UNIVERSITY OF CALGARY
SCHOOL OF ARCHITECTURE, PLANNING AND LANDSCAPE

Winter 2022

Course Number	ARCH 680.8	**Classroom**	CBDL workshop
Course Name	Integrative Design, Masonry and Robotics		
Pre/Co-Requisites			
Instructor	Guy Gardner	**Office Hours/Location**	by appointment
	Email: gegardne@ucalgary.ca	**Phone: 403 471 0183**	
Class Dates	In Person, Monday 9AM -12PM		
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

The course will focus on the development of workflows for the robotic assembly of discrete components using the logic of stacked masonry systems. Students will speculate on the potential for human robot collaboration, distributed manufacturing and on-site robotic construction while engaging in the production of bespoke architectural elements. Digital simulation and remote execution will be employed to allow for a range of potential modes of exploration.

This iteration of the Integrative Design elective will begin with a brief examination of available methods, processes, techniques, and technologies for robotically augmented masonry construction. Drawing on recent advances in computational design tools and workflows, students will speculate on how these techniques can be a pursued as a promising trajectory in architectural design.

As the course progresses, students will utilize analysis and simulation data as inputs in the parametric modeling of geometric forms, and deploy generative computational techniques, digital fabrication, robotics, biomimicry, material exploration, and/or performance analyses to discover and create something (a process, technique, product) that is potentially qualitatively new in design.

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.Basic robot programming, and how to program a collaborative robot using a teach pendant
2.Basic industrial collaborative robot simulation and path planning.
3.Design a component or assembly and produce necessary drawings /fabrication instructions for robotic construction
4.Produce high quality documentation and analysis of mock-ups and prototypes
5.Present the findings of their research in the form of a report and presentation.

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
1. Precedent research and Analysis assignment	PDF/Presentation: Individual Historical, vernacular forms, patterns and precedent examples. Establishing a research trajectory.	20%	2,3,4,6
2. Simulation and visualization assignment	PDF/Presentation/Animation: Partners Physics simulations. Prototype designs.	20%	1,2,3,4,5,6
3. Design/ Pseudo code/ Scripting assignment	PDF/Presentations: Team Designing using pseudocode. Path planning. Robotic simulations. Project documentation/ pitching.	20%	
4. Final Assignment: In-Class Presentation/Pitch	PDF/Presentation Team	30%	1,2,3,4,5,6
5. Design Research Reading Presentation	PDF/Presentation: Individual	10%	1,4,5

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 2 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:
A6. Human Behaviour B4. Sustainable Design; C2. Building Systems Integration; C3. Technical Documentation

Topic Areas & Detailed Class Schedule

Course Schedule Date	Topic	Assignments/Due Dates
Phase 1: Materials and Techniques		
January 14	Course Intro. Lecture 1: Masonry design review – history, principles and vocabulary Assignment Overview. Assignment 5 demo Introduce Assignment 1. In class work time.	Reading: Bricks in Alberta Videos: Medalta History.
January 21	Lecture 2 Material properties (review pt. 2) Guest lecture – Malcolm Sissons, IXL	Universal University Modules
January 28	Student presentations Assignment 1 Introduce assignment 2.	January 28: Assignment 1 due.
February 4	Guest Lecture. Derek Kowalcek, SAIT Masonry construction best practices Lecture: Masonry structures + loads Tutorial: Simulation	Universal University Modules
February 11	Assignment 2 due	Feb 11: Assignment 2 due.
February 18	No classes – Mid-term Break	
Phase 2: Assemblies		
February 25	Introduce assignment 3/4. Develop proposal for instructor review + approval (pseudocode).	Reading: Rise of the Servant Zombies - Michael Silver- Towards a Robotic Architecture
March 4	Production of working drawings, digital models + fabrication files. Desk reviews of proposals	March 4: Assignment 3 due. Reading: Robotic Building - Gilles Retsin
March 11	Production (desk reviews)	
March 18	No classes – Block Week	
March 25	Production (desk reviews)	
April 1	Student presentations Assg. 4	April 1: Assignment 4 presentation + final document due.
April 8	No class (studio production)	
April 15	No class (studio reviews)	

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