

## **CTAN 464L Digital Lighting and Rendering 17913D Lec-Lab**

2 Units

Fall 2010 Semester

Mondays 7-9:50pm RZC 117

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SA: Elyse Kelly

### **Course Description:**

This course will survey the tools and techniques to successfully create cinematic lighting and rendering in computer-generated imagery (CGI), using Autodesk Maya 3D animation software. The course will assist the advancing animation or visual effects student with all aspects of CGI rendering, from developing fully digital scenes to integrating CGI with live-action. Traditional direct lighting as well as advanced global illumination techniques used in the visual effects industry will be presented. The course will encompass a series of hands-on workshops, so a prior working knowledge of Maya is essential. Approaches to final compositing is also covered using The Foundry Nuke 5.0.

### **Prerequisites:**

CTAN 462, Visual Effects: Contemporary Approaches to Image Creation, or  
CTAN 452, Introduction to Maya

### **Course Length:**

15 weeks, meeting once a week. Three hours each class meeting, totaling 45 hours total instruction.

### **Books Required:**

"Advanced Maya Texturing and Lighting" (second edition), Lee Lanier, Sybex, 2008. (\$38.00)

### **Optional Books:**

"Digital Lighting and Rendering" (second edition), Jeremy Birn, New Riders 2000. (\$35.00)

"Encyclopedia of Visual Effects", Damian Allen and Brian Connor, Peachpit Press 2006. (\$40.00)

"Matter of Light and Depth", Ross Lowell, Lowel-Light, 1992. (\$35.00)

"Light-Science and Magic", Fil Hunter, Focal Press, 2007. (\$32.00)

"Lighting for Television and Film", Gerald Millerson, Focal Press, 1991. (\$45.00)

"Maya 6 Killer Tips", Eric Hanson, New Riders 2004. (\$26.00)

"The Art of Maya", Alias Wavefront, 2000. (\$60.00, [www.sybex.com](http://www.sybex.com))

### **Optional Educational DVD's:**

"Practical Light and Color", Jeremy Vickery, The Gnomon Workshop, 2007.

"Digital Sets 2- Lighting and Texturing", Eric Hanson, The Gnomon Workshop, 2005.

"Digital Sets 3- Rendering and Compositing", Eric Hanson, The Gnomon Workshop, 2005.

### **Software Used:**

Autodesk Maya 2011, Mental Ray, Pixar RenderMan, Foundry Nuke 6.0, Adobe Photoshop CS4

**Grading Breakdown:**

Participation @10%  
Weekly Assignments @30%  
Final Project @30%  
Final Exam 30%

**Class Schedule:****Week 1- 8/23: *Introduction to CGI Lighting***

Basics of Cinematic Lighting  
Light Properties  
Key to Fill Ratio  
Establishing Emotion  
Establishing Key  
Working with Color  
Review of CG Light Sources

*Assignment: Light Scene*

*Required Reading pg. 22-32, 1-21 Lanier*

**Week 2- 8/30: *Character Lighting and Direct Lighting Fundamentals***

3 Point Setup  
Basic Maya Rigs  
IPR  
Direct Lighting Technique  
Direct Lighting Rigs  
Light Linking  
Lighting Interiors  
Point Arrays

*In-Class Exercises- Buddha, Cave Temple*

*Assignment: Light Scene- 3 Point, Hi/Lo Key,*

*Required Reading pg. 38-51, 62, 69-99 Lanier*

**Week 3- 9/6: Labor Day – No Class!!**

*Assignment: Light Scene- Interior of Room*

*Required Reading pg. 53, 62, 69-99 Lanier*

## **Week 4- 9/13: Direct Lighting Fundamentals 2**

Shadow Mapping  
Color Mapping  
Incandescence Mapping  
Shader Glow Blooms  
OptiFX Review  
Fogs, Glows, Flares  
Lighting Exteriors  
Environment Skies  
HDR Cheats

*In-Class Exercises*

*Assignment: Light Scene- Lighthouse*

*Required Reading pg. 54-60 Lanier*

## **Week 5- 9/20: Global Illumination Fundamentals**

Global Illumination Terms  
Mental Ray Review  
HDR Lighting  
Physical Sky  
Photon Mapping  
Hemispherical Sampling  
Caustics  
Subsurface Scattering  
Portal Light  
Renderman

*In-Class Exercises- MR ex, Hand*

*Assignment: Light Scene- Car w/ HDR*

*Required Reading pg. 338-357, 375-411, 416-424 Lanier*

## **Week 6- 9/27: Introduction to Texturing 1**

Texturing Fundamentals  
UV Mapping  
3D Texture Painting  
Texture Nodes- 2D  
Texture Nodes- 3D  
Label Mapping  
Projection Types

*In-Class Exercises:*

*Assignment: UV Map Scene- Silo*

*Required Reading pg. 103-133, 266-272 Lanier*

## **Week 7- 10/4: Introduction to Texturing 2**

Animated Maps  
Mipmaps  
Mapping Fractal Noise  
Ramp Texture  
Layered Textures  
Environment Textures  
PSD Texture Node

*In-Class Exercises*

*Assignment: Texture Scene- Silo, Train*

## **Week 8- 10/11: Introduction to Shaders 1**

Basic Shader Review  
Advanced Shader Review  
Shader Networks  
Data Types and Flow  
Color Mult and Offset  
Age and Weathering  
Specular Mapping

*In-Class Exercises- Sunset, Ramp, Weathering*

*Assignment: Render Scene- Train, Silo*

*Required Reading pg. 170-176, 234 Lanier*

## **Week 9- 10/18: Introduction to Shaders 2**

Rendering Metals  
Bump and Displacement Mapping  
Rendering Glass  
Use Background Shader

*In-Class Exercises*

*Assignment: Render Scene- Train, Silo*

*Required Reading pg. 129-133, 289-293, 366-371 Lanier*

## **Week 10- 10/25: Introduction to Shaders 3**

Utility Nodes  
Facing Ratio  
Surface Luminance  
FX Animation w/ Shaders

*In-Class Exercises*

*Assignment: Render Scene-Train, Silo*

*Required Reading pg. 201-227 Lanier*

### **Week 11- 11/1: Camerawork**

Basic Camera Attributes  
Perspective Correction  
Camera Animation Strategies  
Curve Randomization  
Shaker Node  
Tracked Curves  
Multi-Node Camera Setup  
Motion Control Rigs  
Camera Projection

*In-Class Exercises*

*Assignment: Animate Camera in Scene*

### **Week 12- 11/8: Production Rendering**

Rendering by Layer  
Z-Depth Rendering  
OpenEXR Format  
Depth of Field  
Vector Motion Blur

*In-Class Exercises*

*Assignment: Render Scene- Train, Silo*

*Required Reading pg. 301-331, 405, 438-445 Lanier*

### **Week 13- 11/15: Compositing Technique in Rendering**

Nuke vs Shake vs AfterEffects  
Nodal Trees  
Sweetening CG Renders

*In-Class Exercises*

*Assignment: Composite Scene- Train, Silo*

### **Week 14- 11/22: Wrap Up/ Studio Help**

### **Week 15- 11/29: Wrap Up/ Last Class**

**Week 16- 12/6: *STUDY WEEK- NO CLASS***

**Week 17- 12/13: *FINAL EXAM***

#### **STUDENTS WITH DISABILITIES:**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure that the letter is delivered to the Professor as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

#### **MISSING AN EXAM, INCOMPLETES:**

The only acceptable excuses for missing an exam or taking an incomplete in the course are personal illness or a family emergency. Students must inform the professor before the exam and present verifiable evidence in order for a make-up to be scheduled. Students who wish to take incompletes must also present documentation of the problem to the instructor or teaching assistant before final grades are due.

#### **ACADEMIC INTEGRITY:**

The School of Cinematic Arts expects the highest standards of academic excellence and ethical performance from USC students. It is particularly important that you are aware of and avoid plagiarism, cheating on exams, submitting a paper to more than one instructor, or submitting a paper authored by anyone other than yourself. Violations of this policy will result in a failing grade and be reported to the Office of Student Judicial Affairs. If you have any doubts or questions about these policies, consult "SCAMPUS" and/or confer with the professor or TA.