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|--|---|------------------------------|----------------|
| Course Number | ARCH 680.23 L06 | Classroom | CBDL workshop |
| Course Name | Integrative Design, Computational Design | | |
| Pre/Co-Requisites | | | |
| Instructor | Guy Gardner | Office Hours/Location | by appointment |
| | Email: gegardne@ucalgary.ca | Phone: 403 471 0183 | |
| Class Dates | In Person, Tues/Thurs 11AM -12:30PM | | |
| Instructor Email Policy | Please note that all course communications must occur through your @ucalgary email, and I will respond to emails sent via student's @ucalgary emails within 48 hours. | | |
| Name and Email of Teaching Assistant(s) | | | |

Course Description

Understanding how to access, use and generate data provides designers with power and freedom. During this course, students will explore how data and computational design tools can help architects understand and shape relationships between architecture, users and contexts. The course content is designed to familiarize students with digital tools and workflows including Rhinoceros and Grasshopper 3d. Tutorials and lectures will introduce students to concepts related to computational design and automation in architecture. During the course, we will look at plugins and methods of implementing scripting capabilities for the collection and manipulation of data and geometry as well as approaches to interoperability with other software and machines.

Course Hours: 3 units

Online Delivery (If applicable)

NA

Course Learning Outcomes

Upon completion of this course, students will know and be able to:

1. Apply basic principles of computational design in architecture
2. Use visual programming techniques for architectural design
3. Learn and evaluate algorithms and identify opportunities to improve their performance

4. Develop methods for interpretation, description and manipulation of digital information and computational geometry.
5. Leverage the relationship between computational design and digital fabrication to assist in physical making.

Learning Resources

Required readings, textbooks and learning materials:

- Rhino 6/Grasshopper 3d modelling software.
- ACADIA conference publications: <http://papers.cumincad.org>

Technology requirements (D2L etc.):

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Broadband internet connection

Workshop Safety Training Requirement

If a course requires the use of the SAPL workshop, students must complete all online University of Calgary safety courses, the online Trajectory safety training course, as well as in-person workshop training and a grade of pass on the final evaluation project, to be granted access to the SAPL workshop. This training is offered once a year, around the start of the Fall term and has a completion deadline.

Additional Classroom Conduct and Related Information

Guidelines for Zoom Sessions in Online Classes

Students are expected to participate actively in all Zoom sessions and to turn on their webcam. Please join our class in a quiet space that will allow you to be fully present and engaged in the Zoom sessions. Students must behave in a professional manner during the session. Students, employees, and academic staff are also expected to

demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

Assessment Components

| Assessment Method | Description | Weight | Aligned Course Learning Outcome | Due Date |
|-----------------------|--|--------|---------------------------------|-----------------|
| 1. Drawing with Data | PDF/Presentation: individual | 25% | 1,2,3,4 | September 27/29 |
| 2. Translating Data | PDF/Presentation. Individual/Partners Pseudocode Diagrams, Visualizations, Simulations, Animations | 25% | 1,2,3,4, | October 25/27 |
| 3. Materializing Data | Model + Presentation of Design + Project documentation | 50% | 1,2,3,4,5 | Nov 29/Dec 1 |

Assessment and Evaluation Information

Attendance and Participation Expectations:

Students are required to participate in the asynchronous learning tasks using the D2L learning environment and synchronous Zoom sessions. If unable to participate live due to unforeseen circumstances, inform the instructor in advance to work out an alternative participation activity (e.g., watch the recordings, submit a brief reflection, and actively contribute to the follow-up online discussion).

Guidelines for Submitting Assignments:

Students will be evaluated individually for all assignments. In the case of group assignments, participants will be asked to describe their contribution to the assignment. Projects will be evaluated for completeness, quality, and originality.

Assignments should be submitted to D2L Dropbox on or before the due date. Assignments submitted after the deadline will be penalized with the loss of a grade (e.g.: A- to B+). For late submission after one week but not more than 2 weeks late, the loss will be two grades, e.g.:

A- to B. Assignments will not be accepted after 3 weeks.

Final Examinations:

N/A

Expectations for Writing (<https://www.ucalgary.ca/pubs/calendar/current/e-2.html>):

Criteria that must be met to pass: Note: Students must submit and pass Assignment 3 in order to receive credit for the course. Final grades will be reported as letter grades, with the final grade calculated according to the 4-point range. Assignment(s) will be evaluated by percentage grades, with their letter grade equivalents as shown.

Grading Scale

| Grade | Grade Point Value | 4-Point Range | Percent | Description |
|-------|-------------------|---------------|----------|---|
| A+ | 4.00 | 4.00 | 95-100 | Outstanding - evaluated by instructor |
| A | 4.00 | 3.85-4.00 | 90-94.99 | Excellent - superior performance showing comprehensive understanding of the subject matter |
| A- | 3.70 | 3.50-3.84 | 85-89.99 | Very good performance |
| B+ | 3.30 | 3.15-3.49 | 80-84.99 | Good performance |
| B | 3.00 | 2.85-3.14 | 75-79.99 | Satisfactory performance |
| B- | 2.70 | 2.50-2.84 | 70-74.99 | Minimum pass for students in the Faculty of Graduate Studies |
| C+ | 2.30 | 2.15-2.49 | 65-69.99 | All final grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements. |
| C | 2.00 | 1.85-2.14 | 60-64.99 | |
| C- | 1.70 | 1.50-1.84 | 55-59.99 | |
| D+ | 1.30 | 1.15-1.49 | 50-54.99 | |
| D | 1.00 | 0.50-1.14 | 45-49.99 | |
| F | 0.00 | 0-0.49 | 0-44.99 | |

A student who receives a "C+" or lower in any one course will be required to withdraw regardless of their grade point average (GPA) unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript.

CACB Student Performance Criteria

The following CACB Student Performance Criteria will be covered in this course:

A1 Design Theories, Precedents and Methods, A2 Design Skills; A3 Design Tools, A5 Site Context and Design. A7 Detail Design, A8 Design Documentation; B1 Critical Thinking and Communication; C2 Materials; C5 Environmental Systems.

Topic Areas & Detailed Class Schedule

| Course Schedule Date | Topic | Assignments/Due Dates |
|----------------------|---|--------------------------------|
| Sept 7 /9 | Course intro. Lecture. Site data analysis Assignment 1 ideation/production Tutorial: introduction to grasshopper UI, data types, logic, Grids | |
| Sept 13/15 | Lecture: Digital Architecture. Tutorial: Data Management (Lists and Data Trees) | |
| Sept 20/22 | Lecture: Extending Functionality Tutorial: Interacting with Rhino, Loading Plugins, Best practices and Algorithmic Optimization. | |
| Sept 27/29 | Assignment 1: Drawing with Data Due Tuesday. Student presentations T/Th. | Assignment 1 Review |
| Oct 3-7 | No classes – SAPL block week | |
| Monday October 10 | No classes - Thanksgiving | |
| Oct 11/13 | Lecture: Tuning performance. Tutorial: Simulation/Optimization. Environmental interactions | |
| Oct 18/20 | Lecture: Documentation. Tutorial: fabrication scripting– unrolling, tagging, nesting, jointing | |
| Oct 25/27 | Assignment 2: Translating Data Due Tuesday. Student presentations T/Th. | Assignment 2: Review |
| Nov 1/3 | Lecture: Creative Machines Tutorial: Extensions, Interoperability + Machine languages | |
| Nov 6 – 12 | No classes – term break | |
| Nov 15/17 | Production (desk reviews) | |
| Nov 22/24 | Production | |
| Nov 29 /Dec 1 | Final review. PDF due Tuesday. Student Presentations T/TH | Assignment 3 due. Final Review |

Guidelines for Zoom Sessions

Zoom is a video conferencing program that will allow us to meet at specific times for a “live” video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor’s permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith, and respect (as per the [Code of Conduct](#)). When entering Zoom or other video conferencing sessions (such as MS Teams), you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behaviour in these sessions may affect others.

Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities.

Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies (e.g. [Student Non-Academic Misconduct Policy](#)). If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your zoom sessions visit:

<https://elearn.ucalgary.ca/guidelines-for-zoom/>

If you are unable to attend a Zoom session, please contact your instructor in advance to arrange an alternative activity for the missed session (e.g., to review the recorded session). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (for group work, presentations, etc.).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only and will not be shared or used for any other purpose.

Special Budgetary Requirements

nil

University of Calgary Policies and Supports

COVID-19 PROCEDURE FOR SICK STUDENTS: <https://ucalgary.ca/risk/sites/default/files/Covid-19%20Folder/COVID-19-Procedure-for-Sick-Students.pdf>

ACADEMIC ACCOMMODATION

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/university-policies-procedures/student-accommodation-policy>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/university-policies-procedures/accommodation-students-disabilities-procedure>

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability,

should communicate this need, preferably in writing, to their instructor (contact information on first page above).

SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/.

ACADEMIC MISCONDUCT

Academic Misconduct refers to student behavior which compromises proper assessment of a student's academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar.

For information on the Student Academic Misconduct Policy and Procedure please visit:

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf>

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

Additional information is available on the Academic Integrity Website

at <https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

COPYRIGHT LEGISLATION:

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy (<https://www.ucalgary.ca/pubs/calendar/current/k.html>).

INSTRUCTOR INTELLECTUAL PROPERTY

Course materials created by instructors (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may NOT be reproduced, redistributed or copied without the explicit consent of the instructor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

SEXUAL VIOLENCE POLICY

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment,

discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>

UNIVERSITY STUDENT APPEALS OFFICE: If a student has a concern about the course, academic matter, or a grade that they have been assigned, they must first communicate this concern with the instructor. If the concern cannot be resolved with the instructor, the student can proceed with an academic appeal, which normally begins with the Faculty. <https://www.ucalgary.ca/secretariat/student-appeals>

OTHER IMPORTANT INFORMATION

Please visit the Registrar's website at:

<https://www.ucalgary.ca/registrar/registration/course-outlines> for additional important information on the following:

- Wellness and Mental Health Resources
- Student Success
- Student Ombuds Office
- Student Union (SU) Information
- Graduate Students' Association (GSA) Information
- Emergency Evacuation/Assembly Points
- Safewalk