ITP 351 – 3D Character Modeling for Games
Units: 4
Spring 2025
Lecture/Lab: Tuesday, Thursday: 6:00 - 7:50 pm

Location: KAP 107

Instructor: Mayan Escalante
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Office Hours: TBD
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CTA: Kevin Liang
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Course Description
Extrapolate unique design needs of a 3d video game character and then construct that character in 3d polygons. Learn the technical and artistic process to approximate not just topology of a character, but polygon count, UV unwrapping for textures, and edge flow to have them deform realistically within a realtime game engine.

Catalogue Description
Model a complete 3d polygonal character Examine and assimilate game character design, mass and weight. Students mold and modify using both artistic design and technical construction.

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
- Apply 3d methods to 'break down' limited drawn 2d character concepts into solid 3d models.
- Organize and construct polygon edge flow into edge loops for smooth body and face deformation.
- Determine and arrange UV space for even texturing and maximize detail efficiently.
- Combine established modeling methodologies with newer techniques (photogrammetry, voxels).

Prerequisite(s): ITP 215 or CTAN 452

Recommended Preparation: Any experience with polygonal modeling.

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 2023 and Adobe Photoshop. Students are required to sign up for the student license.

Lecture and Lab
Class will be divided between lecture and lab. Lecture is in the first half of class (Tuesday 6:00pm – 7:50pm) and the lab is the second half of the class (Thursday 6:00pm – 7:50pm).

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 build a unique 3d character for animation in a video game. You need to identify the issues specific to any characters' unique topology; sample models will be provided to students in the first half of class, and a unique model will be assigned per student in the latter half. Working as a group is encouraged if the 3d models are similar enough in topology with the express understanding each student turns in a separate and unique 3d character mesh. A team can consist of no more than 4 persons.

Project Timeline:
- Week 2: In-class check of Maya installation and Google Drive access
- Week 4: Prototype model Baseman due
- Week 9: Mid-term Unique Model due (Equidistant polygon edges, matches guide, deformation poly flow)
- Week 14: Unique Character UV layout (issues with topology, proposed solutions)
- Final: Final Character model due (review from assignee, problems, and pivot solutions)

Sample Project: Student constructs a polygonal 3d character model from scratch after identifying the polygon budget, deformation needs of joins, and detailing for prop and/or facial animation to complete it within an agreed deadline for that assignment.

Project Purpose: Each 3d character model has unique needs, and the modeler needs to create solutions for that character's identification and movement within a video game. The modeler must communicate with the person or team who needs the 3d character to and collect all relevant data for the end-goal of the character. The student will become familiar with identifying and executing all modeling needs for any 3d video game character.

Grading Breakdown

Assignment	% of Grade	Due
Weekly Deliverables	50	Ongoing
Midterm Model Deliverable	25	Week 10
Final Model Deliverable	25	Week 15
TOTAL	100	

Assignment Rubrics

Assignments and Homework are due at the beginning of class of the assigned week and expected to be clear of extra or 'rogue' polygons, groups, history, dead-link texture references or other unaccounted objects in Maya to gain full points on the above breakdowns for deliverables.

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 models, but accommodations can be made for asynchronous attendance if the student contacts the instructor early in the semester. Please contact the instructor before any absence from class or communicate as early as possible any special exception to attend class asynchronously. Make sure to also communicate equally with the CTA.

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 my 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 does not 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

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.

ITP-351: Character Modeling For Games			
Week#	**Lecture**	**Assignment / Lab**	**Homework / Deliverables**
Week 01	Intro and Setup		
	Class Intro / Course overview Tools overview Basic tenants of character design: Readability, distance, silhouette. Greyboxing first to allow the rest of your team to work as you make a better model. Reference gathering best practices and resources	Install tools Gather reference for first assignment Choose turnaround drawings and create guides from front, side using photoshop for matching major body parts in guides.	
Lab	Maya setup Setting up the scene Turnaround guides	Create 3d 'guides' from drawings in Maya.	Setup Maya and Image planes in preparation for Model 01
Week 02	Character Model #1 - "Doll body" using primitives ("Simple" Primitive model)		
	Basic Maya modeling tools Modeling with primitives Move, Scale, Rotate Maya 3d modeling: (poly creation/extrusion, object/component) What 3d modeling is, how to build with 3d geometry	Model "Doll Body" Start blocking in entire character geo over the guides using polygon primitives. Finish first pass of character model using simple 'cube' Maya geometry	Save final "Doll Body" to class Google Drive with the files and naming convention posted in Blackboard
	Midterm: Model #1 due before next class.		
Week 03	Character Model #2 - Model "Base Body" ("Simple" No Gear)		
	Poly modeling - Basic block-in Model simple character from concept. Focus on blocking in major forms. **Edge_Loops.pptx** Edge flow is crucial for deformation "Real estate" for important areas. Topology overview - Edge loops	Start modeling simple "Basemesh" over guides using polygon primitives. Focus on: - Torso - Arms - Legs	Homework: Finish modeling basic "Basmesh" Keep it simple. This stage should be an unrefined block in.

	- Flow - Anatomical forms Quad's vs Tri's Extruding vs. Primitives - Modeling and connecting primitives for organic modeling vs. extrusions.		
Week 04	Refine topology on "Base Body"to fit turnaround		
	Modification of existing geometry Insert loops Soft select **Shape_Basemesh.pptx** Edge loops and design unique to the character's needs (action vs static). Goal is to understand poly flow.	Refine "Basemesh" model	Describe forms using more complex geometry. Finish "Basemesh" body: - Body - Arms - Legs Upload progress images to Google Drive
Week 05	Modeling low poly hands and feet		
	Hand overview LOD overview Read-ability in game **LowPoly_Hands_Feet.pptx** Feet extruded, hand simple cubes, head cylinder/sphere	Model hands and feet	Finish modeling hands and feet. Attach new geometry to "Basemesh" Upload progress images to Google Drive
Week 06	Modeling the head	Lecture:	
	Eyes, mouth, head - connect to body **Basic_Head_Modeling.pptx** Make live or multi-cut - smooth with sculpt tool Making an object 'LIVE' to draw polys over it. Process of creating simpler geometry base meshes and then focusing on poly loops. (Ex: faces) Quad draw tool overview Poly modeling vs edge modeling	Use 3d obj model projection of face from image and make 'live' to lay out polys.	Finish modeling the head. Attach new geometry to "Basemesh" This completes the"Base Body" geometry: - Head - Body - Hands - Feet Upload progress images to Google Drive
Week 07	Creating UV's		
	UV tools overview (3d cut tool with unfold for fast UVs) Mirror "Base Body" to create whole UVs versus polygon modeling. Distinct advantages of modeling half, laying out UVs, mirroring. Order of operations and how it saves time and rework.	Sort out the UVs in "Base Body"model for texturing using 3D UV tools.	Finish UV's for "Base Body"

	Efficient distribution of UV shells Edge padding guidlines UV distortion map		
Week 08	Introduction to Texturing		
	Training of using Photoshop and images for texturing the polygon layout. Color blocking "Clown Pass'" / "Color I.D." map Choose textures for 3D model What 'pops' in game and why. Palettes of color and their communication to the player	First pass texture on 3D model Focus on simple flat colors to identify UV layout	Finish color blocking texture
	Midterm: Model #2 due before next class.		Save final "Base Body", UV'd and textured to class Google Drive with the files and naming convention posted in Blackboard
Week 09	Character Model #3 - Review / Discuss ("Complex" - w/ Gear)		
	Review Model #2 in Class. Show to other groups for feedback and critiques	Discuss requirements for final model	
Week 10	Model complex geometry		
	Identify parts of the model that dynammically interact with the model. - What do these pieces require - Extracting new geometry from "Base Body" - Focusing topology and level of detail where needed	Model Custom pieces: - Hair - Clothing - Straps	Block in complex geometry from "base model" Focus on simple shapes first then refine.
Week 11	Model gear and props		
	Gear modeling and integration Non-deformable geometry Identify parts of the model that do not require special consideration.	Model accent pieces: - Props - Gear pieces - Weapons / Gadgets	Finish modeling non deformable geometry.
Week 12	Model review - Polish Stage		
	TBD based on progress / Instrustor assessment of models.	TBD based on progress / Instrustor assessment of models.	
Week 13	UV Final model		
	Advanced UV techniques Discussion of unwrapping body UVs versus face.	Begin modifying unwrapped UVs.	3D: Finish unwrapping body UVs

	Distribution of texel density - When/where to focus detail Mapping gear and duplicate geometry		Paint over image projection.
Week 14	Texture final model		
	Techniques for applying secondary details on top of color blocking using Photoshop Photoshop actions for quick iteration of reviewing textures on model	Finish texturing final model	3D: Finish texture for body Drawing: Add painted image projection onto Online Portfolio
Week 15	Final model delivered - Ready for rigging!		
	Final model delivered. Matches design, good poly flow, UV unwrapped and textured. (Ready for rigging!) Review deliverables posted in Blackboard.	Final Presentation: Showcase final models to class. Discuss presentation/portfolio best practices	
	Final model due complete with UV's and texture.		Final Deliverables: Uploaded into class Google Drive

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:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
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
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
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, 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
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
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
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.

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