



# USC

## **CTAN 280 – Intermediate Character Animation for Games**

**Units: 4**

**Fall 2021**

### **Lecture/Lab:**

**Monday 6:30 pm - 8:30 pm**

**Wednesday 6:30 pm - 8:30 pm**

**Location: SCI L113**

**Instructor: Scott Easley**

**Office:** EGG 207

**Office Hours:** By Request

**Contact Info:** [seasley@usc.edu](mailto:seasley@usc.edu)

**TA: TBD**

**Contact Info: TBD**

**Office Hours:** By Request

### **Course Description**

Create animation for a 3d character for video games; studying motion alongside optimal iteration exporting techniques, judging the speed of controller feedback, and character definition through the purely visual communication of a video game character. This course builds on the old foundation of 2d character animation fundamentals used by Disney and Fleischer studios and combines them with new needs for video game character animation in recent developments such as virtual reality, location-based games and experimental AI games.

### **Catalogue Description**

Design and improve 3D video game character animation with hands-on learning. Understand the combination of both technical and creative processes unique to video games, esp. within a larger group project.

### **Course Interrelations**

The basic differences between the classes of modeling, rigging and animation for a 3d character can be applied to the centuries-old tradition of marionette puppetry: Modeling is the carving and painting of the character from wood, rigging is the addition of hinges and strings to allow controls for a puppeteer, and animation would be the puppeteer using the various controls to simulate life in the marionette.

### **Learning Objectives and Outcomes**

Students in ITP 351 will acquire and animate several provided rigged characters in the first half of the semester to express that characters' goal in a game. Devise and explore visual communication as the method to interpret movement clarity from any camera view, execute scripts for export and depict efficient

character response from a game controller. An engineering background helps, but it is not necessary as this class aims to break down these processes and assimilate them in a friendly and intuitive way.

The student will leave class knowing the process of how to animate any basic 3d character for games as well as optimize their workflow. Creativity and individualism is encouraged.

**Prerequisite(s):** ITP 215 or CTAN 452

**Recommended Preparation:** Any experience with 3d or 2d animation.

### **Course Notes**

This course will assign a letter grade.

Students will submit work via Blackboard, and by showing builds to instructors and peers in class.

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

The class uses the 3D software Maya 2019. Students are required to sign up for the three-year free trial.

### **Lecture and Lab**

Class will be divided between lecture and lab. Lecture is in the first half of class (Monday 9:30 am – 12:30 am) and the lab is the second half of the class (Friday 10:00 am – 12:00 am).

### **Description and Assessment of Assignments**

Items listed as 'Homework' are assignments that the student should be finished with to keep up in class, whereas items listed and underlined as 'Deliverables' are assignments to be handed in (using either Blackboard or a Google Drive as set up by the CTA) as a graded project.

**Course Project:** The purpose of the class project is to be able to provide unique animation for any 3d rigged character. Students need to identify animation specific to any characters' unique purpose in a video game. Sample rigs will be provided to students in the first half of class, and a unique and individual rig per student in the latter half. Working as a group is acceptable with the understanding each student individually animates their separate character. A team can consist of no more than 4 persons.

#### **Project Timeline:**

- Week 2: In-class check of Maya and Unity installation and Google Drive access
- Week 6: Prototype Animation due (Exports to Engine or online build)
- Week 10: Mid-term Animation due (Custom character moves, controller response)
- Final: Final Character animation delivery

**Sample Project:** The animator animates several separate moves on a rigged 3d character in Maya and then exports that animated character into a game engine, playing their character via a game controller to see the unified moves in real-time. Ultimately the student can choose their animation final as a rigged character for a USC Games project.

**Project Purpose:** Students learn how to animate a 3d character for the goal of both clear moves within a game and character purpose. Students are also provided with several custom scripts to optimize their experience, as well as emphasizing the importance of both organization and structure to allow project sharing across multiple stations. Students become familiar with animating, exporting, and examining all moves either in real-time or asynchronously in any game engine.

### **Grading Breakdown**

Assignment	% of Grade	Due
Weekly Homework (Checked in beginning of next class)	50	Ongoing
Midterm: Four Base Moves Online	15	Week 8
Final Online Animation Deliverable	20	Week 15
Recorded research and feedback per animation	15	Ongoing
TOTAL	100	

### Assignment Rubrics

Assignments and Homework are due at the beginning of class of the assigned week.

### Missing an Assignment Deadline, Incompletes:

The only acceptable excuses for missing an assignment deadline or taking an incomplete in the course are personal illness or a family emergency. Students must inform the instructor **before the assignment due date** and present verifiable evidence in order for a deadline extension to be granted. Students who wish to take incompletes must also present documentation of the problem to the instructor or student assistant before final grades are due.

For assignments turned in after the assignment deadline without prior permission from the instructor, a penalty will be imposed equal to 10% of the total available points for the assignment, for each day or part of a day that the assignment is late, up to a maximum of seven days.

### Attendance Policy:

Punctual attendance at all classes is preferred to provide the best feedback loop for your character animations, but accommodations can be made for asynchronous attendance if the student contacts the instructor early in the semester.

Social media, including text messaging and internet messaging, are excluded from class unless explicitly permitted by the instructor.

### Diversity

In making games and interactive media in a professional and ethical way, it is important that you consider diversity. When looking at your projects, you should consider who is depicted and how this work will impact others. What kinds of individuals and communities are represented in your work? What point of view does your work express? This class may assist you in learning how to make work that includes diverse viewpoints, and may discuss racial, religious, gender and sexual orientation issues in the context of games and interactive media.

### Creating an Inclusive Space

In this class, we make a commitment to foster a welcoming and supportive environment where students of all identities and backgrounds can flourish. This means that you will be expected to offer content warnings when appropriate, use students' stated pronouns, and respect self-identifications. While debate and discussion are welcome, please remain aware of the implications of your words and the images that you include in your work. If the instructor or another student points out something problematic, avoid being defensive; this is a valuable opportunity for us to grow and learn together. If you have a concern about any aspect of the class, you are welcome to speak with the instructor or the advisor for the division.

### **Additional Policies**

This course emphasizes teamwork, and one of the desired learning outcomes is for students to develop communication and leadership skills. Students are expected to treat each other with respect, listen to each other, and work together towards a shared, collaborative, healthy work culture. Any student found to be disruptive or engaging in behavior that doesn't meet the standards of respectful teamwork may be asked to leave by the instructor.

If you experience any problems with a fellow student regarding their work, please bring up your concerns with the instructor.

### **Course Schedule: A Weekly Breakdown \*\*Subject to change**

	<b>Topics</b>	<b>Lectures and Lab</b>	<b>Homework/ Deliverables</b>
<b>Week 1</b>	<p>Introduction to the Course and Goals. Intro to Graph Editor and Game Animations</p> <p>Game vs Cinema character animations, toolsets in Maya for both</p>	<p><b>What is 'Game Animation' versus 'Movie animation'.</b></p> <p><i>Lecture:</i> Showing game animation in different genres, attention to motion loops, readability of moves from various angles. Iteration within an export pipeline is key; judge moves in-game. Graph editor, setting keys and tangents curves.</p> <p><i>Lab:</i> <i>Experiment with needs for rig to use inverse and forward kinematics and when to use either. Set static keyframes to check deformations.</i></p>	<p><b>Homework:</b> Animate provided base rig IK/FK pushup to get familiar with Maya Graph Editor and setting keyframes.</p>
<b>Week 2</b>	<p>Evolution of game animation using moving greyboxes</p> <p><b>Movelister</b> script and examples</p>	<p><b>Form 4 or 5 person teams for labwork.</b></p> <p><i>Lecture:</i> <i>Using movies on image planes (or polygons) as guides for movement. Folder organization for sources. Begin studying movement keyframes, Hips and Chest first, key poses. Stability in a 360 pose</i></p> <p><i>Lab:</i> Plug in a video run, idle and walk as guides in Maya. Use boxman rig to make core poses for each of the three moves. Offset movie animation in graph editor as move 'guide'.</p>	<p><b>Deliverable:</b> <b>Maya installed, Unity installed, Student webpage access</b></p> <p><b>Homework:</b> Key poses for game animation using filmed reference. Make two main poses for walk and idle using reference guides</p>
<b>Week 3</b>	<p>Exporting to console; knowing the limits of each engine (Ex: blendshapes)</p> <p><b>Straighten up</b> script</p>	<p><b>Exporting to Engine</b></p> <p><i>Lecture:</i> <i>Using automatic exporters versus by hand – stripping out errata. Checking using Autodesk FBX viewer</i></p> <p><i>Lab:</i> Read in existing moves/poses from boxman rig, bake and export to online class console and have students run it in console. Can use Autodesk's FBX Viewer if student is remote.</p>	<p><b>Homework:</b> Make two unique poses for attack and death (No guides).</p> <p>Successfully export rig and see animation outside Maya in Game Engine or FBX Viewer.</p>

<p><b>Week 4</b></p>	<p>Version Control software</p> <p><b>Timeline Shift</b> script and examples</p>	<p><b>SVN and Version Control</b></p> <p><i>Lecture:</i>  <i>Animation projects using teams – version control and group animation pipelines. Test run with groups in class.</i></p> <p>Lab:          Form teams for group projects. Record them in online team sheets. First team upload and download of animations using simple version control of Google Sync, Dropbox, OneDrive. Bake and check work in WebGL game console using simmer.io or some other development site:  <a href="https://youtu.be/JZqTHjttQHM">https://youtu.be/JZqTHjttQHM</a></p>	<p><b>Homework:</b>          Each team records and chooses from list of game characters from AGP or custom character.</p>
<p><b>Week 5</b></p>	<p>Readability from distance</p> <p><b>Playbomb</b> script and examples</p>	<p><i>Lecture:</i>  <i>Core poses for chosen characters</i>  <i>Make custom filmed movie guides</i>  <i>Folder structure for each team and character. Switching cameras</i></p> <p>Lab:          Create a ‘Game Cam’ in Maya to check work – code to toggle it.</p>	<p><b>Homework:</b>          Greybox Prototype of character moves are ready in following week</p>
<p><b>Week 6</b></p>	<p>References and group work. What is helps to do and when to use them.</p>	<p><i>Lecture:</i>  <i>Team projects and reference chains for automatic updates of rig and mesh. Identify what is efficient and what is a liability during production</i></p> <p>Lab:          Teams schedule out their progress on game animations with weekly progress and exports</p>	<p><b>Deliverable:</b>          Greybox Prototype poses published on WebGL, link on team page</p>
<p><b>Week 7</b></p>	<p>Using shelves for custom scripts in Maya</p> <p>Intro scripting          MEL/Python/pyMel</p>	<p><b>Custom Scripts to help workflow</b></p> <p><i>Lecture</i>  <i>Custom shelves, Coding in MEL, python or pyMel. Resources and toolsets.</i></p> <p>Lab:          Make custom shelf of scripts provided for class, including setting project</p> <ol style="list-style-type: none"> <li>1. Movelister</li> <li>2. Straighten Up</li> <li>3. Timeline Shift</li> <li>4. Playbomb</li> </ol>	<p><b>Homework:</b>          Schedule and pipeline construction for group project animations</p>

<b>Week 8</b>	Review of process, review of animation. Give examples to class from previous midterms	<p><i>Lecture:</i> Best midterm presentation methods. Understand your audience and player</p> <p><i>Lab:</i> Prep for next week's midterm</p>	<b>Homework:</b> Group review of system, identify issues in pipeline with possible fixes
<b>Week 9</b>	Tracking and Response Player communication	<p><i>Lecture:</i> How to use animation to improve a 'limited' rig. (Ex: Grenade throw)</p> <p><i>Lab:</i> Instructor review of each team's pipeline and export systems.</p>	<b>Homework:</b> Fixes to Identified issues in pipeline
<b>Week 10</b>	<b>MIDTERM PRESENTATION</b>	<b>MIDTERM PROTOTYPE</b> Students present (in teams) their animated characters, showing the progress on each move. Afterward each team plays the other's prototype and fills in online Google feedback form with critique.	<b>Deliverable:</b> Live midterm presentation and playable link on WebGL. Playtesting Feedback on each Team's game. Live breakout room sessions with instructor
<b>Week 11</b>	UI and UX – clear communication with player is the goal. Examples how UI and UX differ and how they can clarify goals or confuse the player	<p><i>Lecture:</i> Online bug checklists: Trello, Discord And Google Spreadsheets. Choose one during class</p> <p><i>Lab:</i> Students will receive feedback from classmates <b>and AGP team</b> detailing what was learned from the playtest, possible changes based on the feedback – and animation clarity</p>	<b>Homework:</b> Teams meet and discuss feedback and changes to game for final. Scheduled plan for changes/fixes/updates for final presentation
<b>Week 12</b>	Game Art vs Animation – indicate to player what is 'malleable' in game. Examples from classic 2d animation	<p><i>Lecture:</i> Drawing the player's eye through motion and contrasting speed</p> <p><i>Lab:</i> Teacher reviews each team and their feedback, identifying how to polish their animation and improve readability in game and speed of controller response.</p>	<b>Homework:</b> Polish final animations – focus on key points of impact
<b>Week 13</b>	<b>Guest Lecture:</b> "Going into Industry: What I Wish I Knew as a Student"	<p><i>Lecture:</i> Best practices for online portfolio presentation and interviews. Online resources and how to use them (Ex: polycount, gamedevmap.com)</p> <p><i>Lab:</i> Work on animations with midterm feedback. Stronger poses, filmed reference, and smooth transitions.</p>	<b>Homework:</b> Polish final animations – focus on smoothness in transitions and loops

<b>Week 14</b>	Export all finished character moves, check each in game using controller	<i>Lecture:</i> <i>Job hunting: Social connections, USC resources and campus groups</i>  <i>Lab:</i> Present mockup of web design for online portfolio	
<b>Week 15</b>	<b>Future explorations in Real Time Animation</b>	Four polished moves for an in-game character exported in following formats: Separate FBX files, ASCII Maya files and corresponding playblasts with frame info. Uploaded to Google Drive Folder for class.	<b>Final Deliverables: Uploaded into class Google Drive</b>
<b>FINAL</b>	<b>Present final character animations to class</b>	<b>Animated character shown in various angles and proximities of camera angle to display readability.</b>	<b>Final Presentation</b> Presentation and showcase of all four animation movies polished running in a game engine, alongside a flowchart of the moves. Also presented is any motion research, gameplay feedback and the list of critiques and improvements for each move throughout the semester.

## 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](http://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](http://policy.usc.edu/scientific-misconduct).

### Support Systems:

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*  
[studenthealth.usc.edu/counseling](http://studenthealth.usc.edu/counseling)

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

*National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*  
[suicidepreventionlifeline.org](http://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) 740-9355(WELL), press “0” after hours – 24/7 on call*  
[studenthealth.usc.edu/sexual-assault](http://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](http://equity.usc.edu), [titleix.usc.edu](http://titleix.usc.edu)

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*  
[usc-advocate.symplicity.com/care\\_report](http://usc-advocate.symplicity.com/care_report)

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](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 and Intervention - (213) 821-4710*

[campussupport.usc.edu](http://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](http://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](http://dps.usc.edu), [emergency.usc.edu](http://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](http://dps.usc.edu)

Non-emergency assistance or information.

*Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)*  
[ombuds.usc.edu](http://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.