ARCH&UD 564

# SPECIAL TOPICS IN ARCHITECTURE AND URBAN DESIGN

AGENT ECOLOGY:

CLUMPY SPACE CITY

# CATALOG DESCRIPTION

With increasing software ubiquity and literacy, it is difficult to separate the design process from the software itself. The emergence of accessible software has collapsed the traditional flow of creativity, to the extent that, as Mario Carpo puts it, “digital tools are no longer the tools for making: they are primarily tools for thinking.” This seminar takes on the premise that software is an ingrained part of the contemporary creative process where real-time technologies such as game engines open additional frontiers into form making, simulation, and representation.

# LOCATION

UCLA IDEAS Campus

Slack:

TBD

Zoom:

<https://ucla.zoom.us/j/2181928441>

Meeting ID: 218 192 8441

Miro:

<https://miro.com/welcomeonboard/VkVCZXNaaXcxbWFjMlhUVEs0dENIU0dINVhGM0RRa2RVbDFWNDB6eUhucUY1eGtFQ0Q1bWs4RGhUVFVCRXlObHwzMDc0NDU3MzUwNzI4ODY5ODk4?invite_link_id=90709206439>

# COURSE DESCRIPTION

This course will explore algorithmic techniques to simulate how multiplicities of forms move through and aggregate into complex spatial compositions. Using a game engine we will produce agent ecologies, superimpositions of representation and simulation. Agents with responsive behaviors will be instantiated together in a sandbox, resulting in quantified architectural speculations of atypical interactions.

# LEARNING OBJECTIVES

This course aims to equip students with technical coding skills to create representative simulations of interactive architectural environments. Understanding of these skills and concepts will be demonstrated through a sandbox Unity3d project involving interplay between aggregating autonomous agents. Each agent will be algorithmically designed to have unique interactions between themselves and other agents and the environment. Interactive systems will be designed as a means of real-time testing and evaluation of proposals. The result will be an architectural design toolkit for simulating mobile urban speculations as quantified representations:

1. Develop an understanding of computer programming concepts.
2. Develop an understanding of game design mechanics and their architectural application.
3. Understand experiential implications through coding.
4. Learn methods of aggregating geometry into complex forms.
5. Produce interactive simulations that act as tools and experience.

# COURSE NOTES

The seminar meets every Monday from 7:30 pm PST to 10:30 pm PST at IDEAS Campus (except for the first class which is held through Zoom, linked above). The course consists of lectures, tutorials, and workshops as well as weekly project development discussion and critique. The students will work in teams of two or three to develop their own Agent Ecologies. Assignments and Progress should be completed before class time.

Each week there will be a git commit. The purpose of the git commits each week will be to see if you can conceptualize through programming what has been presented in your reading and the lecture. Scripting, therefore, becomes a way of thinking, and gaming as a way of reading. Thus, each week there will be three aspects to your work: tutorial project application, assigned simulation, and attendance at the lecture and interactive representation review.  
  
Group List:

[UCLA 289 CLASS LIST](https://docs.google.com/spreadsheets/d/1FE-1wyhETR_M7h88bslFafo5PDBcBrJgppB-Je0nUbU/edit?usp=sharing)

# SOFTWARE REQUIRED

All tutorials and templates will be given using the following software:

Unity3d, Visual Studio, Github. Tutorials will generally be given on Windows OS. Students will be required to look into solutions if their software differs from those used in demos. Mice are required at all times.

The course will utilize Miro for communication and coordination and collaboration.

[2021 289 SOFTWARE REQUIREMENTS](https://docs.google.com/document/d/1amZPrwr4oCi9o2BQiy5HUxqTHaKSNnUb2l0xK7Lf8hE/edit?usp=sharing)

# DESCRIPTION AND ASSESSMENT OF ASSIGNMENTS

An intuitive and critical understanding of digital craft as it applies to our digital instruments is valuable for evaluating them and their results. Therefore, evaluation of the assignments will not be based solely on technical complexity or accomplishment, but the digital design integrity and the ability to take advantage of limitations and even “bugs” in your assignments will be equally important. Assignments will be assessed based on the following Rubric:

|  | 100% | 75% | 50% | 25% |
| --- | --- | --- | --- | --- |
| Technological Proficiency | Exceptional modeling craft, organization, and techniques. | General modeling craft, organization, and techniques. | Basic modeling craft, organization, and techniques. | Bad modeling craft, organization, and techniques. |
| Design Development | Work is exceptionally unique and interesting. Exceptional understanding and application of design principles. | Work is generally unique and interesting. Good understanding and application of design principles. | Work is somewhat unique and interesting. Minimal understanding and application of design principles. | Work is not unique and interesting. Lack of understanding and application of design principles. |
| Representation | Communicates design exceptionally using architectural presentation materials and techniques. | Communicates design generally using architectural presentation materials and techniques. | Communicates design somewhat using architectural presentation materials and techniques. | Does not communicate design using architectural presentation materials and techniques. |

# GRADING BREAKDOWN

| ### | Assignment Title | Points | % of Grade |
| --- | --- | --- | --- |
| A | [Github Repository](https://docs.google.com/document/d/1OtXDTgPXt4hFzGVKcrBN4BVirUw_ZIpXlSRqPsNwYjw/edit?usp=sharing) | 5 | 5% |
| B | [Agents + Factory Modules](https://docs.google.com/document/d/1OtXDTgPXt4hFzGVKcrBN4BVirUw_ZIpXlSRqPsNwYjw/edit?usp=sharing) | 10 | 10% |
| C | [Agent Aggregations](https://docs.google.com/document/d/1OtXDTgPXt4hFzGVKcrBN4BVirUw_ZIpXlSRqPsNwYjw/edit?usp=sharing) | 10 | 10% |
| D | [Agent Interactions](https://docs.google.com/document/d/1OtXDTgPXt4hFzGVKcrBN4BVirUw_ZIpXlSRqPsNwYjw/edit?usp=sharing) | 10 | 10% |
| E | [Midterm](https://docs.google.com/document/d/1OtXDTgPXt4hFzGVKcrBN4BVirUw_ZIpXlSRqPsNwYjw/edit?usp=sharing) | 10 | 10% |
| F | [Rendering Precedent](https://docs.google.com/document/d/1OtXDTgPXt4hFzGVKcrBN4BVirUw_ZIpXlSRqPsNwYjw/edit?usp=sharing) | 5 | 5% |
| G | [Applied Rendering](https://docs.google.com/document/d/1OtXDTgPXt4hFzGVKcrBN4BVirUw_ZIpXlSRqPsNwYjw/edit?usp=sharing) | 10 | 10% |
| H | [Final Presentation](https://docs.google.com/document/d/1OtXDTgPXt4hFzGVKcrBN4BVirUw_ZIpXlSRqPsNwYjw/edit?usp=sharing) | 40 | 40% |

# ASSIGNMENT SUBMISSION POLICY

Each assignment will be submitted to Github and Miro, meeting the deadlines and protocols specified by assignment briefs. Each student must be prepared to discuss their assignment in class. Only one assignment submission per group required.

# SCHEDULE

| Date | W | Time | Theme | Workshop | Assignment | Due |
| --- | --- | --- | --- | --- | --- | --- |
| 2021.09.27 | 01 | 7:30-10:30 | **Introduction** | Versioning (Github), Game Engine (Unity3d), Integrated Development Environment (Visual Studio), Script Component, C#, Variables, Types, Navmesh | A | - |
| 2021.10.04 | 02 | 7:30-10:30 | **Interactivity** | Input Manager, Console, Instantiate, Conditionals, NavMesh Agent, Hierarchy, Tags, Layers, | B | A |
| 2021.10.11 | 03 | 7:30-10:30 | **Intermediate Programming** | Loops, Methods (Functions), List, Array, Dictionary, Transforms, Quaternions | C | B |
| 2021.10.18 | 04 | 7:30-10:30 | **Game Object Interactions** | Triggers, Colliders, Raycast | D | C |
| 2021.10.25 | 05 | 7:30-10:30 | **Advanced Programming** | Class, Inheritance, Namespace | E | D |
| 2021.11.01 | 06 | 7:30-10:30 | **Midterm** | - | F | E |
| 2021.11.08 | 07 | 7:30-10:30 | **Rendering** | Universal Render Pipeline, Shader Graph, UI, Particle Systems, Lighting | G | F |
| 2021.11.15 | 08 | 7:30-10:30 | **Runtime** | Generating Navmesh At Runtime, Updating Navmesh During Runtime | H | G |
| 2021.11.22 | 09 | 7:30-10:30 | **Prototype Reviews** | - | - | - |
| 2021.11.29 | 10 | 7:30-10:30 | **Prototype Reviews** | - | - | - |
| 2021.12.06 | 11 | 7:30-10:30 | **Final** | - | - | H |

# ATTENDANCE POLICY:

Each unexcused absence will result in the reduction of one letter grade from the final grade. More than 3 unexcused absences will result in a failing grade. Being 15 mins late to the class will account for half an absence. Due to the technical nature of this course it is imperative that classes are not missed as each class is building on technical knowledge presented in the previous class.

# VIDEO CONFERENCING DISCLAIMER:

This program uses video recording or other personal information capture for the purpose of facilitating the course and/or test environment. Pursuant to the terms of the agreement with UCLA, the data is used solely for this purpose and any vendor is prohibited from disclosing this information. UCLA also does not use the data for any other purpose. Students may not distribute recordings or other instructional materials provided as part of remote learning by faculty, teaching assistants, or invited guests.

# COURSE OUTLINE BY THE DEPARTMENT OF ARCHITECTURE AND URBAN DESIGN:

If you are already registered with the Center for Accessible Education (CAE), please request your Letter of Accommodation on the Student Portal. If you are seeking registration with the CAE, please submit your request for accommodations via the CAE website. Please note that the CAE does not send accommodation letters to instructors--you must request that I view the letter in the online Faculty Portal. Once you have requested your accommodations via the Student Portal, please notify me immediately so I can view your letter. Students with disabilities requiring academic accommodations should submit their request for accommodations as soon as possible, as it may take up to two weeks to review the request. For more information, please visit the CAE website (www.cae.ucla.edu), visit the CAE at A255 Murphy Hall, or contact us by phone at (310) 825-1501.

It is a requirement of this course that all students submit course materials digitally by the end of quarter. Failure to do so will result in the loss of one letter grade. Please follow this procedure in digitally submitting your work:

1.) For Studios: All students are required to submit all final project boards, drawings, animations, photos, and videos. Drawings, boards, and photos should be provided at 300dpi. All animations and videos should be provided as a MP4 file. Students may also elect to take digital photographs of their models and submit these along with their final boards.

2.) For Lectures and Seminars: All students must submit required assignments as compressed PDF files.