I. **OVERVIEW**
The following information will appear in the 2009 - 2010 catalog

**CMPGR 225 3D Graphics and Animation** 3 Units

**Recommended for Success:** Before enrolling in this course, students are strongly advised to have a basic working knowledge of personal computers including: turning on and off a computer system correctly; starting programs, moving and resizing windows, the Start Menu, understanding how a computer is organized; manipulating a mouse, including selecting, double clicking, and dragging items; naming, saving, and deleting files; using portable flash memory and other common storage devices.

Graphic and animation techniques utilizing microcomputers and 3D software. 3D modeling, scene composition, materials editing, object and camera movement, character development, and story boarding will be explored. Students will have intensive hands-on experience with IBM or MAC graphic systems and related peripheral devices.

Three maximum completions.
Field trips might be required.  (A-F or P/NP - Student choice) Lecture /Lab

**Transfer:** (CSU)

II. **LEARNING CONTEXT**

Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. **COURSE CONTENT**

1. **Required Content:**

   A. Introduction

   1. 3D graphics as virtual photography
   2. Metaphor of camera, sun and lights
   3. Use of light by masters of painting and photography
   4. History of computer graphics and animation

   B. Hardware and software

   1. System requirements and options
   2. Overview of MJC hardware and software
   3. Discussion of interrelationship with other classes
   4. Rendering time and assignment planning

   C. Basic scene composition

   1. Arranging physical models and lights
   2. Composition with primitives, light and shadow

   D. Modeling and primitives

   1. Assemblage of physical objects
   2. Assemblage of 3D primitives
   3. Creation of still life environment and lighting
4. Boolean operations within that environment

E. Materials and mapping

1. Basic materials properties
   a. ambience
   b. diffusion
   c. specularity

2. Mapping types
   a. texture
   b. opacity
   c. bump maps

3. Application of surface maps and properties

F. Modeling tools and methods

1. Generation of planar surfaces
2. Surfaces of revolution
3. Extrusion
4. lofting

G. Complex environments and objects

1. Creating a building
2. Creating a vehicle
3. Environments: land, underwater, space
4. Revisiting concepts of scene composition

H. Animation fundamentals

1. Animated properties
2. Object rotation
3. Object movement
4. Camera movement
5. Paths
6. Bones
7. Kinematics

I. Character creation

1. History of inanimate objects as characters in film
2. Elements of character
3. Audience identification
4. Character model sheets and sketchbooks
5. 3D character and appropriate environment
6. Object and material libraries

J. Economy and time planning
1. Re-use and modification of objects and materials
2. Storyboarding
3. Editing and action planning

K. Telling a story

1. Final project

2. **Required Lab Content:**

   A. Introduction
      1. 3D graphics as virtual photography
      2. Metaphor of camera, sun and lights
      3. Use of light by masters of painting and photography
      4. History of computer graphics and animation
   
   B. Hardware and software
      1. System requirements and options
      2. Overview of MJC hardware and software
      3. Discussion of interrelationship with other classes
      4. Rendering time and assignment planning
   
   C. Basic scene composition
      1. Arranging physical models and lights
      2. Composition with primitives, light and shadow
   
   D. Modeling and primitives
      1. Assemblage of physical objects
      2. Assemblage of 3D primitives
      3. Creation of still life environment and lighting
      4. Boolean operations within that environment
   
   E. Materials and mapping
      1. Basic materials properties
         a. ambience
         b. diffusion
         c. specularity
      2. Mapping types
         a. texture
         b. opacity
         c. bump maps
      3. Application of surface maps and properties
   
   F. Modeling tools and methods
      1. Generation of planar surfaces
      2. Surfaces of revolution
      3. Extrusion
      4. Lofting
   
   G. Complex environments and objects
      1. Creating a building
      2. Creating a vehicle
      3. Environments: land, underwater, space
      4. Revisiting concepts of scene composition
   
   H. Animation fundamentals
      1. Animated properties
      2. Object rotation
      3. Object movement
      4. Camera movement
      5. Paths
      6. Bones
      7. Kinematics
   
   I. Character creation
      1. History of inanimate objects as characters in film
      2. Elements of character
      3. Audience identification
4. Character model sheets and sketchbooks  
5. 3D character and appropriate environment  
6. Object and material libraries  
J. Economy and time planning  
   1. Re-use and modification of objects and materials  
   2. Storyboarding  
   3. Editing and action planning  
K. Telling a story  
   1. Final project  

B. **ENROLLMENT RESTRICTIONS**  
   1. **Advisories**  
      
      Before enrolling in this course, students are strongly advised to have a basic working knowledge of personal computers including: turning on and off a computer system correctly; starting programs, moving and resizing windows, the Start Menu, understanding how a computer is organized; manipulating a mouse, including selecting, double clicking, and dragging items; naming, saving, and deleting files; using portable flash memory and other common storage devices.  

C. **HOURS AND UNITS**  

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<tr>
<th>INST METHOD</th>
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D. **METHODS OF INSTRUCTION (TYPICAL)**  

*Instructors of the course might conduct the course using the following method:*  

1. Lectures and discussion  
2. Instructor demonstration of each assignment via computer and projector  
3. Student presentation of their work  
4. Instructor-produced video tutorials where needed  
5. Hands-on laboratory assignments and projects  
6. Professional examples on video  
7. Many assignments will be presented as challenges to be solved with invention and creative solutions  
8. Students will be encouraged to use manuals and tutorials to find answers to problems encountered  
9. Group projects create new sets of expectations and responsibility to peers  

E. **ASSIGNMENTS (TYPICAL)**  

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**  

*Time spent on coursework in addition to hours of instruction (lecture hours)*  

- Practical projects given on a weekly basis  
- One major final project consisting of a finished 3d animation utilizing all concepts covered during the semester
EVIDENCE OF CRITICAL THINKING

Assignments require the appropriate level of critical thinking

- Utilize 3D creation, transform, and user interface tools to create a still life arrangement
- Use polygon modeling techniques to model a robot. It can be your own design or your favorite robot character. However simple or complex the design you choose, you and you alone must create the model from scratch.
- Use the joint creation and manipulation tools to create a functional rig for a character model, and connect the model to the rig using parent binding and smooth binding.

F. TEXTS AND OTHER READINGS (TYPICAL)


III. DESIRED LEARNING

A. COURSE GOAL

As a result of satisfactory completion of this course, the student should be prepared to:

use industry standard 3D and support applications to create professional quality 3D still images and animations.

B. STUDENT LEARNING GOALS

Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. Required Learning Goals

   Upon satisfactory completion of this course, the student will be able to:

   a. Demonstrate proficiency at 3D image creation and animation
   b. Identify the computer system requirements and options for creating 3D graphics including CPU speed, RAM, and hard drive capacity
   c. Identify a variety of software applications which can achieve their goals as 3D artists and animators.
   d. Recognize the tools and nomenclature of 3D software
   e. Describe the issues of output related to finished products including resolution, animation frames per second, web issues, and video issues
   f. Demonstrate an understanding of the elements of visual composition
   g. Demonstrate an understanding of character development and story telling
   h. Appraise how their achievements relate to industry standards
   i. Evaluate requirements of video portfolios
   j. Appraise some of the process which lies behind professional computer graphic production

2. Lab Learning Goals

   Upon satisfactory completion of the lab portion of this course, the student will be able to:

   a. Demonstrate proficiency at 3D image creation and animation
b. Identify the computer system requirements and options for creating 3D graphics including CPU speed, RAM, and hard drive capacity

c. Identify a variety of software applications which can achieve their goals as 3D artists and animators.

d. Recognize the tools and nomenclature of 3D software

e. Describe the issues of output related to finished products including resolution, animation frames per second, web issues, and video issues

f. Demonstrate an understanding of the elements of visual composition

g. Demonstrate an understanding of character development and story telling

h. Appraise how their achievements relate to industry standards

i. Evaluate requirements of video portfolios

j. Appraise some of the process which lies behind profesional computer graphic production

k. SECOND COMPLETION:

l. Demonstrate updated skills reflecting current industry standards as software tools, interface and functions evolve in new versions.

m. THIRD COMPLETION:

n. Demonstrate updated skills reflecting current industry standards as software tools, interface and functions evolve in new versions.

IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT

1. Graded application assignments and projects

2. Graded presentation of projects

B. SUMMATIVE ASSESSMENT

1. Finished final 3D animation project