

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of drawing skills, analysis of the elements of art and principles of design in their ideation sketches, and the student’s ability to annotate their ideation process.

C. Written composition, reports, and reflections: Students write an 3-4 paragraph artist statement that accompanies their art piece displayed in unit 10. A writing rubric is provided for this assignment that is aligned with the Common Core Anchor Standards for writing. The artist statement is posted on the students website in Unit 12.

D. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on the history of the Wunderkammer.

F. Design Challenge critiques: A formal progress grade will be given for students that participate during in-progress critiques. Teacher uses a critique rubric to grade the students’ feedback and participation. The rubric is discussed together. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others. The focus of this critique is on creating visual interest and metaphor.

G. Unit quizzes: At the end of this unit, the students complete a quiz focusing on creating materials.

H. Unit projects presentations: Projects will be combined with work in Unit 10. A peer evaluation rubric will be used to assess students’ presentations in small groups.

I. Final Project: A design challenge rubric will be used to evaluate the students’ 3d sculpture. The rubric will focus on their application of design principles and technical skills around materials, textures, and lighting.

Unit Ten: Virtual Museum Project

A. In-class Tinker Challenge: Student groups will create quick floor plans of a museum divided into 4 Aesthetic Theories and evaluated on their participation and accuracy in representing the 4 aesthetic theories discussed in class. A Tinker rubric/checklist will be provided to the student as the rubric.

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of perspective drawing skills and their ability to analyze and communicate an aesthetic theory.

C. Written composition, reports, and reflections: Students write a 4 paragraph curatorial statement for their gallery that defines how the works in the gallery represent the aesthetic theory. A writing rubric is provided for this assignment that is aligned with the Common Core Anchor Standards for writing.

D. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on aesthetic theory.

E. Design Challenge critiques: A formal progress grade will be given for students that participate during in-progress critiques. Teacher uses a critique rubric to grade the students’ feedback and participation. The rubric is discussed

together. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others. The focus of this critique is on the student's understanding of the aesthetic theories discussed in class.

F. Unit quizzes: Students take 2 quizzes about aesthetic theory.

G. Unit projects presentations: Students will create a museum and fill it with 3d objects. Virtual Gallerie software is used to share the museum with others in the Internet.

H. Continual analysis through self and peer critiques: An informal progress grade will be given for students that participate during an small group critique (4 or 5 students). The intent is for students to receive feedback about how the gallery design matches the aesthetic theory their team is representing.

I. Presentation: Students present their final museum models with their curated works.

Unit Eleven: Surrealistic Illustration, Animation, and the 3D scanner

A. In-class Tinker Challenge: A Tinker Challenge checklist rubric is used to evaluate the scan of the students' face according to the techniques taught during class.

B. Weekly Sketchbook Assignments: A sketchbook rubric will be used to evaluate the application of drawing skills, analysis of the elements of art and principles of design in their ideation sketches, and the student's ability to represent ideas in their visual metaphor.

C. Notes Check: Students take Cornell Notes on Google Drive. Notes focus on surrealism and technical aspects of the 3D scanner.

D. Unit quizzes: Students take a unit quiz on the characteristics of Modern and Post-modern Surrealism.

E. Written composition, reports, and reflections: Student write an 3-4 paragraph artist statement. A writing rubric is provided for this assignment that is aligned with the Common Core Anchor Standards for writing.

F. Unit projects presentations: Students will share their work in the museum created in Unit 10 and print it for public display.

G. Design Challenge critiques: A formal progress grade will be given for students that participate during in-progress critiques. Teacher uses a critique rubric to grade the students' feedback and participation. The rubric is discussed together. The intent of the process critique is for students to learn how to provide constructive feedback and listen to the opinions and questions of others. The focus of this critique is on whether the student's form meets his/her content.

H. Continual analysis through self and peer critiques: An informal progress grade will be given for students that participate during an small group critique (4 or 5 students). The intent is for students to receive feedback during the process about the intended message in their surrealistic artwork.

Unit Twelve: The Reel and Print Portfolio

A. Weekly Sketchbook Assignments: Storyboard for the portfolio reel is drawn and evaluated using a storyboard rubric. Webpage layout is drawn and evaluated using webpage rubric that evaluates the design and usability of the website.

B. Final Reel and Print Portfolio Presentation: Student's final presentations are evaluated using the "Am I Hired?" rubric that outlines CTE career readiness skills, visual arts skills, and common core writing skills.

Artistic Perception: Courses must include processing, analyzing, and responding to sensory information through the language and skills unique to a given art. Describe in detail how the class satisfies the Artistic Perception requirement. Provide examples where this might appear in the outline and/or assignments/activities.

Artistic perception in 2-dimensional work is developed throughout the year with activities that challenge the students to apply the elements of art and principles of design. For instance, students process, analyze and respond to shape symbolism in character development by analyzing sensory information presented in the visual language unique to art in characters found in contemporary and historical animated movies (Unit 3). Students process, analyze, and respond to the visual aspects of their work through experimenting with manipulating the value and colors of various models impacts emphasis, unity, and balance. Students process and analyze how various painters and sculptors have distorted the human figure throughout time and then sculpt a classical figure, as well as a figure with distorted proportion using zBrush (Unit 4). Later, these works are printed using a 3d printer. Students analyze through writing the formal and emotional aspects of works made by Dali, Rene Magritte, and contemporary surrealist painters (Unit 12). Students learn how to grow and paint virtual textures on models of mythological creatures that mimic textures found in the natural world. Then, they simulate various lighting conditions in their virtual environments to affect the overall mood of an artwork (Unit 12). Students analyze how the expressive qualities in a works of art are affected by compositional strategies. Compositional strategies such as rule of 3rds, triangular composition, and symmetry are all discussed when composing a 2-dimensional work (Units 4, 6, 8, and 12). 2-dimensional images are printed, analyzed, and critiqued by classmates and displayed for exhibition.

Artistic perception in 3-dimensional work is developed through extensive exploration of various 3D art forms in both traditional and digital media, the students build a broad understanding of what it means to create works of art that exist in 3-dimensions. The elements of art and principles of design are discussed in relation to 3-dimensional works of art (Units 1, 3, and 10). Additional concepts about sculpture are discusses, like: sculpture in the round, functional art (instrumentalism) vs. fine art, and interior and exterior space. Artistic perception in animated work is developed through the study of the 12 principles of animation to animate scenes in several short movies and apply these concept to their own works of art.

Creative Expression: Courses must include creating, performing, and participating in a given art. Describe in detail how the class satisfies the Creative Expression requirement. Provide examples where this might appear in the outline and/or assignments/activities.

Students demonstrate a personal style and point of view by completing several design challenges that focus on creative expression. For instance, students will explore a number of methods for developing ideas, including weekly sketchbook assignments that focus on observational drawing of objects, architecture, vehicles and observations of nature. In Unit 1 students create a stacked, 3-dimensional sculpture using their knowledge of the elements and principles of design. Using their knowledge of shape symbolism, they create a simple blob-like character that expresses a mood (Unit 2) and in Unit 3 create an original cartoon character using zBrush.. Students spend several days creating a portfolio of figure drawings (Unit 4) and use these drawings as reference in a 3d model of a human. Student apply their knowledge of the principles of animation to create a human figure (Unit 5) and again to create a virtual kinetic sculpture (Units 7). Sketchbook drawings focused on Linear perspective (Unit 10) , isometric perspective (Unit 10), and orthographic drawing (Unit 2 and 3) are created to visually communicate their ideas. Create build a virtual art museum and curate artists' work and their own into distinctive galleries (Unit 10). Students participate in the production process, or Project Pipeline, used in the entertainment industry, create ideation sketches, and conduct written and visual research for projects (Unit 9 and 11).

Additionally, students deconstruct the work of traditional and contemporary artist that use visual metaphor, and the Post-modern Principles. Students then create their own visual metaphors that combines a 3d scan, abstract forms and images to illustrate a point of view about a social issue of our time applying one or more of the Post-modern Principle (Unit 11).

Historical and Cultural Context: *Courses must include understanding historical contributions and cultural dimensions of a given art. Describe in detail how the class satisfies the Historical and Cultural Context requirement. Provide examples where this might appear in the outline and/or assignments/activities.*

The historical and cultural importance of art making is explored in a number of ways. Traditional and contemporary artworks made in the form a totem found in various cultures is introduced to learn how the elements of art have been employed throughout many cultures (Unit 1). They analyze how artists across time have represented the human figure focusing the discussion on how technology has influenced the ways artists have represented the human figure in various cultures. They compare contemporary 3D modelers that focus on the human figure with artwork from Greek and Roman antiquities, the Renaissance, and modernist sculpture. Artists like Scott Eaton, Marc Quinn, Sophie Robinson are discussed in the context of how they use current technology to produce artwork (Unit 4).

Students explore the development of early forms of animation including the Egyptian tomb of Khnumhoptep and Niankhkhnun, the Thaumatrope, Zoetrope and Kineograph (flipbook) to gain an understanding of the evolution of art. They study the work of Eadweard Muybridge and early stop frame animation in films like *King Kong*, *Jason and the Argonauts*, and *The Making of ParaNorman* to see how animation has evolved with technological developments (Unit 5). In Unit 3 students analyze the artworks of Otto Messmer's *Felix the Cat*, Walt Disney Studios, UPA, Studio Ghibli, Pixar, and stop motion animations like, *Wallace and Gromit* and *The Nightmare Before Christmas*. They explore how every new animation has been influenced by the past and one can trace a film's "ancestry" back to previous works of art (Unit 3).

The history of kinetic sculpture is explored, focusing on historical artists like Alexander Calder and Jean Tinguely, and contemporaries like Li Mee Young, Theo Jansen, Paul Grundbacher, and David C. Roy, Richard Box, Janet Echelman, Gabriel Dawe, and Ron Arad (Unit 6). Students explore the history of collecting objects and the development of the Wunderkammer, or Cabinet of Curiosity (Unit 9). During Unit 11, students explore the Surrealists, Salvador Dali and Magritte, and compare these works to contemporary artists working with 3D modeling and Surrealism (Aram Vardazaryan, Fran Camos, Gediminas Pranckevicius, Petar Petrov, Steve Barrett, Tomasz Strzalkowski, and Kosmur). Students study the 4 aesthetic theories; Imitationalism, Instrumentalism, Emotionalism, and Formalism. They research various artworks made throughout time and explore how to create works that can be frames within the discussion of an aesthetic theory (Unit 10).

Aesthetic Valuing: *Courses must include responding to, analyzing, and making critical assessments about works of a given art form. Describe in detail how the class satisfies the Aesthetic Valuing requirement. Provide examples where this might appear in the outline and/or assignments/activities.*

To develop aesthetic valuing students study a wide variety of artwork, analyze works of art as they relate to aesthetic theory, make judgments about works of art in relation to the elements of art and principles of design, and apply these theoretical perspectives to discuss their own work. During Unit 1, students learn the elements of art and principles of design, create several studies of these concepts, and create a 3d

model representing the elements of art and principles of design. The principles of design are reinforced through teacher-led and student-led critiques throughout the course in each unit. Students apply these concepts to various projects using appropriate vocabulary and terminology to describe and analyze their own work.

Students analyze, assess, and derive meaning from art historic and contemporary Surrealist works of art. The discussion focuses on what the Breton called “a poetic vision of the real mind.” (Unit 11). In Units 4, 6, 8, and 9 students identify intentions of artist in contemporary and discuss the implications of these intentions for the viewer. In these units, they discuss the relationship between form and content, the importance of the art process and product. Students apply the theories of Emotionalism, Imitationalism, Instrumentalism and Formalism to analyze both traditional and digital works of art and use these theories to construct a rationale for a work they don't like.

To help the student understand the relationship between the artist, the art process, and the viewer, students embody the various stages of the Production Process (pre-production, production, and post-production) in an Industrial Design unit (Unit 7) and a Toy Design project (Unit 8). They collaborate with professional mentors to guide and critique their products and present their work to a panel of experts for final critique. These design challenges model for the student how to collaborate in various fields like, industrial design, product and toy design, and concept design from the animation industry.

They write about artwork that use traditional media and those that use digital media, then create a virtual museum to curate their own works of art (Unit 10). As a final activity, students develop criteria of successful work for the making of an artist's final reel and portfolio website (Unit 12).

Connections, Relationships, and Applications: Courses must include **connecting** and applying what is learned in a given art form to learning in other art forms, subject areas, and careers. Describe in detail how the class satisfies the Connections, Relationships, and Applications requirement. Provide examples where this might appear in the outline and/or assignments/activities.

Students make connections and relations to other visual art forms and careers in the arts. To develop a wide range of competencies and creative problem solving skills, the instructional unit in this course are centered around design challenges. The design challenges build a broad foundation of knowledge visual literacy, the act of making, and presenting information to a variety of forums. Student compare and contrast works of historical and contemporary artwork in several units of study. In Unit 1 we explore totem around the world, in Unit 2 and 4 we examine symbolism and the human figure, and in Unit 11 we compare several Surrealist works of art.

They speculate on the impact computer technologies will have on the visual arts by researching emerging technologies used by contemporary artists. They will examine augmented reality, the use of video games outside the field of entertainment, 3d scanning, and how 3d printers have impacted contemporary fine art and industrial design (Units 1, 4, 6, 8 and 11).

The students further their lifelong learning and career skills while working with a wide range of outside support. Industry professionals act as advisors to aid students in creating an original industrial design product and toy design (Units 7 and 8). Students work with professional artist and art teachers to complete a portfolio of their original artwork for exhibition, college admittance, and online public viewing.

