CSCI 281: Pipeline Assets for Games
Units: 4
Spring 2022
Lecture: Mondays/Wednesdays 10:00 am to 11:50 am

Location: Online Zoom Meeting Room (Info on Blackboard)

Instructor: Scott Easley
Location: THH 212
Remote: Zoom link on Blackboard
Office Hours: By request
Contact Info: seasley@usc.edu

Teaching Assistant: David Li
Office: Online
Office Hours: By request
Contact Info: zuoweili@usc.edu

IT Help:
Viterbi IT: https://vsoeweb.vsoe.usc.edu/helpdeskpro/
USC ITS: https://itservices.usc.edu/
Hours of Service:
Phone: 24 hours per day, 7 days per week
Email: M-F, 8am – 6pm
Contact Info: 213.740.5555

Revised August 2019
Course Description
An applied introduction to the techniques used for modeling, animating, texturing, rendering, and creating 3D content for games, cinematics, visual effects, animation, and visualizations.

Learning Objectives
Gain a thorough applied foundation in the practice of 3D modeling, texturing, animation, surfacing, and visual special effects. Understand the processes involved in the creation of 3D content for animation, games, entertainment, and design. Use industry leading software and tools to explore the production cycle of animation, how pipelines are implemented to support the production process, and how to manage vision, budget, and time constraints. Develop an understanding of the diverse methods available for achieving similar results and the decision-making processes involved at various stages of project development. Gain insight into the differences among the various animation tools. Understanding the opportunities and tracks in the field of 3D animation.

Prerequisite(s): No Prerequisite
Recommended Preparation: Experience with 2d graphics, 3d modeling, or CAD useful but not required.

Course Notes
There is no text for the course, however each student is expected to make use of the many resources available online, including Autodesk learning documentation, Linda.com resources, and course materials on Blackboard. Course materials, assignment submissions, lecture slides, and updates will be posted on Blackboard. This course is for a letter grade. The grading scale for the course is listed below. Students should plan to bring note taking materials, sketchbooks, or other materials for brainstorming, note taking, sketching, and design work.

Technological Proficiency and Hardware/Software
- Autodesk Maya 2019
- Adobe Photoshop or Pixlr Editor

USC Technology Rental Program
We realize that attending classes online and completing coursework remotely requires access to technology that not all students possess. If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university’s equipment rental program. To apply, please submit an application. The Student Basic Needs team will contact all applicants in early August and distribute equipment to eligible applicants prior to the start of the fall semester.

USC Technology Support Links
Zoom information for students
Blackboard help for students
Software available to USC Campus

Required Readings and Supplementary Materials
Materials available on Blackboard.usc.edu
Description and Assessment of Assignments
Projects will be assigned and submitted via Blackboard or Google Drive. Many assignments will have a deliverable set of 2d and 3d assets but should be supported with the supplementary files and assets required in the assignment details.
**Grading Breakdown**
All assignments and grading criteria will be posted and submitted via Blackboard.usc.edu.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
<th>% of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pball Modeling</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Pball Model UV layout</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Pball Model Texturing</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Vehicle Modeling</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Vehicle Model UV Layout</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Vehicle Model Texturing</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Dorm Prop (Model, UV, Texture)</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Vehicle with auto-expression wheels</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Vehicle on rails with expression wheels</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Camera on rails, renders with Arnold</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Car setup with camera, rails, rendering</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>Finished movies from storyboard</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>Participation</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

**TOTAL** 200 100

**Attendance/Tardiness Policy:**
Students should be in class every day and for every lab session. If you are not able to attend, you must contact your advisor and instructor. Unexcused absences will negatively affect your grade. Students must arrive to class promptly. Points will be deducted for tardiness. Repeat tardiness will increase the points deduction per instance of tardiness. Additionally, any student who does not show up within 15 minutes of the start of either the morning and afternoon sessions will be reported to the summer program advisor. Please set an extra alarm and show up on time!

**Grading Scale (Example)**
Course final grades will be determined using the following scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>95-100</td>
</tr>
<tr>
<td>A-</td>
<td>90-94</td>
</tr>
<tr>
<td>B+</td>
<td>87-89</td>
</tr>
<tr>
<td>B</td>
<td>83-86</td>
</tr>
<tr>
<td>B-</td>
<td>80-82</td>
</tr>
<tr>
<td>C+</td>
<td>77-79</td>
</tr>
<tr>
<td>C</td>
<td>73-76</td>
</tr>
<tr>
<td>C-</td>
<td>70-72</td>
</tr>
<tr>
<td>D+</td>
<td>67-69</td>
</tr>
<tr>
<td>D</td>
<td>63-66</td>
</tr>
<tr>
<td>D-</td>
<td>60-62</td>
</tr>
<tr>
<td>F</td>
<td>59 and below</td>
</tr>
</tbody>
</table>

**Assignment Rubrics**
Assignments and Rubrics will be available on Blackboard.usc.edu

**Assignment Submission Policy**
All assignments, submission rules, and details will be published on Blackboard.usc.edu.
Grading Timeline
Assignments will be graded as quickly and efficiently as possible. Due to the five day per week course schedule, grades may not be posted until the weekend following each week.

Synchronous session recording notice
The synchronous sessions will be recorded and provided to all students asynchronously. Information for faculty on recording class sessions can be found on the Academic FAQs for Faculty on the USC COVID-19 Resource Center.

Sharing of course materials outside of the learning environment
Sharing of any synchronous and asynchronous course content outside of the learning environment is prohibited.

SCampus Section 11.12(B)

Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. 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. (SeeSection C.1 Class Notes Policy).

Residential and Hybrid Streaming Model Courses
Continuously updated requirements about COVID-19 can be found on the USC COVID-19 resource center website.

Course evaluation
Course evaluation occurs at the end of the semester university-wide. It is an important review of students’ experience in the class. The process and intent of the end-of-semester evaluation should be provided. In addition, a mid-semester evaluation is recommended practice for early course correction. See CET support document Mid-semester Evaluations.
### Course Schedule: A Weekly Breakdown
Below is the detailed course calendar that includes a list of deliverables (homework assignments, examinations, etc.) broken down on a weekly basis. It includes:

- Subject matter, topic and activity
- Required preparatory reading or tasks (e.g., viewing videos)
- Deliverables and when each deliverable is due.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics/Daily Activities</th>
<th>In Class/Study</th>
<th>Deliverables</th>
</tr>
</thead>
</table>
| Week 1| Jan 10| **Introduction to course:** Special hours to accommodate orientation:  
**Content:** USC code of conduct
USC Blackboard, USC Lynda.com  
**Areas of Interest:** Describe favorite aspects of games or movies you are interested in.  
**Expectations of Class:** What you will learn, what is graded and handed in and at what time. | **Homework:** Download Maya 2019 successfully onto your local laptop or desktop and have it dependably working for next class.  
Watch Sizzle Reel (blackboard) |
|       | Jan 12| **Introduction to Maya**  
Maya and web support resources: Online help, class webpage, tutorials, etc.  
**Maya Modeling** | **Homework:** Finish 3d model of Pball, as per video tutorial for class and upload it in Google Drive ‘Work’ folder |
| Week 2| Jan 17| Martin Luther King Day – NO CLASS |
|       | Jan 19| **UV Systems and Wrapping 2D images around 3D Objects**  
Sort out the UVs in Pball 3d model for existing texture.  
UV Texture Dice  
UV Texture 2 types of ‘Globe’ | **Homework:** Finish UV layout of Pball using lab time and online tutorial, upload finished work to individual Final folder. |
| Week 3| Jan 24| **Lecture: Character Design**  
Paint Systems  
Using Pixlr to manipulate images and paint over UVs.
Paint over UVs for basic geometry types.  
Paint over Dogbunny’s textures | **Homework Due:** Modeled and UV textured Pball in Final folder. |
|       | Jan 26| **Create ‘Shoebox Garage’ guides for modeling with polygons and paint systems**  
Make sure all joints of character turnaround align.  
Make ‘shoebox garage’ using Superhero turnaround | **Homework Due:** Superhero ‘Shoebox Garage’ setup saved in Work folder |
| Week 4 | Jan 31 | **Lecture: Edge Loops**  
**Modeling using image guide for characters** | **Character Modeling for Deformation**  
Maya for edge flow modeling and connecting cylinders for organic modeling vs. extrusions. Connect cylinders for ‘base doll’ geometry | **Homework:**  
Create Basemesh from three separate geometric cylinders. Save work in ‘Work’ Google Drive folder. |
| --- | --- | --- | --- | --- |
| Feb 2 | **Lecture: Shaping the Basemesh**  
**Align basedoll mesh to character guide** | **Base Doll realignment**  
Realign the cylinders of the basedoll according to the new image guide. Get edge flow down, smooth things over with no right angles. Add poly lines where needed. | **Homework:**  
Reshape circular vertices on base doll character to align with superhero turnaround guide. |
| Week 5 | Feb 7 | **Lecture: LowPoly Hands and Feet** | **Create lo-poly Hands and Feet**  
Study geometry and create hands and feet using different methods: Extrusion from existing geometry and creation of geometry from scratch. | **Homework:**  
Start creation of 3d hands and feet of Superhero. |
| | Feb 9 | **Finish Hands and Poly Feet** | Finish modeling hands and feet using extrusions or poly and vertex translation | **Homework:**  
Finish 3d models of hands and feet of Superhero. |
| Week 6 | Feb 14 | **Lecture: Basic 3D Head Modeling**  
**Building a 3D Character Head** | **Finish Face of Superhero Character**  
Finish modeling character face from cylinder according to image planes. | **Homework:**  
Model character face according to new image planes, including face subdivisions. |
| | Feb 16 | **Lecture: Modeling Reminders** | **Finish the 3D Superhero model**  
Complete head, attach face, create hair using original method of chamfering vertices and creating poly lines | **Homework:**  
Finish up all 3d modeling of the Superhero: Body, head, hands or feet. |
<table>
<thead>
<tr>
<th>Week 7</th>
<th>Feb 21</th>
<th>President’s Day – NO CLASS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb 23</td>
<td>Unzipping UVs in 3D</td>
<td>Unwrap the UVs of the entire character into one UV space</td>
<td><strong>Homework:</strong> Finish UV unwrapping of Superhero</td>
</tr>
<tr>
<td>Week 8</td>
<td>Feb 28</td>
<td><strong>Use Pixlr to paint over UV sets for Superhero</strong></td>
<td>Paint over Superhero UVs to make texture for entire character.</td>
</tr>
<tr>
<td></td>
<td>Mar 2</td>
<td><strong>Use Mixamo to rig and animate character</strong></td>
<td>Use online auto-rigging script from Mixamo to rig and animate your character. Use playblast to make a movie</td>
</tr>
<tr>
<td>Week 9</td>
<td>Mar 7</td>
<td><strong>Student makes 3d .obj file of their face using online machine learning</strong></td>
<td>Student re-sculpts .obj using make live and quad draw to make face loops</td>
</tr>
<tr>
<td></td>
<td>Mar 9</td>
<td><strong>Pixlr 2d Projections and 3d baking</strong></td>
<td>Create face texture using same image for your .obj face model</td>
</tr>
<tr>
<td><strong>Spring Recess</strong></td>
<td>Mar 13 - Mar 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 10</td>
<td>Mar 21</td>
<td><strong>Lecture:</strong> Original Design Modeling</td>
<td>Search and choose original character, Draw basic body shapes with simple 2d as placeholder</td>
</tr>
<tr>
<td></td>
<td>Mar 23</td>
<td><strong>Original Character Body</strong> Start with original character, set up shoebox garage using image guides</td>
<td>Start body of original character Start modeling base body model for original character. Model new or use existing base doll body to align to character.</td>
</tr>
<tr>
<td>Week 11</td>
<td>Mar 28</td>
<td><strong>Original Character Begin (Body)</strong></td>
<td>Finish Modeling the original 3d character body.</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>----------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Finalize modeling body using basic shapes</td>
<td></td>
</tr>
<tr>
<td>Mar 30</td>
<td></td>
<td><strong>Original Character Begin (Head)</strong></td>
<td>Start modeling base 3d head model for original character.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Begin modeling head using basic shapes</td>
<td></td>
</tr>
<tr>
<td>Week 12</td>
<td>Apr 4</td>
<td><strong>Original Character Begin (extras)</strong></td>
<td>Model extras for character</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Begin modeling extra shapes unique to the character (hair, armor)</td>
<td></td>
</tr>
<tr>
<td>Apr 6</td>
<td></td>
<td><strong>Lecture: Considerations as you model</strong></td>
<td><strong>3D:</strong> Finish Modeling the original 3d character body, head and extras</td>
</tr>
<tr>
<td>Week 13</td>
<td>Apr 11</td>
<td>UV unwrap the extras/details</td>
<td>UV unwrap the 3d character body</td>
</tr>
<tr>
<td></td>
<td>Apr 13</td>
<td>UV unwrap the body</td>
<td>UV unwrap the 3d character head</td>
</tr>
<tr>
<td>Week 14</td>
<td>Apr 18</td>
<td>Paint or project the character body texture map</td>
<td>Paint or project the character body</td>
</tr>
<tr>
<td></td>
<td>Apr 20</td>
<td>Paint or project the character head texture map</td>
<td>Finish painting your 3D character’s body, head and extras</td>
</tr>
</tbody>
</table>
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/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/scientific-misconduct.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call engemannshc.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-health-leave-absence/

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call 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 Services (RSVP) - (213) 740-4900 – 24/7 on call engemannshc.usc.edu/rsvp
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of 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.

Bias Assessment Response and Support - (213) 740-2421  
studentaffairs.usc.edu/bias-assessment-response-support
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776  
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 Support and Advocacy - (213) 821-4710  
studentaffairs.usc.edu/ssa
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
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  
dps.usc.edu, emergency.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) 442-120 – 24/7 on call  
dps.usc.edu
Non-emergency assistance or information.

Diversity and Inclusion
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 person 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. You can also report discrimination based on a protected class here https://equity.usc.edu/harassment-or-discrimination/

Disruptive Student Behavior:
Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office of Student Judicial Affairs for disciplinary action.

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