



**CTAN-464 Digital Lighting Rendering**

**Units: 2**

**FALL 2024 — Thursday Night — 7:00pm-9:50pm (PST)**

**Location: Zemeckis, RZC-117**

**Instructor:** *Alessandro Jacomini*

**Contact Info:** *jacomini@usc.edu*

**Office Hours:** *available upon request*

**Teaching Assistant:** **Ciara Borgards**

**Contact Info:** *borgards@usc.edu*

**Lab Hours:** *Thursday 4:00-6:50pm*

**Contact Info:**

**IT Help:** *Creative Tech Help Desk*

**Contact Info:** [creativetech@sca.usc.edu](mailto:creativetech@sca.usc.edu),

**Contact Info Phone:** *213-821-4571*

## **Land Acknowledgement**

USC acknowledges that we are on the traditional land of the Tongva People. For thousands of years, the Tongva people lived on this land we occupy today and were considered the most powerful indigenous peoples to inhabit the Los Angeles basin. Along with the Tongva, we also recognize the Chumash, Tataviam, Serrano, Cahuilla, Juaneño, and Luiseño People, for the land that USC also occupies around Southern California. To learn about the Indigenous land on which your learning location resides, please visit [Native-Land.ca](http://Native-Land.ca) to discover the Original People of your home.

## **This is an in-person class**

### **Course Description**

This course focuses on developing a comprehensive understanding of the role and potential of digital lighting and rendering techniques in the creation of computer-generated imagery, both as a standalone process and within the framework of a modern studio CGI production pipeline. It will provide an overview of the theory and techniques involved in creating images that effectively utilize lighting to enhance storytelling and evoke emotions. Additionally, students will participate in a series of hands-on workshops and homework assignments, engage in collaborative in-class discussions, and receive constructive feedback on their work.

Familiarity with Maya, Arnold and Nuke is recommended although the objective is to understand and learn concepts that can be applied to other 2d and 3d packages as well.

### **Learning Objectives**

Students will gain proficiency in the foundational elements required to utilize both basic and advanced CGI lighting and rendering techniques effectively and purposefully. Upon completion of this course, students - particularly those interested in the cinematic arts - will have gained a deeper understanding of the principles and practices involved in enhancing the visual impact of their future projects. Moreover, they will have developed greater skill in using lights and shadows to convey and interpret narrative elements within their work

**Prerequisite(s):** CTAN 462, Visual Effects, or CTAN 452, Introduction to 3D Computer Animation

**Co-Requisite(s):** None

**Concurrent Enrollment:** None

**Recommended Preparation:** Linked-in Learning (via [my.usc.edu](http://my.usc.edu)), Maya and Nuke Essential Training, Maya Learning Channel on YouTube

### **Course Notes**

Grading will be Letter (A, B, C, etc.) or Credit/No Credit if applicable. We will conduct all classes in person. Blackboard will be used for Announcements, Class Notes, Video Links and Tutorials as well as the Mid Term Questionnaire and Final Test/Questionnaire. Assignments are turned in on Google Drive.

### **Technological Proficiency and Hardware/Software Required**

Basic computer proficiency is assumed. Maya, Arnold rendering plugin, Nuke compositing software, Adobe Photo Shop and Substance if necessary. A willingness to learn new software packages is necessary as is a familiarity with Windows or Mac based desktop environment.

### **Required Readings and Supplementary Materials**

Any required reading will be provided by instructor in the form of links, or digital handouts.

Supplementary materials also take the form of free tutorials can be found in the following link via the [my.usc.edu](http://my.usc.edu) web page. See [my.usc.edu](http://my.usc.edu) web portal page, open all links and find the Lynda.com link/button. Other supplemental Online Help can often be found through Blackboard links to the various software tutorials referenced in class. These will be discussed in class.

### **Optional Reading Materials**

"The Visual Story", Bruce Block, Focal Press, 3<sup>rd</sup> Edition.

"Painting with Light", John Alton, University of California Press, 2013  
 "Digital Lighting and Rendering", Jeremy Birn, New Riders, 3<sup>rd</sup> Edition.  
 "Essential Lighting Techniques", Darren Brooker, Focal Press, 2002  
 "Digital Compositing for Film and Video", Steve Wright, Focal Press, 2017.  
 "The Art and Science of digital compositing", Ron Brinkmann, Morgan Kaufmann, 2<sup>nd</sup> Edition.  
 "Matters of Light and Depth", Ross Lowell, Broad Street Publishing, 1992  
 "Cinematography Theory and Practice", Blain Brown, Focal Press, 4<sup>th</sup> Edition.

## Description and Assessment of Assignments

For the homework section of class, students will be producing imagery in Maya, with Rendering Plugins Arnold and compositing in Nuke. Students should complete the homework and turn it in on the following class date. We will review in class when time permits as part of the learning process and evaluate progress as the class moves forward. The final test/project is an animated shot or shots sequence and is evaluated in terms of what is taught in class: overall look and feel, design and composition, final lighting and compositing.

## Grading Breakdown

**Participation:** 10% - Questions and discussion of relevant topics presented in class are encouraged

**Homework:** 60% - A set of 10 homework assignments, 6 points each

**Class Final Project:** 30 % - Due December 9<sup>th</sup>. The final project consists of animated renderings of three 3d scene. The work will serve to demonstrate the range of techniques and artistic skills learned in the class, and allow the student to show how their knowledge of lighting and rendering is applied to their own work.

Assessment Tool (assignments)	Points	% of Grade
<i>10 Homework Assignments. 6pt each</i>	<i>60</i>	<i>60</i>
<i>Participation</i>	<i>10</i>	<i>10</i>
<i>Final Project</i>	<i>30</i>	<i>30</i>
<b>TOTAL</b>	<i>100</i>	<i>100</i>

## Grading Scale

Course final grades will be determined using the following scale

A	95-100
A-	90-94
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

## Assignment Submission Policy

Homework assignments should be copied/submitted to the Google Drive area before the next class date. Final Project is due on the last day of class, submitted to the Google Drive area. Quiz and Tests would eventually to be taken on specified dates using Blackboard

## Grading Timeline

Homework will be given credit when turned in. Mid Term Questionnaire and Final Test/Questionnaire are graded through Blackboard

## Additional Policies

Students are expected to be on time and prepared for each class. When assignments are late or not completed the grade may be lowered up to one full grade.

## Attendance

No portion of the grade may be awarded for class attendance, but non-attendance can be the basis for lowering the grade, when clearly stated on the syllabus. Attendance policies may address student athletes with approved Travel Request Letters and students who give advance notice of religious observation.

## Participation

Participation is intended and credited as students active contribution to the classes review process and presentation of the student own homework and attention to others own presentations, contribution and attention to in class conversation and in class work.

## Course Schedule

	Course Schedule: A Daily Breakdown	
	Topics/Daily Activities	Assignments
<b>Week 1</b> 08/29	<b>Class 1, Introduction to CG Lighting</b> <i>Welcome Students, Course Overview. Lighting and Cinematography Language. Lighting Fundamentals Introduction.</i>	<b>Homework 1</b> – <i>Studio scene with geometric solids. Match assigned cgi reference in b/w</i>  <i>Due 9/04</i>
<b>Week 2</b> 09/05	<b>Class 2, Basic Lighting Principles</b> <i>Intro to light, Reflected light, Refracted light, Color temperature. Light in art &amp; photography. Lighting Styles. Lighting Qualities.</i> <b>In Class Review: Homework 1</b>	<b>Homework 2</b> – <i>Studio scene with geometric solids. Match assigned reference in color</i>  <i>Due 9/11</i>
<b>Week 3</b> 09/12	<b>Class 3, Character Lighting Part 1</b> <i>Three Point Lighting, The Art of Character Lighting. Lighting setups: wrap, front, fill. Films breakdown examples.</i> <b>Workshop: Character Close Up Wrap Lighting</b> <b>In Class Review: Homework 2</b>	<b>Homework 3</b> – <i>Studio character CU Set-up #1 match assigned cgi reference</i>  <i>Due 9/18</i>
<b>Week 4</b> 09/19	<b>Class 4, Character Lighting Part 2</b> <i>Background-Foreground separation, readability, appeal, storytelling. Believability and the art of cheating. Lighting eyes. Lighting a diverse cast: Skin types and subsurface.</i> <b>In Class Review: Homework 3</b>	<b>Homework 4</b> – <i>Studio character CU Set-up #2 match live action mood and feel reference</i>  <i>Due 9/25</i>

<p><b>Week 5</b> 09/26</p>	<p><b>Class 5, Outdoor + Indoor Lighting Part 1</b> Natural lighting (outdoor): sun light and sky light, scattering and cloud cover. The lighting through the day. Atmospheric effects. Global illumination &amp; Hdri lighting. Skies and set extensions. <b>Workshop:</b> Creating hdr map using HDREye app <b>In Class Review:</b> Homework 4</p>	<p><b>Homework 5 – Interior office #1, character posed, wide camera angle. Match assign cgi reference</b>  Due 10/02</p>
<p><b>Week 6</b> 10/03</p>	<p><b>Class 6, Outdoor + Indoor Lighting Part 2</b> Artificial light (indoor): candle lights, practical indoor / outdoor lights, indoor film references review. Light projections: cucoloris, barn doors, shape lights, les curves. Lighting Volumetrics, type of volumes. <b>In Class Review:</b> Homework 5</p>	<p><b>Homework 6 – Interior office #2, character posed, wide camera angle. Match assign live action mood and feel reference</b>  Due 10/09</p>
<p><b>Week 7</b> 10/10</p>	<p><b>FALL RECESS - 10/10-10/11</b> Enjoy your time Off!</p>	<p><b>No Homework 7 Assigned</b></p>
<p><b>Week 8</b> 10/17</p>	<p><b>Class 8, Basic Compositing Principles</b> Multilayer renders: layers and passes. Render Outputs an Aovs. Render mattes. The Exr format. Basic compositing nodes. Graph organization, elements integration. Compositing do and don't. <b>Workshop:</b> Nuke session <b>In Class Review:</b> Homework 7</p>	<p><b>Homework 8 – Interior office #3, character posed, wide camera angle. Render in separate layer and composite. Match assign color key reference.</b>  Due 10/23</p>
<p><b>Week 9</b> 10/24</p>	<p><b>Class 9, Materials + Rendering Part 1</b> Introduction to rendering: the basics, ray tracing, light reflection, light rays. <b>In Class Review:</b> Homework 8</p>	<p><b>Homework 9 - Exterior restaurant #1, character posed, wide camera angle. Use the hdri image and same time of day to light the scene.</b>  Due 10/30</p>
<p><b>Week 10</b> 10/31</p>	<p><b>Class 10, Materials + Rendering Part 2</b> Review basic shaders types and their attributes <b>Workshop:</b> Arnold shaders session <b>In Class Review:</b> Homework 8</p>	<p><b>Homework 9 – Exterior restaurant #1, character posed, wide camera angle. Use volumetric, change material properties to match and live action assigned reference</b>  Due 11/06</p>

<b>Week 11</b> 11/07	<b>Class 11, Camera + Composition</b> <i>Camera frame, aspect ratio, exposure. Optical extremes: lens flare, lens distortion, lens aberration. Composition and directing the eye. Perspective. Principle and components of an image. Principle and components in classic animation.</i> <b>In Class Review:</b> Homework 9	<b>Homework 10 -</b> <i>Animated marketing toolkit: lighting animated character performing with prop, in studio interior.</i>  Due 11/13
<b>Week 12</b> 11/14	<b>Class 12, Key-Master Lighting + Propagation</b> <i>Color script, color keys and references. Shot planning and shot/lighting/compositing strategies. Rough to fine. Naming conventions. Shot Lighting: depth, directing the eye, emotions, plussing and finessing.</i> <b>In Class Review:</b> Homework 10 <b>Workshop:</b> Presentation Final assignment.	<b>Presentation final project:</b> <i>Interior/Exterior, character is animated, 3 shots (1 exterior, 2 interiors). Match the assigned references.</i>
<b>Week 13</b> 11/21	<b>Class 13, Lighting Strategies + Studio Pipeline</b> <i>The life of a shot: from script to storyboard to color timing. Departments and roles. Interaction with other departments. Foundation lighting. Lighting strategies. Post process and color timing.</i> <i>A case Study: Lighting and Cinematography on Encanto (part 1)</i> <b>In Class Review:</b> feedback session	<b>No Homework</b> <i>No homework due, spend time on Final Project, due 12/06</i>
<b>Week 14</b> 11/28	<b>Thanksgiving Break</b> 11/27 to 01/01	<b>No Class</b>
<b>Week 15</b> 12/05	<b>Class 13 – Lighting Observation + Critique</b> <i>Understanding, Evaluating and Appreciating images. Vision, perception, and imaging. Selection, Gestalt, Illusion and Ambiguity. Perception and attention. Purpose and Process of reviews in production.</i> <i>A case Study: Lighting and Cinematography on Encanto (part 2)</i> <b>In Class Review:</b> feedback session	<b>No Homework</b> <i>No homework due, spend time on Final Project, due 12/11</i>
<b>Study Days</b> 12/07-12/10	<b>Saturday, December 7th – Tuesday, December 10th</b> <i>No final examinations may be scheduled on Study Days.</i>	<b>Study Days before Final project due 12/11</b>
<b>Final Class</b> 12/12	<b>Class 14: Final Project</b> <i>In Class Screening and Review of Final Projects and open conversation.</i>	<b>Final Project due</b>  12/12 7-9pm

### **This is an in-person class**

In accordance with university recommendations, all meetings of this class will be held in person. Students who become ill and need to self-isolate will be supported in their efforts to stay current with classwork and assignments, to the extent possible. Please contact Prof. Alessandro Jacomini and your SA Ciara Borgard at least one hour prior to class start time if you become ill and need to self-isolate. Do not come to class if you are experiencing any symptoms of COVID-19 or other illnesses.

Timely attendance is mandatory and failure to attend all class sections from beginning to end may affect grades.

- Exemptions will be allowed on a case-by-case basis and must be supported by a written accommodation request from the USC Office of Student Accessibility Services (OSAS).

- Students who become ill and need to self-isolate will be supported in their efforts to stay current with classwork and assignments.

Students must contact the professor or SA 24 hours prior to class start time if they need to miss class for any reason.

Info on use of AI Generators in the John C. Hench Division of Animation and Digital Arts

In this course, AI may be used as reference or inspiration for your work, but we do not accept AI-generated art as your own original work as it is deemed derivative of other works whose originators may not have granted permission for its use.

You should also be aware that AI text generation tools may present incorrect information, biased responses, and incomplete analyses; thus, they are not yet prepared to produce text that meets the standards of this course. To adhere to our university values, you must cite any AI-generated material (e.g., text, images, etc.) included or referenced in your work and provide the prompts used to generate the content. Using an AI tool to generate content without proper attribution will be treated as plagiarism and reported to the Office of Academic Integrity. Please review the instructions in each assignment for more details on how and when to use AI Generators for your submissions.

## **Course Content Distribution and Synchronous Session Recordings Policies**

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the internet, or via any other media. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

## **The School of Cinematic Arts Support Systems and Statements**

Diversity and Inclusion are foundational to the SCA community. We are committed to fostering a welcoming and supportive environment where students of all identities and backgrounds can flourish. The classroom should be a space for open discussion of ideas and self-expression; however, SCA will not tolerate verbal or written abuse, threats, harassment, intimidation, or violence against persons or property. If students are concerned about these matters in the classroom setting, they are encouraged to contact their SCA Diversity and Inclusion Liaison, <http://cinema.usc.edu/about/diversity.cfm>; e-mail [diversity@cinema.usc.edu](mailto:diversity@cinema.usc.edu) or anonymously submit a report on SCA Community: <https://scacommunity.usc.edu/secure/diversityEquity/> You can also read more about how to report

discrimination based on a protected class here: <https://eetox.usc.edu/get-help/what-are-my-choices-text/>

### **SCA Office of Student Services**

213-740-8358 or StudentAffairs@cinema.usc.edu

### **SCA Embedded Therapists**

Students enrolled in an SCA major program can schedule an appointment with an embedded therapist for the School of Cinematic Arts through the student health portal [MySHR](#).

### **SCA Community**

For additional SCA resources please visit [scacommunity.usc.edu](http://scacommunity.usc.edu)

### **Creative Technology and Support**

(213) 821-4571

[creativetech@cinema.usc.edu](mailto:creativetech@cinema.usc.edu)

Location: SCA 128

Support Hours: Monday - Friday, 8:30 AM - 8:30 PM

<https://knowledgebase.sca.usc.edu/>

<https://workstations.sca.usc.edu/>

### **Physical Production Office**

The Physical Production Office assists students and faculty with production-related matters including production numbers, locations, permits, insurance, gear and equipment vendors, safety issues, and crew and actor policies. More information can be found by visiting the online [Production Procedures and Safety Handbook](#). The Physical Production Office is located at SCA 304 and is open every weekday from 9am-5pm (Fridays 9am-1pm). You can also reach the Office by calling 213-740-1298 or by email at [spo@cinema.usc.edu](mailto:spo@cinema.usc.edu).

### **Office of Industry Relations**

School of Cinematic Arts - SCA 235

(213) 740-4432

[ir@cinema.usc.edu](mailto:ir@cinema.usc.edu)

### **Cinematic Arts Library Research Guide**

<https://libguides.usc.edu/cinema>

## **Statement on Academic Conduct and Support Systems**

### **Academic Integrity:**

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.



The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see [the student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

## **Students and Disability Accommodations:**

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodation is not retroactive. More information can be found at [osas.usc.edu](#). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

## **Support Systems:**

*COVID-19 Resource Center* - <https://coronavirus.usc.edu/what-should-i-do/>

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call  
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-5086 or (213) 821-8298

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu)

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.

**PLEASE NOTE:**

**FOOD AND DRINKS (OTHER THAN WATER) ARE NOT PERMITTED IN ANY  
INSTRUCTIONAL  
SPACES IN THE CINEMATIC ARTS COMPLEX**