USC Iovine and Young Academy
Arts, Technology and the Business of Innovation

IDSN 599: Computational Visual Design

Units: 2
Day-Time: TBA

Location: TBA

Instructor: Aaron Siegel
Office: IYH
Office Hours: By email appointment.
Contact Info: aaronsie@usc.edu

IT Help:
https://uscedu.sharepoint.com/sites/IYAStudent/SitePages/IT-Resources.aspx
Hours of Service: M-F, 8:30am - 6:30pm
Contact Info: iya.helpdesk@usc.edu, 213-821-6917

Course Description

This course is about exploring the history and contemporary applications of using computational algorithms in visual design processes and practices. Students will be using code as their medium to execute aesthetically and conceptually interesting projects with very tangible outcomes. The focus of the work will be on the visual output of custom designed software in the areas of graphic design, motion graphics, simulation, and interaction.

Learning Objectives and Outcomes

1. Understanding the tools and processes artists and designers utilize within the field of computational design.
2. Exploring applications of computing in visual design practices across a variety of mediums.
3. Executing innovative visual applications of computational design in class projects.

Prerequisite(s): None.
Co-Requisite(s): None.
Concurrent Enrollment: None.
Recommended Preparation: None.

Course Notes

The class will be a mix of technical demonstrations, software workshop exercises, lectures on the history and contemporary applications of computationally generated designs, as well as collective critique sessions. In class material may be recorded and shared with the students afterward for further review. Lecture materials will be made available on Blackboard or via class email.

Technological Proficiency and Hardware/Software Required

- Visual Studio Code
- P5.js

Required Readings and Supplementary Materials

- Daniel Shiffman - The Nature of Code

Projects:

1. **Static Graphic**
   Produce a high resolution static graphic through the implementation of your own original algorithm. Consider visual composition, color, value, balance, harmony, rhythm, and movement when generating your graphic.
2. **Emergent Animation**
   Create a code based generative animation that focuses on the principle of emergence. The animation should render live as an in-browser software experience. You will also need to take a 30 second video screen recording as well as 5 still high resolution screen captures for documentation.
3. **Interactive Graphics**
   Create a code based generative animation that focuses on interaction as the core feature for engaging the user with the visual content. Look at the various opportunities for user input and pick one that is meaningful to the experience. The animation should render live as an in-browser software experience. You will also need to take a 30 second video screen recording as well as 5 still high resolution screen captures for documentation.

Exercises:

1. **Basic Drawing**
   Use the shape functions, color, variables, conditionals, and loops to create a basic still image.
2. **Object Oriented Drawing**
   Use a custom class to create many instances of your graphic forms in order to generate a basic still image.
3. **Pattern Drawing**
   Plan out a pattern using repetition of forms, colors, placement, and consider how to incorporate oscillation and incrementation to affect the pattern elements.
4. **Particle System Animation**
   Use the principles of object oriented programming to create a particle system of moving graphic elements. The particles should have a lifespan and should be removed from the screen after their lifespan has been exceeded.
5. **Autonomous Agent Animation**
   Utilize one of the autonomous agent algorithms from the Nature of Code text to create a system of independent graphic forms that respond to each other's interactions.
6. **Recursive Animation**
   Use principles of recursion and repetition in order to create generative graphic forms.
7. **Mouse/Keyboard Interaction**
   Use input from the mouse and/or the keyboard to create some engaging experience between user interaction and resulting graphic animations.
8. **Camera Interaction**
   Use image input from the webcam in order to create some engaging experience between the user and the resulting graphic animations.
9. **Audio Interaction**
   Use audio input from the microphone in order to create some engaging experience between the user and the resulting graphic animations.

Reading Response Essays:

1. **Nature of Code #1**
   Chapters 1 - 5.
2. **Nature of Code #2**
   Chapters 6 - 10.

Grading Breakdown			Grading Scale		
Project #1: Static Graphic	20%			A = 100 - 95	A- = 94 - 90
Project #2: Emergent Animation	20%		B+ = 89 - 87	B = 86 - 83	B- = 82 - 80
Project #3: Interactive Graphics	20%		C+ = 79 - 77	C = 76 - 73	C- = 72 - 70
Reading Response Essays (6.5% x2)	13%		D+ = 69 - 67	D = 66 - 63	D- = 62 - 60
Exercises (3% x9)	27%		F = 59 and below		

Weekly Course Schedule

Week	Day 1	Day 2
1	Introduction. Shapes. Color. Matt DesLauriers.	Variables. Conditionals. Loops. **Exercise #1: Basic Drawing.**
2	Randomness. Noise. Arrays. Functions. Joshua Davis. Alida Sun.	Object Oriented Programming. **Exercise #2: Object Oriented Drawing.**
3	Patterns. Manolo Gamboa Naon.	Oscillation. **Exercise #3: Pattern Drawing.**
4	Emergence. Evolution. Casey Reas. Jessica In.	**Project #1: Static Graphic.** Presentations & Critique.
5	Frame Based Animation. Time Based Animation. Vectors. Forces. Chelly Sherman.	Particle Systems. **Exercise #4: Particle System Animation.**
6	Physics Simulation. Yugo Nakamura. Robert Hodgin.	Autonomous Agents. **Exercise #5: Autonomous Agent Animation.** **Reading Response Essay #1**
7	Flocking. Matt Pearson.	Recursion. **Exercise #6: Recursive Animation.**
8	Flowfield. Anders Hoff.	**Project #2: Emergent Animation.** Presentations & Critique.
9	Mouse Interaction. JT Nimoy.	Keyboard Interaction. **Exercise #7: Mouse/Keyboard Interaction.**
10	Camera Input. Golan Levin. Zach Lieberman. Annica Cuppetelli and Cristobal Mendoza.	Image Analysis. Computer Vision. **Exercise #8: Camera Interaction.**
11	Audio Input. FFT Analysis.	**Exercise #9: Audio Interaction.**
12	WebGL. Geometry. Marius Watz. Memo Akten.	**Project #3: Interactive Graphics.** Presentations & Critique. **Reading Response Essay #2**

Assignment Rubrics

Student work will be assessed based on:

- Level of understanding and execution of software skills on assignments.
- Degree of complexity of the assignment goal both creatively and technically.
- Innovative application of tools and concepts covered in class.

Assignment Submission Policy

Submit all of your digital assets via the class Brightspace page. Make sure you submit all related assignment assets and materials.

Grading Timeline

Labs, assignments, and responses to assigned readings will be reviewed, graded, and provided with feedback within a week of submission.

Late Submissions

Projects will be accepted after the deadline with the following grade penalties. Do not ask for extensions.

- Submission in the 24 hours after the deadline — 10% deduction
- Submission between 24 and 48 hours after the deadline — 20% deduction
- Submission between 48 hours and 3 days after the deadline — 50% deduction
- Submission more than 3 days after the deadline — 100% deduction

Keep copies of all your files and emails until the end of the semester.

Course Attendance Policy

The Academy maintains rigorous academic standards for its students and on-time attendance at all class meetings is expected. Each student will be allowed **two** absences over the course of the semester without facing a penalty to their final grade. Students are advised to not waste those two absences on non-critical issues, and to use them carefully for illness or other issues that may arise unexpectedly. Except in the case of prolonged illness or other serious issue (see below), no additional absences will be excused. Each unexcused absence will result in the lowering of the final grade by ⅓ of a grade (e.g., an A will be lowered to A-, and A- will be lowered to a B+, etc.). In addition, being tardy to class will count as one-third of an absence. Three tardies will equal a full course absence.

Students remain responsible for any missed work from excused or unexcused absences. Immediately following an absence, students should contact the instructor to obtain missed assignments or lecture notes and to confirm new deadlines or due dates. Extensions or other accommodations are at the discretion of the instructor.

Automatically excused absences normally may not be used for quiz, exam or presentation days. Using an excused absence for a quiz, exam or presentation, such as in the case of sudden illness or other emergency, is at the discretion of the instructor.

In the case of prolonged illness, family emergencies, or other unforeseen serious issues, the student should contact the instructor to arrange for accommodation. Accommodation may also be made for essential professional or career-related events or opportunities. Additionally, students who need accommodations for religious observations should provide advanced notice to instructors and student athletes should provide Travel Request Letters. All accommodations remain at the discretion of the instructor, and appropriate documentation may be required.

Unless students provide an accommodation letter from USC's Office of Student Accessibility Services (OSAS) or a letter from IYA Student Services detailing visa or travel restrictions, attendance and active participation is expected in the classroom. Any student with such accommodations should submit their accommodation

document to the instructor as soon as possible to discuss appropriate accommodations.

Students who are experiencing illness should not attend class in person. Please inform the instructor in advance of any class sessions that you can't attend for medical reasons, and accommodations will be arranged to view recorded lectures and submit alternatives to any missed class participation. Students will not be penalized for not attending class in person under these circumstances.

Statement on University Academic and Support Systems

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the USC Student Handbook. All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), 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 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.

Policy for the use of AI Generators

Generative AI for the use of creating snippets of code is allowed as long as you credit the source and include the prompt you used in the comments within your code. Generative AI to create images for inspiration on directions to take your visualization is allowed for moodboarding and brainstorming purposes, but not as submissions for your lab exercises or assignments. Generative AI is not allowed for the rendering of charts, graphs, plots, or any other data representation as they are not reliable and can not be vetted for accuracy. Generative AI text generation is not permitted on reading reflection submissions.

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 accommodations are 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.

Student Financial Aid and Satisfactory Academic Progress:

To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the Financial Aid Office webpage for undergraduate- and graduate-level SAP eligibility requirements and the appeals process.

Support Systems:

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 consists 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) 740-2500
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
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.