

CATALOG INFORMATION

Dept and Nbr: APTECH 64      Title: 3D ANIM: VFX, CHAR, COM  
Full Title: 3D Animation: Visual Effects, Character Anim. & Compositing  
Last Reviewed: 11/13/2017

| Units   |      | Course Hours per Week |      | Nbr of Weeks | Course Hours Total |       |
|---------|------|-----------------------|------|--------------|--------------------|-------|
| Maximum | 4.00 | Lecture Scheduled     | 3.50 | 17.5         | Lecture Scheduled  | 61.25 |
| Minimum | 4.00 | Lab Scheduled         | 1.50 | 6            | Lab Scheduled      | 26.25 |
|         |      | Contact DHR           | 0    |              | Contact DHR        | 0     |
|         |      | Contact Total         | 5.00 |              | Contact Total      | 87.50 |
|         |      | Non-contact DHR       | 0    |              | Non-contact DHR    | 0     |

Total Out of Class Hours: 122.50

Total Student Learning Hours: 210.00

Title 5 Category: AA Degree Applicable  
Grading:              Grade Only  
Repeatability:      39 - Total 2 Times  
Also Listed As:  
Formerly:

**Catalog Description:**  
This course focuses on the animation of digital characters in effects-rich environments. Using Autodesk 3ds Max software, students will apply classical mechanics of movement to create expressive performances with 3D characters. Advanced techniques for creating complex visual effects, lighting and rendering will be covered. Complementary software may be used for additional effects work, and for compositing student animations with real world imagery.

**Prerequisites/Corequisites:**  
Course Completion of APTECH 43 ( or APTECH 53)

**Recommended Preparation:**

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: This course focuses on the animation of digital characters in effects-rich environments. Using Autodesk 3ds Max software, students will apply classical mechanics of movement to create expressive performances with 3D characters. Advanced techniques for creating complex visual effects, lighting and rendering will be covered. Complementary software

may be used for additional effects work, and for compositing student animations with real world imagery. (Grade Only)

Prerequisites/Corequisites: Course Completion of APTECH 43 ( or APTECH 53)

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Total 2 Times

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                      |                      |                        |           |
|----------------------|----------------------|------------------------|-----------|
| <b>AS Degree:</b>    | <b>Area</b>          | Effective:             | Inactive: |
| <b>CSU GE:</b>       | <b>Transfer Area</b> | Effective:             | Inactive: |
| <b>IGETC:</b>        | <b>Transfer Area</b> | Effective:             | Inactive: |
| <b>CSU Transfer:</b> | Transferable         | Effective: Spring 2011 | Inactive: |
| <b>UC Transfer:</b>  |                      | Effective:             | Inactive: |

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

Upon completion of the course, students will be able to:

1. Apply a production pipeline structure typical of professional film and broadcast work, and adhere to a production schedule.
2. Apply traditional animation principles and classical mechanics of movement to 3D characters.
3. Use the Biped functions of 3ds Max to create simple footsteps, gaits and freeform animations.
4. Apply motion capture data to digital characters.
5. Animate custom character rigs to create expressive performances.
6. Use lip-synchronization techniques to animate their character's speech.
7. Apply Mental Ray lighting systems and materials.
8. Use the particle systems and dynamics tools of 3ds Max to create and modify complex visual effects.
9. Output realistic and/or imaginary scenes and atmospheric effects with multiple render passes.
10. Use node-based and/or layer based compositing software to composite multiple render passes and to create additional visual effects.
11. Use node-based and/or layer based compositing software to mix multiple video and audio tracks.
12. Use compositing and motion-tracking software to create broadcast quality renderings that incorporate real-world and computer-generated imagery.
13. Repeating students will:
  - a. Update their skills on new software releases.
  - b. Utilize new toolsets and applications related to new software releases.
  - c. Increase the level of complexity and sophistication of their projects.

**Topics and Scope:**

- I. Pipeline review and animation project guidelines
  - A. Student project review and revision procedures
  - B. Production break down and scheduling
- II. Principles of character animation
  - A. Laws of motion
  - B. Squash & stretch
  - C. Line of action
  - D. Silhouette
  - E. Overlapping action
  - F. Pose-to-pose vs. straight-ahead animation
- III. Animating the Biped
  - A. Biped basics:
    - 1. Forward kinematics and inverse kinematics elements
    - 2. Trajectories
  - B. Footsteps and walk cycles
  - C. Conversion to freeform animation
  - D. Quadruped Biped
  - E. Using motion capture files
    - 1. Motion Mixer
    - 2. Motion Flow
- IV. Animating custom character rigs
  - A. User interfaces and custom attributes
  - B. Keyframing
    - 1. Auto key vs. set key
    - 2. The dope sheet - graph editor
  - C. Blocking & polishing passes
  - D. Simple animation tests: weight and force
  - E. Lip-synching
    - 1. Phonemes
    - 2. Visemes
  - F. Final project animations
    - 1. Expression and mood changes
    - 2. Breakdown poses
    - 3. Finishing touches
- V. Lighting & rendering: Mental Ray
  - A. Shot layout
    - 1. Test renders
    - 2. Colored lights
  - B. Simulating indirect lighting
    - 1. Global illumination
    - 2. Final gather
    - 3. Ambient/reflective occlusion shader
  - C. Caustics & volumetric effects
  - D. Saving & reusing data
  - E. Image-based lighting
  - F. Environment lighting: various conditions
  - G. Match-lighting
    - 1. Background plates
    - 2. Matching real-world cameras
  - H. Multipass rendering
- VI. Visual effects: Particle systems

- A. Particle flow
  - 1. Operators
  - 2. Tests, forces/space warps, deflectors
- B. Advanced particle flow effects
  - 1. Animating materials
  - 2. Instancing animated meshes
  - 3. Splitting flows
- VII. Compositing & editing
  - A. Compositing multi-pass renders
  - B. Motion tracking with Mocha and After Effects
  - C. Combining live action with CG (computer generated) objects & visual effects
  - D. Combining pre-rendered & stock footage with CG animation
    - 1. Pre-keyed action footage: pyrotechnics
    - 2. Using background plates
  - E. Basic editing with Adobe After Effects &/or Composite
    - 1. Overlapping video clips, effects & transitions
    - 2. Audio mixing and synchronizing
    - 3. Export formats & procedures
- VIII. With Repeat:
  - A. New software releases
  - B. New toolsets and applications related to new software releases
  - C. Complexity and sophistication of projects

### **Assignment:**

Note: Listed below are representative assignments; actual projects will take into consideration new software features, class expertise, etc.

- 1. Basic Biped exercises (1-2)
- 2. Freeform Biped animations (1-2)
- 3. Biped motion capture exercises using Motion Mixer and Motion Flow (1-2)
- 4. Posing characters exercises: Silhouette and Line of action (2-3)
- 5. Character animations (Biped or custom rig) (2 or more)
- 6. 3D effects and lighting exercises (2-5)
- 7. Compositing exercises (2-4)
- 8. Textbook reading (minimum of 20-25 pages per week)
- 9. Final project scene: A movie clip of animated character(s) in an effects-rich environment (~10 to 20 seconds long)
- 10. Repeating students will accomplish assignments using new software features, and complete projects of increasing complexity.

### **Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Freeform Biped animation, Posing, Character animations.

Problem solving  
20 - 40%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Basic Biped, motion capture, 3D effects, and compositing exercises; Final projects scene: animated movie clip.

Skill Demonstrations  
60 - 80%

**Exams:** All forms of formal testing, other than skill performance exams.

None

Exams  
0 - 0%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category  
0 - 0%

### **Representative Textbooks and Materials:**

Character Animation: 2D Skills for Better 3D, Steve Roberts, Focal Press 2007

The Animator's Survival Kit, Revised Edition, Richard Williams, Faber & Faber Limited 2009

Instructor prepared materials