CTAN - 485L Pipeline and Character Modeling for Animation
2.0 Units
Fall semester 2023, Tuesdays 7 - 9:50pm

Location: SCA 356 7-9:50pm

Instructor: Jaewon Lee
Office Hours: Tues 7-10pm
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Office Hours:
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IT Help: Creative Tech Help Desk
Tech support:
creativetech@cinema.usc.edu
Contact Info: 213-821-4571

Course Description

This course teaches 3D modeling and pipeline integration of 3D models for the use in production. Also, students will learn the fundamental human anatomy and practice human body modeling. Students will use modeling and texturing software to create and color their models while adhering to common standards used in production pipelines.

This is a practical class, teaching the students techniques that can be used right away to expedite the CGI asset creation process. The practical nature of the class means there is no required weekly reading but there are weekly assignments. Additional resources will be provided that are tailored to the concepts and objectives of that week.

Learning Objectives

- Learn how to create 3D model from 2D designs.
- Learn the basic human anatomy for 3D modeling fundamental
- Learn how 3D models are used in productions by other departments.
- Understand common production standards for 3D models.
- Learn the concepts for creating hair, fur, feathers, and clothing for characters.
- Create 3D models and texture them for their animation projects or personal enlightenment.
- Learning how to present their work to a group.

Recommended Preparation: Basic understanding of 3D modeling in Maya, Zbrush and using Photoshop is advisable, not mandatory.

Course Notes

This course will be taught on campus for the Fall semester and will receive a Letter grade.

Technological Proficiency and Hardware/Software Required

Autodesk Maya 2020, Pixologic Zbrush 2020, Adobe Substance Painter and Photoshop. We will discuss other software packages that are commonly used in production for modeling, texturing, cloth, hair, lighting, and rendering.

Supplementary Materials

- Autodesk Maya: https://academy.autodesk.com/software/maya HYPERLINK "https://academy.autodesk.com/software/maya%20HYPERLINK%20%22https://academy.autodesk.com/software/maya%22" HYPERLINK "https://academy.autodesk.com/software/maya%20HYPERLINK%20%22https://academ

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- Pixologic Zbrush: http://pixologic.com/zclassroom/ HYPERLINK "http://pixologic.com/zclassroom/%20HYPERLINK%20%22http://pixologic.com/zclassroom/%22" HYPERLINK "http://pixologic.com/zclassroom/%20HYPERLINK%20%22http://pixologic.com/zclassroom/%22" HYPERLINK "http://pixologic.com/zclassroom/" HYPERLINK HYPERLINK "http://pixologic.com/zclassroom/%20HYPERLINK%20%22http://pixologic.com/zclassroom/%22""http://pixologic.com/zclassroom/%20HYPERLINK%20%22http://pixologic.com/zclassroom/%22"

- Adobe Photoshop: https://helpx.adobe.com/photoshop/tutorials.html HYPERLINK "https://helpx.adobe.com/photoshop/tutorials.html%20HYPERLINK%20%22https://helpx.adobe.com/photoshop/tutorials.html%22" HYPERLINK "https://helpx.adobe.com/photoshop/tutorials.html%20HYPERLINK%20%22https://helpx.adobe.com/photoshop/tutorials.html%22" HYPERLINK "https://helpx.adobe.com/photoshop/tutorials.html" HYPERLINK "https://helpx.adobe.com/photoshop/tutorials.html%20HYPERLINK%20%22https://helpx.adobe.com/photoshop/tutorials.html%22"

- Substance Painter: https://academy.substance3d.com/ HYPERLINK "https://academy.substance3d.com/%20HYPERLINK%20%22https://academy.substance3d.com/%22" HYPERLINK "https://academy.substance3d.com/%20HYPERLINK%20%22https://academy.substance3d.com/%22" HYPERLINK "https://academy.substance3d.com/" HYPERLINK "https://academy.substance3d.com/%20HYPERLINK%20%22https://academy.substance3d.com/%22"

- Arnold Rendering: https://vimeo.com/arnoldrenderer HYPERLINK "https://vimeo.com/arnoldrenderer%20HYPERLINK%20%22https://vimeo.com/arnoldrenderer%22" HYPERLINK "https://vimeo.com/arnoldrenderer%20HYPERLINK%20%22https://vimeo.com/arnoldrenderer%22" HYPERLINK "https://vimeo.com/arnoldrenderer" HYPERLINK "https://vimeo.com/arnoldrenderer%20HYPERLINK%20%22https://vimeo.com/arnoldrenderer%22"

Description and Assessment of Assignments
Characters are generally the most complex assets on a CGI project. Che principles and techniques learned during this course can also be applied to inanimate assets such as prop and environment 3D models.

The student will work on one male or female body provided by the instructor and on two characters of their choosing. Ideally the characters students choose will be for their personal projects and complex enough to challenge them but still meet their assignment deadlines.

- **Base model** (4 weeks) will work as a test subject where the new techniques and pipeline will be learned. Pick male or female anatomy-based reference.
- **Mid-term** (4 weeks) will work as a practice subject where the new techniques in Maya and Zbrush will be learned. Pick any character from animated film.
- **Final project** (5 weeks) will work reinforcing the techniques and methods learned from Base model and Mid-term projects in addition to learning alternative modeling techniques in production.

The learning outcome will be assessed by these criteria:
- Aesthetically: How well does the 3D model resemble the reference art and images for the character?
- Technically: How closely the 3D model meets the technical specifications discussed in the lecture.

Grading Breakdown
Evaluation criteria
- **Participation:** Students will be assessed based on class engagement and implementation of the techniques learned during the weekly lecture and how the students apply the feedback given by the instructor and the other students. Participation also includes presenting your work to the group.
- **Assignments & Mid-term:** Each week students will be given weekly assignments. These assignments are required to be completed by next week class. Mid-term and weekly assignments will need to be uploaded into a class online drive, to be reviewed prior to class.
- **Final Project:** Students will model and texture a character of their choosing and provide a video turntable of each character. In addition, the students will create a character model sheet of their character using renders of their character and a character description and include their initial designs of the character

Assessment Tool (assignments)	Points	% of Grade
Class participation	10	10
Assignment (include 'Base model')	30	20
Mid-term	30	30

Final project	30	40
TOTAL	100	100

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
Each weekly submission will need to be uploaded before 6:00 pm PST by the Tuesday prior to the next class.

Grading Timeline
Grading for each assignment will be completed by the following Sunday night after the submission is due.

Additional Policies

- Any student arriving 10 minutes late will be marked ″LATE″. Three ″LATES″ constitute an absence. Three absences will result in failure. The only exceptions will be valid emergencies with appropriate documentation. Impersonating other classmates when signing roll sheet will not be tolerated and will be subject to disciplinary action.
- 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.

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Deliverables
Week 1 **8/22**	• Introductions • Animation production overview • Intro to Maya • Maya UI, scene creation, directories, modeling tools	
Week 2 **8/29**	• Continue tools in maya • Maya image plane setup • Low polygon modeling demo • Modeling pipeline	**Due 9/5** • Complete the helmet modeling
Week 3 **9/5**	• Human head anatomy • Learn how to prepare images for Image plane in Photoshop • Use 'Create Polygon' tool to start face modeling	**Due 9/12** • Complete the face area of the head
Week 4 **9/12**	• Face extras • Nose and ear anatomy • Nose and ear modeling • Explore 'Sculpting Tools' in Maya .	**Due 9/19** • Complete the head model with nose and ear parts.
Week 5 **9/19**	• Body anatomy – torso, hand and foot • Torso, hand and foot modeling • Using Primitives to build torso • Deformer – Lattice tool	**Due 9/26** • Complete the body model with hands and feet. • Pick a character from an animated film that you like for Mid- term project
Week 6 **9/26**	• UV basics- UV tools • Unwrap face UVs	**Due 10/3** • Start to work on Mid-term project. Expect 25% done (ex. Head part).

	• UDIM & 0-1 UV space • File formats	

Week 7
10**/3**
	• Texture maps
	  - Color, Bump, Spec and Normal
	• Learn how to create color maps in
	Photoshop with Maya Snapshot
	• Create Normal map in Maya
	• Introduction of Zbrush
	  - UI, menu, tools, brushes etc.
	• Extract Normal map in Zbrush
		Due 10/10
		• Expect 50% done (ex. Body part).

Week 8 10/10	• Create clothes in Maya • Add wrinkle details in Zbrush and bake Normal maps. • Model geometry hair clumps • Face extras - Create brow hair, eyelash and temporary lip	**Due 10/17** • Continue to work. • Expect 75% done (ex. Clothes).
Oct. 12-13	**Fall Recess**	

Week 9 10/17	• Pose in Zbrush - Transpose • Rigging characters in Maya • Posing characters and neutral pose	**Due 10/24** • Create a pose in Maya or Zbrush.

Week 10
10/24
	• Blender Shape & Wrap deform tools
	• Create Facial expressions
	• Using Wrap & Blend Shape tool for
	posing with clothes
	• Retopology - Maya Quad tools
	        - Zbrush ZRemesher
		Due 10/31
		• **Submit Mid-term** project.
		• Includes simple pose, expression, and extras.
		• Prepare the Final project plan
		  – Pick a character with 2D concepts

Week 11
10/31
	• Intro to Substance Painter.
	  - UI, work space
	  - Layers
	  - Smart materials
	• Maya and Substance Painter work process
		Due 11/7
		• Start the Final project either Maya or Zbrush.
		• Expect 20% complete (ex. Head and Body).

Week 12 11/7	• CG hair, fur, and feather discussion. • Xgen in Maya.	**Due 11/15** • Create a facial expression.

	• Fibermesh in Zbrush.	• Expect 40% complete (ex. Clothes and Pose).
Week 13 **11/14**	• Lighting basics • 3-point lighting: Key, Fill and Rim light • Setup background image.	**Due 11/21** • Create some form of hair for your character using Xgen in Maya or fibermesh in Zbrush. • Expect 60% complete (ex. UVs and hair).
Week 14 **11/21**	• Renderer - Maya Arnold • Create a back stage & Arnold lights • Learn how to assign the textures to Arnold shader	**Due 11/28** • Continue to work. • Expect 80% complete (ex. Texture).
Nov. 22-26	**Thanksgiving Break**	
Week 15 **11/28**	• Rendering - Turntable movies • Final checkup & critiques	**Due 12/12 FINAL** • Render set up and final tweaks. • Prepare the final presentation. .
Dec. 2-5	**Study Days**	
FINAL **12/12** **7-9pm**	Presentation - Share the work process of character and show your movie and character packet.	**Submit by 12/12 7pm** • Provide a video turntable of the Final project. • Provide a character model sheet. • Description includes initial designs of the character.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/ HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/"scampus HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/"- HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/"part HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/"- HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/"b HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK

"https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/" HYPERLINK "https://policy.usc.edu/scampus-part-b/". Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientifichttp://policy.usc.edu/scientific-misconduct HYPERLINK "http://policy.usc.edu/scientific-misconduct" HYPERLINK "http://policy.usc.edu/scientific-misconduct" HYPERLINK "http://policy.usc.edu/scientific-misconduct" HYPERLINK "http://policy.usc.edu/scientific-misconduct"misconduct HYPERLINK "http://policy.usc.edu/scientific-misconduct" HYPERLINK "http://policy.usc.edu/scientific-misconduct" HYPERLINK "http://policy.usc.edu/scientific-misconduct" HYPERLINK "http://policy.usc.edu/scientific-misconduct" HYPERLINK "http://policy.usc.edu/scientific-misconduct".

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling HYPERLINK "https://studenthealth.usc.edu/counseling/" HYPERLINK "https://studenthealth.usc.edu/counseling/" HYPERLINK "https://studenthealth.usc.edu/counseling/" HYPERLINK "https://studenthealth.usc.edu/counseling/" HYPERLINK "https://studenthealth.usc.edu/counseling/"
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

Student Health Leave Coordinator – 213-821-4710
Located in the USC Support and Advocacy office, the Health Leave Coordinator processes requests for health leaves of absence and advocates for students taking such leaves when needed.
https://policy.usc.edu/student HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/"- HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/"health HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/"- HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/"leave HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/"- HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/"absence/ HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/" HYPERLINK "https://policy.usc.edu/student-health-leave-absence/"

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org HYPERLINK "http://www.suicidepreventionlifeline.org/" HYPERLINK "http://www.suicidepreventionlifeline.org/" HYPERLINK "http://www.suicidepreventionlifeline.org/" HYPERLINK "http://www.suicidepreventionlifeline.org/" HYPERLINK "http://www.suicidepreventionlifeline.org/"

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention and Services (RSVP) - (213) 740-9355(WELL), press ″0″ after hours – 24/7 on call

studenthealth.usc.edu/sexual HYPERLINK "https://studenthealth.usc.edu/sexual-assault/" HYPERLINK "https://studenthealth.usc.edu/sexual-assault/" HYPERLINK "https://studenthealth.usc.edu/sexual-assault/"- HYPERLINK "https://studenthealth.usc.edu/sexual-assault/" HYPERLINK "https://studenthealth.usc.edu/sexual-assault/" HYPERLINK "https://studenthealth.usc.edu/sexual-assault/"assault HYPERLINK "https://studenthealth.usc.edu/sexual-assault/" HYPERLINK "https://studenthealth.usc.edu/sexual-assault/" HYPERLINK "https://studenthealth.usc.edu/sexual-assault/" HYPERLINK "https://studenthealth.usc.edu/sexual-assault/" HYPERLINK "https://studenthealth.usc.edu/sexual-assault/"

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)- (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu HYPERLINK "https://equity.usc.edu/" HYPERLINK "https://equity.usc.edu/" HYPERLINK "https://equity.usc.edu/" HYPERLINK "http://titleix.usc.edu/" HYPERLINK "https://equity.usc.edu/", HYPERLINK "https://equity.usc.edu/" HYPERLINK "https://equity.usc.edu/" HYPERLINK "http://titleix.usc.edu/" HYPERLINK "https://equity.usc.edu/" HYPERLINK "https://equity.usc.edu/" HYPERLINK "http://titleix.usc.edu/" HYPERLINK "https://equity.usc.edu/"titleix.usc.edu

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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. The university prohibits discrimination or harassment based on the following *protected characteristics*: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations. The university also prohibits sexual assault, non-consensual sexual contact, sexual misconduct, intimate partner violence, stalking, malicious dissuasion, retaliation, and violation of interim measures.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298 usc HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-advocate.symplicity.com/care_report/"- HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-advocate.symplicity.com/care_report/"advocate.symplicity.com/ HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-advocate.symplicity.com/care_report/"care_report HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-advocate.symplicity.com/care_report/" HYPERLINK "https://usc-

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

The Office of Disability Services and Programs - (213) 740-0776 dsp.usc.edu HYPERLINK "http://dsp.usc.edu/" HYPERLINK "http://dsp.usc.edu/" HYPERLINK "http://dsp.usc.edu/" HYPERLINK "http://dsp.usc.edu/" HYPERLINK "http://dsp.usc.edu/"

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support & Intervention - (213) 821-4710 campussupport.usc.edu HYPERLINK "https://campussupport.usc.edu/" HYPERLINK "https://campussupport.usc.edu/" HYPERLINK "https://campussupport.usc.edu/" HYPERLINK "https://campussupport.usc.edu/" HYPERLINK "https://campussupport.usc.edu/"

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

Diversity at USC - (213) 740-2101 diversity.usc.edu *HYPERLINK "https://diversity.usc.edu/" HYPERLINK "https://diversity.usc.edu/" HYPERLINK "https://diversity.usc.edu/" HYPERLINK "https://diversity.usc.edu/" HYPERLINK "https://diversity.usc.edu/"*

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. HYPERLINK "https://diversity.usc.edu/" HYPERLINK "https://diversity.usc.edu/" HYPERLINK "https://diversity.usc.edu/" HYPERLINK "https://diversity.usc.edu/" HYPERLINK "https://diversity.usc.edu/"

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call dps.usc.edu HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://emergency.usc.edu/" HYPERLINK "http://dps.usc.edu/", HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://emergency.usc.edu/" HYPERLINK "http://dps.usc.edu/"emergency.usc.edu *HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://emergency.usc.edu/" HYPERLINK "http://dps.usc.edu/"*

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 dps.usc.edu HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/" HYPERLINK "http://dps.usc.edu/"

Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC) ombuds.usc.edu HYPERLINK "https://ombuds.usc.edu/" HYPERLINK "https://ombuds.usc.edu/"

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HYPERLINK "https://ombuds.usc.edu/"
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.

PLEASE NOTE:
FOOD AND DRINKS (OTHER THAN WATER) ARE NOT PERMITTED IN ANY INSTRUCTIONAL SPACE IN THE SCHOOL OF CINEMATIC ARTS COMPLEX