



DIG-554: 3D DIGITAL MODELING

Effective Term

Fall 2024

BOT Approval Date

11/09/2023

Discipline

DIG - Digital Media

Course Number

554

Course Title

3D Digital Modeling

Short Title

3D Modeling

Credit Status (CB 04)

D - Credit - Degree applicable

Units**Activity Units**

3.00

Total Units

3

Hours**Activity Contact Hours**

96-108

Out of Class Hours Activity

48-54

Total Contact Hours

96 - 108

Total Out of Class Hours

48 - 54

Total Student Learning Hours

144 - 162

Distance Education

No

Catalog Description

This course introduces concepts of 3D modeling within a virtual modeling environment. Students will explore three-dimensional concepts, the use of digital modeling techniques, utilize current industry software tools, and refine custom models for professional industry use in games and 3D printing.



Requisites

Prerequisite(s)

Prerequisite(s) (must be taken before)

DIG-110 (with a grade of C or better).

Codes

TOP Code (CB 03)

0614.20* - *Electronic Game Design

CIP Code

50.0411 - Game and Interactive Media Design.

Student Accountability Model (SAM) Priority Code (CB 09)

C - Clearly Occupational

Noncredit Category (CB 22)

Y - Credit Course

Repeatability Code

No

Grading Option

Letter grade OR P/NP

Minimum Qualifications

Minimum Qualifications	And/Or
Multimedia	End

CSU Area(s)

IGETC Area(s)

Learning Objectives

Learning Objectives

Learning Objective

1. Create 3D digital models utilizing the fundamental concepts of poly modeling.
2. Analyze box modeling and extrusion techniques for use with static and animated game models.
3. Apply methods for UV unwrapping 3D props, vehicles, environments, and characters for use in Game Development and Animation.
4. Evaluate the effectiveness of incorporating diversity and inclusion into organic modeling designs.
5. Analyze hard surface models for game development assets.
6. Identify model adaptations necessary for 3D printing construction.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome

1. Students will transform creative ideas into tangible forms.
2. Students will generate new meaning using different media.
3. Students will adapt and apply a technical skill in a new and novel situation.

Program Learning Outcomes

Learning Outcome

Integrate theory with technical skills in digital media projects.

Devise innovative solutions to workflow-related problems.

Analyze the implications of technology changes on the digital media industry.

Apply appropriate design decisions and techniques in new, industry-relevant contexts.

Interpret and produce digital media content in a culturally responsive manner.

Institutional Learning Outcomes

Aesthetic Awareness: The student will identify and evaluate how aesthetic expression leads to an appreciation of social and cultural context as well as the values of art and nature.

Communication: The student will effectively express and exchange ideas through listening, speaking, reading, writing, visual works, and other modes of interpersonal expression.

Critical Thinking: The student will analyze problems, gather and synthesize relevant information, evaluate ideas, information, and evaluate alternative points of view to create, innovate and implement effective solutions.

Information and Technology Literacy: The student will access, interpret, evaluate, and apply relevant information sources and digital media effectively, and in an ethical and legal manner.

Social Awareness: The student will recognize and analyze the interconnectedness of global, national, and local concerns, analyzing cultural, political, social, and environmental issues from multiple perspectives and appreciate similarities and differences among cultures.

Civic

Personal

and Professional Responsibility

Content

Course Activity Content

1. Pre-Production
 - a. Reference Image Creation
 - i. Traditional
 - ii. Digital
 - iii. Choosing Diverse Reference Images
 - b. Navigation
 - i. Layers/Layer Effects
 - ii. Rulers/Guides
 - c. Tool Box
 - i. Selections/Transform
 - ii. Brushes/Eraser
 - d. Masks
 - e. File Management
2. 3D Digital Workspace
 - a. Navigation
 - b. Orientation
 - i. World, Local Axis, & Object Axis
 - ii. View & Camera Controls
 - c. Tool Box
 - i. Translate
 - ii. Rotate
 - iii. Scale
 - d. Editors
 - i. Attributes
 - ii. Channel Editor
 - iii. Tool Editors
 - iv. UV
 - e. Models
 - f. File Management

- i. Project Creation
 - ii. Source Images/Image Planes
- 3. Polygon Modeling
 - a. Tools
 - i. Polygon Primitives
 - ii. Deformations
 - iii. Extrusion Modeling
 - 1. Faces
 - 2. Edges
 - iv. Bridges
 - 1. Faces
 - 2. Edges
 - v. Inserting Edge Loops
 - vi. Combine / Separate
 - 1. Extract
 - 2. Grouping
 - b. Hard Surface Modeling
 - i. Environmental Props
 - ii. Weapons
 - iii. Vehicles
 - c. Organic Modeling
 - i. Environmental Props
 - ii. Animal / Creatures
 - iii. Humanoid
 - 1. Bias & Depiction
 - 2. Representation through Creative License
- 4. Introduction to UV and Unwrapping
 - a. Unwrapping Solutions
 - i. Planar
 - ii. Cylindrical
 - iii. Spherical
 - iv. Automatic
 - b. UV Texture Editor
 - i. Slice Edges
 - ii. Sew Edges
 - iii. UV Layout
- 5. Textures & Shading
 - a. Material Attributes
 - i. Blinn / Lambert Materials
 - ii. Physical Based Rendering Materials
 - b. Texturing
 - i. Color / Albedo Maps
 - ii. Bump / Normal Maps
 - iii. Specular Maps
 - iv. Specialty Maps
 - c. Texture Manipulation
 - i. Bitmap Textures
 - ii. Colors and Value
 - iii. Painting Techniques
- 6. Lighting & Rendering
 - a. Lights
 - i. Types of Lights
 - ii. Light Controls
 - b. Advanced Rendering
 - i. Software Rendering
 - ii. Hardware Rendering

- c. Shadows
 - d. Bake Lighting / Shadows
- 7. Rendering Expanded
 - a. Settings
 - i. Formats, Size, Duration
 - ii. Motion Blur
 - b. Rendering
 - i. Test Render
 - ii. Shadow Layers (Alpha)
- 8. Portfolio
 - a. Preparation of Presentation
 - b. Credits

Methods of Instruction

Method

In-class Exercises

Integration

In-class tutorials introduce the software interface and the working order of activities in the 3D modeling process, giving students the opportunity to experiment with the objectives in class.

Method

Reading

Integration

Articles pertaining to the ways bias and visual stereotyping negatively impact the important role that 3D modelers play in the diversification of the game industry will be posted for students to engage with and apply to their own works.

Method

Visiting Lecturers

Integration

Current 3D modelers will guest lecture to discuss the industry and what job opportunities there are for entry level modelers.

Methods of Evaluation

Method

Portfolios

Integration

Portfolio generation exhibiting artifacts communicating animation skills, cultural awareness/sensitivity, and industry knowledge. The portfolio will be evaluated for the number of artifacts, artifact quality, contribution to character/in-game diversity, and visual communication.

Method

Exams/Tests

Integration

Software-based exams evaluate student understanding of the terminologies and processes of the modeling software including navigation and file management.

Method

Projects

Integration

Projects demonstrating proficient modeling tool skills and rendering abilities will be evaluated based on the visual appeal, texture detail and use of motion blur.

Assignments**Assignment Type**

Other

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

Assignment Example: 3D Game Asset (Vehicle)

Create a 3d vehicle asset for a game such as a racing game or flying combat game

CRITERIA (3d model will include the following elements)

Creation of a 3d asset that will be used in potential future game project

Create variant add-on pieces to add variation or potential customization options to the 3d model

Create high-quality texture for the 3d object

GOALS (Students will be able to)

Use 3d application to make assets for their game

Understand and manipulate geometry for game development and/or future animation

Create complex and appealing texture(s) and place them on their game assets

Create engine usable materials and manipulate them for hardware engine rendering

Assignment Type

Reading

In-class and/or outside of class

In-class

Formative or Summative

Formative

Assignment

Assignment: Designing for Diversity in 3D Modeling

Objective: This article explores the importance of diversity and inclusion in 3D modeling and provides practical strategies for designing models that are more inclusive and accessible. The article begins by discussing the benefits of designing for diversity, including increased creativity, better problem-solving, and a more positive impact on society. The article then goes on to discuss specific strategies for designing inclusive 3D models, such as using a diverse range of reference images, incorporating cultural elements into designs, and designing for accessibility.

Reading Assignment:

Read the article Passmore, Cale J. & Mandryk, Regan (2018). An About Face: Diverse Representation in Games. Association for Computing Machinery, pp. 365-380. <https://doi.org/10.1145/3242671.3242711>

Write a 1-2 page reflection on the article, addressing the following questions:

What are the benefits of designing for diversity and inclusion in 3D modeling?

Which strategies discussed in the article do you find most useful for creating more inclusive designs?

How will you apply the concepts discussed in the article to your own 3D modeling work?

Be prepared to discuss your reflection in class, focusing on your insights and takeaways from the article, and how you plan to incorporate the concepts discussed into your own work.

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Assignment: The Future of 3D Modeling: Trends and Innovations

Objective: This writing assignment will explore the latest trends and innovations in 3D modeling, and their potential impact on the industry. You will research current developments in the field and analyze their potential impact on future design practices and workflow.

Directions:

Research a current trend or innovation in 3D modeling. This could include topics such as real-time rendering, virtual and augmented reality, generative design, or machine learning in 3D modeling.

Write a 2-3 page essay exploring the trend or innovation you have chosen, addressing the following questions:

What is the trend or innovation you have chosen, and how does it work?

What are the benefits and challenges associated with this development?

How might this trend or innovation impact the future of 3D modeling? What new opportunities or challenges might it create?

Be prepared to present your essay to the class, summarizing your findings and insights, and leading a discussion on the potential impact of this trend or innovation on the industry.

Course Materials

Textbooks

Murdock, K, L (2020). Autodesk Maya 2020 Basics Guide SDC Publications. ISBN: 1630572551

Class Size Information

Class Size

32

Class Size Category

G - Large lab 32

Diversity and Inclusion

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

As a technical/skill-based course, students will consistently apply their technical knowledge in projects/animations that reflect/communicate their views, beliefs, and concerns about society, race, gender, and self. Students will explore and adapt characters and designs from a broad range of cultures and styles other than their own.

Diverse reference images (1.a.iii in the COR): When teaching students how to model characters or objects, reference images that represent a diverse range of body types, ethnicities, and gender identities will be highlighted.

Incorporating cultural elements into designs (3.c.iii.ii in the COR): Students will be encouraged to incorporate cultural elements into their designs, such as patterns, textures, and iconography that are meaningful to different communities.

Gender diversity in character design: Students will be encouraged to create characters that represent a diverse range of gender identities, such as non-binary or trans.

Address biases in design (3.c.iii.i in the COR): Students will be taught to be aware of their own biases when designing and to consider how their designs might be perceived by people from different backgrounds.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

Course instruction and assignments will emphasize the importance of representing diverse experiences and perspectives in 3D models of characters, textures and iconography. Instruction will create a welcoming and inclusive classroom environment by promoting respectful communication and addressing any biases or discriminatory behavior. Additionally, assignments and lectures will help expose students to a range of models and reference images from diverse creators to broaden their understanding of the potential impact and significance of diverse representation in the modeling industry.

Interactions

Explain how the course will incorporate student-to-student interaction.

Student assignments will be influenced by cultural styles and techniques throughout the world incorporating them into their own artifacts showcasing various cultural backgrounds and the source of inspiration upon completion of the artifact. Students will engage in reflective critique and peer conversations of the presented content of their own created artifacts throughout the course and discuss with their peers the experiences and cultural backgrounds used to inspire the creation.

Explain how the course will incorporate instructor-to-student interaction.

Using the course discussion forums and/or in-class discussions, the instructor will present artifacts of the creative discipline and industry-created artifacts from other markets and cultural backgrounds. Students will deconstruct these artifacts and discuss the merits of the presentation and how the source artifact's cultural background contributes to the work in a unique way.

Explain how the course will incorporate student-to-content interaction.

Students will learn about various markets and how products evolve throughout time and from different cultural markets and what historical-cultural influences lead to those differences. Students will learn design principles and differences from these historical-cultural artifacts and how they succeeded (or failed) in these markets to better understand how to tailor their content for a higher degree of success in these markets.

Explain how the course will incorporate student-to-self interaction (metacognitive).

Students will be expected to build on the concepts from previous discussions and class examples to allow them to blend a wide variety of cultural influences into their work throughout the course. Students will study cultural content for their work and translate it into their work for effective communication and reflection of the researched culture by an end-user of the student's artifact design.