

ARCH-599 Video Games, New Media & Simulation - Software Studies for Designers



Units: 2

Semester: Spring 2018

Location: Watt Hall 212

Day and Time: Fridays 9:00 - 11:50 am

Instructor: Jose Sanchez

Office Location:

Office Hours: Monday - Wednesday - Friday

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Course Description

Video games are considered by many the most relevant medium of the 21st century, allowing players to deal with complex systems of inter-dependences and algorithms in an intuitive fashion. The ability to manipulate data is an asset that the gaming world has developed over the past 50 years combining ideas of computation with human intuition. Today, video games and simulation engines have been democratized allowing anyone to create a new immersive experience.

In the seminar, students will play and study key historic software; Games that allow for design and reinforce ideas of systemic thinking, combinatorics and simulation.

By reverse engineering the games, the seminar will present ideas and paradigms of programming as well as design strategies for the interdependence of resources.

By understanding the premises and algorithms involved in them, students will develop an understanding of complex systems and object oriented design strategies preparing them to engage the new mediums and paradigms of the 21st century.

Required Readings and Supplementary Materials

Required:

- Bogost, Ian. 2008. Unit Operations: an approach to Videogame Criticism. Cambridge: MIT Press.
- Sanchez, Jose. Hacklikes, Weird Interactions between things -TxA 2013 Paper
- Sanchez, Jose. Gamescapes - Acadia 2013 Paper
- Sanchez, Jose. Polyomino - Acadia 2014 Paper.

Optional:

- Manovich , Lev. 2013, Software Takes Command
- Kas Oosterhuis, Lukas Feireiss 2006, Game Set And Match II. On Computer Games, Advanced Geometries, and Digital Technologies
- 10 PRINT CHR\$(205.5+RND(1)); : GOTO 10 (Software Studies) by Nick Montfort, Patsy Baudoin, John Bell and Ian Bogost (Nov 16, 2012)
- Fowler 2004, UML Distilled Third Edition
- Bogost, Ian. 2012. Alien Phenomenology. Minneapolis: University of Minnesota Press.
- Gleik, James. 2012. The Information
- Winny Mass 2007, Space Fighter MVRDV
- Peter Tyson 2012, Getting started with Dwarf Fortress, Learn the most complex video game ever made.
- Sims, Karl. Evolving Digital Creatures
<http://www.karlsims.com/papers/siggraph94.pdf>
- Seth Cooper, Adrien Treuille, Janos Barbero, Andrew Leaver-Fay, Kathleen Tuite, Firas Khatib, Alex Cho Snyder, Michael Beenen, David Salesin, David Baker, Zoran Popović The Challenge of designing scientific discovery Games
<http://homes.cs.washington.edu/~zoran/foldit-fdg10.pdf>
- Licklider, J.C.R. Man Computer Symbiosis
<http://worrydream.com/refs/Licklider%20-%20Man-Computer%20Symbiosis.pdf>
- Hiller, Bill. Space is the Machine
- Bratton, Benjamin. On the Nomos of the Cloud: The Stack, Deep Address, Integral Geography <http://bratton.info/projects/talks/on-the-nomos-of-the-cloud-the-stack-deep-address-integral-geography/>
- <http://academicearth.org/courses/programming-methodology/>

SESSIONS:

Course Schedule: A Weekly Breakdown

WEEK 1: SOFTWARE STUDIES

The first session will introduce the course in the terms of 'Software Studies' referencing media and videogames that express the power and logic of algorithms in a visual manner. The first session will work as an orientation to the rest of the semester and will allow students select a topic to develop, build teams and acquire the specific technical skills to do a presentation including video and footage from their play experience.

WEEK 2: LEARNING TO CODE

The second session will develop software platforms as a learning device. The narrative and progression of games as a mechanic for generative creation and skill progression. While some of the examples in this session are programs developed for kids, they contain all the tools that are needed to develop complexity and higher logical operations. The session also introduces the notion of computational literacy as a fundamental asset for a contemporary designer.

[Games / Software / Topics to research]

-Code and Play

-Learning how to program, media literacy / Learning how to code for kids.

-Scratch

-Lightbot

-Cargobot

-Hopscotch

-Karel The Robot

-Design by Numbers

-Processing

[Links]

<http://www.youtube.com/watch?v=0LoKDDR1fZc>

<http://twolivesleft.com/CargoBot/>

<http://scratch.mit.edu/>

<https://vimeo.com/72611093>

<http://www.openprocessing.org/>

<https://www.gethopscotch.com/>

<http://light-bot.com/>

WEEK 3: OBJECT ORIENTED PROGRAMMING (OOP)

The third session develops the idea of object oriented programming and Object Oriented Design. In some extent, the whole course is based on the idea of object oriented design, but in this session we dig deeper into the core ideas behind the programming paradigm and the theoretical understanding its implications. The games and examples suggest a designers attitudes towards objects and the design of pre-actualized classes.

[Games / Software / Topics to research]

-Alan Kay, Object Oriented Programming

-Sound Shapes

-Scribblenauts

[Links]

<http://www.soundshapesgame.com/home/public.html>

<http://store.steampowered.com/app/218680/>

WEEK 4: REVIEW 01 - TOOLS

In this session we will revise the projects developed and the analysis of tools found in digital games and software. Students will have to present a series of tools that they consider break the tradition of the current design paradigm.

WEEK 5: COMPUTATIONAL SPACE

Session 4 will explore notions of computation starting with the simple models behind boardgames. How the interdependence of variables can yield a complex system. This will be further developed into games of computational combinatorics and analytics of space. Games such as 'Hot Spring Story' containing a powerful scoring system that continuously encourage the player to try different permutations.

[Games / Software / Topics to research]

-Board Games - Catan - Carcassonne

-Cellular Automata / Game of Life

-Space is the machine / Space Syntax

-Frozen Synapse

-Hot Spring Story

-Discrete Computation

[Links]

https://play.google.com/store/apps/details?id=net.kairosoft.android.onsen_en&hl=en

<http://mathworld.wolfram.com/CellularAutomaton.html>

<http://www.youtube.com/watch?v=o3WJTlDa7oo>

<http://www.youtube.com/watch?v=G6VpW4Vljr8>

https://www.khanacademy.org/math/probability/random-variables-topic/random_variables_prob_dist/v/discrete-and-continuous-random-variables

WEEK 6: EVOLUTIONARY SIMULATIONS, COMPUTATIONAL PHYSICS

Session 5 will explore the notion of 'continuous' space as opposed to notion of discrete space introduced in session 4. The main focus will be in the use of computational spring models as techniques for simulations allowing entities to evolve using genetic algorithms and structural performance evaluations.

[Games / Software / Topics to research]

-Theo Jensen

-Karl Sims

-Soda Constructor

-Catastrophe

-World of Goo

[Links]

http://www.youtube.com/watch?v=JBgG_VSP7f8

<http://www.thinkup.org/index.php/projects/view/catastrophe-an-addictive-game-to-get-children-into-structural-engineering/>

<http://sodaplay.com/creators/soda/items/constructor>

<http://www.youtube.com/watch?v=ZzwuHS9ldbY>

WEEK 7: REPRESENTING LOGICAL PROCESSES / MAN-MACHINE SYMBIOSIS

Session 6 will develop in depth notions explored in session 2, seeing how algorithmic operators like repetition and a-synchronic coordination can allow to design process and the production of Form. In this area a deep analysis of the work of Zach Barth and Zachtronic Industries will imply intensive puzzle games and speculation of the implications of such process for a design practice.

[Games / Software / Topics to research]

-Zach Barth / Spacechem, Manufactoid, Infinifactory

-UML

-State Machines

[Links]

<http://www.hutonggames.com/>

http://www.hutonggames.com/tutorials_game_design_with_playmaker.php

<https://www.youtube.com/watch?v=6TFVzBW7oo>

WEEK 8: CITY SENSING, BID DATA

Session 7 will introduce to the ideas of databases and data manipulation. Software and strategies that allow to deal with tables and location services. Algorithms that live in event triggered locations and frameworks that allow us to use them. We will explain what is an API and how can we access it, and the creative application of this platforms for graphics and the generation of form.

[Games / Software / Topics to research]

-Project Ingress

-Plague Inc.

-Jer Thorp - Data visualization strategies

-API's what is an API, refer to several important API's

[Links]

<http://www.tableausoftware.com/>

<http://d3js.org/>

<http://blog.blprnt.com/>

<http://www.thelavinagency.com/speaker-jer-thorp.html>

<http://ingressfieldguide.com/content/what-ingress-niantic-project>

WEEK 9: PROCEDURAL CONTENT GENERATION (PCG)

Session 8 will dive deep into the world of procedural content generation. Going back to the beginning of the Roguelike genre, we will explore the evolution of Roguelikes and algorithmic strategies developed to create infinite algorithmic adventures that were always different. The Roguelike Genre has become very popular in the last few years as a larger group of independent game developers seek for strategies to deal with large scale projects.

[Games / Software / Topics to research]

-Roguelikes

-netHack

-FTL

-Spelunky

-Procedural content generation techniques

-Teleological vs Ontogenic Strategies

[Links]

<http://en.wikipedia.org/wiki/Roguelike>

http://www.roguebasin.com/index.php?title=Main_Page

<http://pcg.wikidot.com/>

<http://pcg.wikidot.com/pcg-algorithm:map-generation>

<http://pcg.wikidot.com/pcg-algorithm:teleological-vs-ontogenetic>

<http://www.roguelikeradio.com/>

<https://vimeo.com/49472813>

WEEK 10: REVIEW 02 - WORLDS

This session will explore how worlds are created. Students will demonstrate how tools allow the creation of digital worlds

WEEK 11: SANDBOXES, COMBINATORICS

Session 9 will pick up on issues developed by session 8 and go deeper into the combinatorics of data and play as a permutation strategy. The concept of the sandbox allows games not to present a specific goal but rather an inventory of possibilities. The combination of this possibilities can often yield unexpected results. In this session we will tackle some of the most relevant games available; Minecraft, is certainly a game that has been a paradigm shift for design strategies and game as a creative medium.

[Games / Software / Topics to research]

-Lemmings

-Falling Sand

-Minecraft

-Minecraft Mods

[Links]

<https://minecraft.net/>

<http://www.zocalopublicsquare.org/2012/12/05/teachers-of-yesteryear-bow-to-the-awesomeness-of-minecraft/events/the-takeaway/>

<http://fallingsandgame.com/sand/>

<http://www.elizium.nu/scripts/lemmings/>

<http://www.youtube.com/watch?v=UMXnHhk-7sA>

WEEK 12: HOLISTIC / NON-HOLISTIC SYSTEMS

Session 10 will touch into some of the most complex games ever created. Simcity and Dwarf Fortress. By analysing this 2 games we will discover fundamental different design architectures present in them and the implications of them at the moment of design. The notion of Holistic and non-Holistic systems will be explained through the examples and understanding how this works in code.

[Games / Software / Topics to research]

-Sim city

-Dwarf Fortress / Gnomoria

[Links]

<http://www.bay12games.com/dwarves/>

<http://afteractionreporter.com/dwarf-fortress-tutorials/>

http://www.youtube.com/watch?v=XTmVt82_q0Q

<http://www.youtube.com/watch?v=TXnh4qR6bMg>

<http://www.youtube.com/watch?v=cBtLbma3zxY>

WEEK 13: DIGITAL MATTER , THE INTERNET OF THINGS / OPEN SOURCE/ OPEN HARDWARE

Session 11 will go stay closer to the physical world, by looking at how the algorithmic revolution has started blending into physical objects. Notions of combinatorics that were developed by games like LEGO have diversified into analog / virtual hybrids that allow users to create powerful artifacts. Together with this hybridization of analogue toys is the analysis of the maker movement and open source communities that have sustain them and the initiatives and strategies available for architecture and design.

[Games / Software to research]

-Little Bits

-Braun Lectron

-Cublets

-Modular Robotics

-Neil Gershenfeld / Jonathan Ward - Digital Matter.

-Open source Ecology

-Wikihouse

-Skylar Tibbits

-[Links]

- <http://www.wired.com/beyond-the-beyond/2010/05/the-braun-lectron-system/>

-<http://berglondon.com/projects/olinda/>

-<http://makezine.com/2011/12/08/the-braun-lectron-system-retro-circuit-dominoes/>

-<http://www.dasprogramm.org/electrical/lectron-system/misc-lectron-elements.html>

http://www.lectron.de/index.php?option=com_content&task=blogcategory&id=69&Itemid=116

-<http://www.lectron.info/>

<http://opensourceecology.org/>

WEEK 14: CROWDSOURCING PARADIGMS

Session 12 will close by analysing the different paradigms behind crowdsourcing. From competition strategies to collaborative strategies, what is the role of distributed labour and the mathematical paradigms of search behind the idea. The session includes games like Fold-it which allow players to help in scientific discoveries and analysis of the work of Aaron Koblin who uses crowdsourcing strategies as a generative design engine.

[Games / Software / Topics to research]

-Fold-It

-EteRNA

-Aaron Koblin's work [several projects]

-Mechanical Turk

[Links]

<https://www.mturk.com/mturk/>

<http://www.youtube.com/watch?v=A-CCEy3u2WM>

<http://eterna.cmu.edu/web/>

WEEK 15: FINAL REVIEW

Session 12 will close by analysing the different paradigms behind crowdsourcing. From competition strategies to collaborative strategies, what is the role of distributed labour and the

mathematical paradigms of search behind the idea. The session includes games like Fold-it which allow players to help in scientific discoveries and analysis of the work of Aaron Koblin who uses crowdsourcing strategies as a generative design engine.
[Games / Software / Topics to research]

FINAL EXAMINATION PERIOD: Final Report Due

Prerequisite(s)

No-prerequisite

Co-Requisite/Concurrent Enrollment

No Co-requisite

Recommended Preparation

It is recommended that the student gets familiarized with the software platforms that will be studied throughout the course. Many of this are video games, in which case, a critical view needs to be placed to the processes and implications of the software. It is possible to study this cases by viewing footage, although playing is preferred.

Course Notes

The course will be recorded and placed online for documentation purposes. Students need to allow for this recording to take place for the methodology of the course to be effective. If this is a problem, please address the issue with the instructor.

Technological Proficiency and Hardware/Software Required

No special requirements

Description and Assessment of Assignments

The class will be evaluated by a student presentation to be done throughout the semester in each module and by a final report. Participation will also be an important criteria for the final assessment.

Each student will prepare a 30 min presentation on each session, based on a piece of software or game. The presentation will develop the context and paradigms present in the piece. After the student presentation the tutor will present, expanding on the content from students. Each session will end with a round-table and discussion. The presentation and final report will be evaluated on the rigor and dedication on the historical background, and on a speculative attitude towards the implications of the technology, especially towards design practices. It is strongly encouraged investigation that expands of the given material.

The final report can be written or in a different medium to be discussed by the instructor. A video format is encouraged but not mandatory.

Presentation (Assignment 1) How to play / kit of parts

The 30 minute presentation should include video footage of gameplay or exploration in the software assigned. Drawing conclusion on design paradigms present in the platform. The students are encouraged to search online for articles or papers regarding the given software, this would allow for a critical understanding of the medium. By showcasing the community and culture surrounding any given software we expect to find potentials and contradictions that can greatly influence our design methodology. It is suggested that students have a brief conversation with the tutor in the session prior to their presentation, allowing for specific content to be suggested. The 30 minute presentation should try to develop a **comprehensive argument**; Including Explanation, Key Features, Paradigm, Culture, History and Speculation.

Final Report (Assignment 2) Design within the Game

The Final report requires the design of a settlement within the game assigned.

By designing and diagraming the systems involved in the game, the student will explain the work of reverse engineering and the understanding of the engines that the game deploys. The final report will be in the form of a **video narrating** the argument. A video critic of the content with footage, quotes and thoughts that allow to contextualize the topic. The piece should become a 'tutorial of thought' for a next generation approaching the subject. The final report should be a comprehensive survey and argument of the topic.

Grading Breakdown

Assignments:	
Points	%of Grade
Presentation	
120	30%
Final Report	
220	55%
Class Participation	
60	15%
Total	
400	100%

Assignment Submission Policy

The class presentation will be evaluated separately from the final report. Each student will pick a session to present, based on the interest on the topic. The material of the presentation will be further developed towards the final report. The final report will need to link ideas from different sessions, so attendance to all sessions is crucial.

Additional Policies

It is expected a 100% attendance, below 70% will receive a penalty unless justification is presented. Sessions will be recorded a put online for documentation purposes.

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, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

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

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime. Provides overall safety to USC community. dps.usc.edu