UNIVERSITY OF CALGARY
SCHOOL OF ARCHITECTURE, PLANNING AND LANDSCAPE

Winter 2024

| Course Number	ARCH 702	Classroom	CBDL
Course Name	Senior Research Studio in Architecture II		
Pre/Co-Requisites			
Instructor	Jinmo Rhee	**Office Hours/Location**	By appointment
	Email: jinmo.rhee@ucalgary.ca	**Phone:** 412-628-2948	
Class Dates	All in-person Monday and Thursday, 14:00-18:00 hrs (Meeting days)		
Instructor Email Policy	Please note that all course communications must occur through your @ucalgary email. See Communication Guidelines section for more details.		
Name and Email of Teaching Assistant(s)			

Course Description:

This course invites students to delve into the innovative realm of utilizing Artificial Intelligence (AI) in reinterpreting the typology of buildings in Calgary, aiming to foster exploration and the advancement of new design methodologies. This studio stands witness to an era where the explosive growth of AI is increasingly intertwined with architectural and urban design practices. The current framework employed in architectural design involves the incessant generation of images, such as perspectives or plan/section drawings from AI models, transforming these images into 3D forms, and unearthing spatial values from these forms until satisfactory results are achieved.
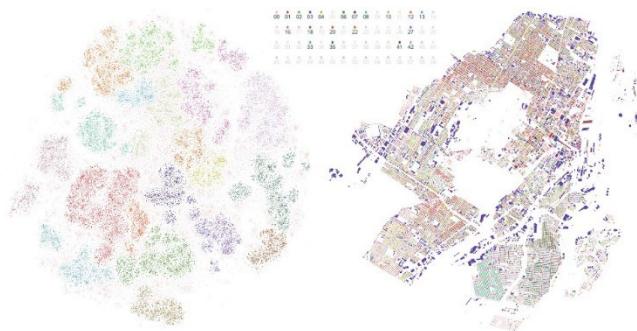
Figure 1. Clusters of Building Form in Montreal Using Deep Learning Model in Data Space (left) and Map Space (right)

Launching this design research studio, this studio adopts a critical stance on the prevalent tendency to use AI as an oracle in contemporary practices. This studio advocates for a transition: beyond viewing AI as merely the oracle, there lies a vast horizon of benefits to reap from employing AI models in design, both creatively and scientifically. From this standpoint, the course aspires to train AI models on the forms of buildings in Calgary to discover new typo-morphologies, subsequently reinterpreting Calgary's vernacular to propose innovative vernaculars and prototypes.
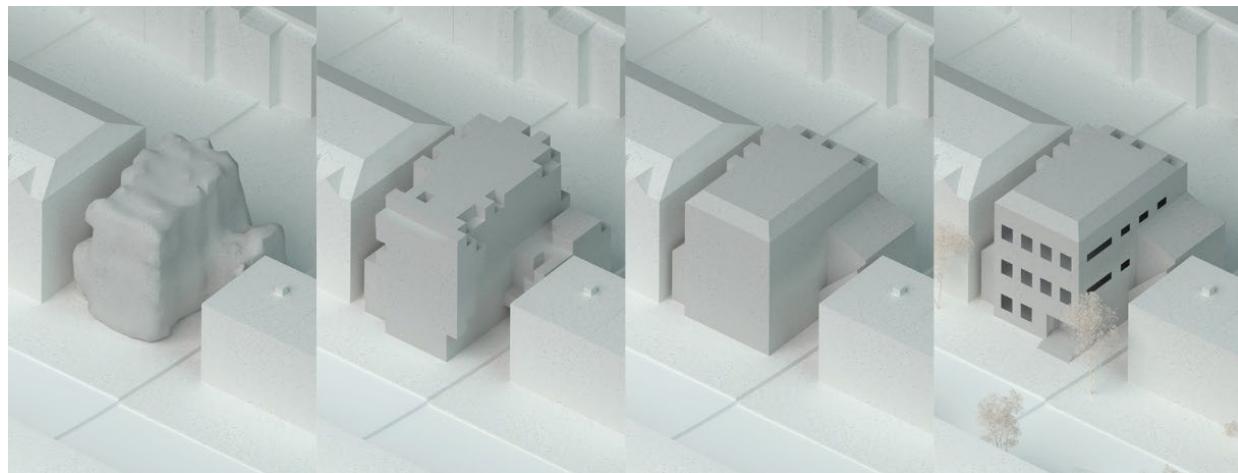
Figure 2. An Example of Ways to re-Interpret and Develop a New Vernacular in Montreal

To realize these objectives, students will complete an architectural design through three progressive phases:

Phase 1. Theoretical Foundation and Explorative Design.
In the initial phase, students engage in readings, drawings, and debates to grasp the relationship between form and space in architectural design, understand what morphology is and its origins, and recognize the significance of the vernacular in design. This phase establishes the design theoretical foundation, setting the stage for the explorative design that characterizes this studio.

Phase 2. AI-Enabled Typology and Vernacular Reinterpretation.
The second phase immerses students in the discovery and reinterpretation of a new vernacular, grounded in AI-assisted typology. Initially, students investigate the vernacular of Calgary's buildings without AI assistance, understanding the city through its vernacular and variations. Subsequently, with AI's assistance, they cluster Calgary's buildings based on morphological features and reinterpret the results to define a new vernacular.

Phase 3. Design Development of New Vernacular.
The final phase is dedicated to the design development that materializes the new vernacular. Students will advance the reinterpreted vernacular into prototypes, devising rules for variations. Through site selection, they will analyze suitable locations for applying the prototypes, propose

variations responsive to this analysis, and proceed with the spatial concretization and development.

This course, lying at the intersection of technology and creative inquiry, is designed for students who aspire to push the conventional boundaries of architectural design and seek to pioneer in the incorporation of AI into dynamic design landscapes.

Course Hours: 6 units;

Online Delivery

As a significant component of this course, we will be leveraging online platforms such as Desire2Learn (D2L) and Zoom to facilitate learning. Throughout the term, students are expected to actively engage in asynchronous learning tasks via the D2L learning environment and synchronous Zoom sessions if they will be. In the event that a student is unable to participate in real-time due to unforeseen circumstances, it is essential to notify the instructor in advance. This will enable us to collaboratively devise an alternative participation plan, which may involve watching recorded sessions, submitting a brief reflection, and actively participating in follow-up online discussions. To ensure a comprehensive understanding of the material, asynchronous online learning requires students to watch recorded lecture videos diligently and conduct their own lab sessions following the instructions provided in the videos.

Course Learning Outcomes:

Upon successful completion of this course, students will have acquired the knowledge and competencies to:
1. comprehend the concept that form serves as an alternate representation of space in architectural contexts,
2. differentiate between 'types' and 'typology' in architectural discourse and gain an in-depth understanding of urban morphology,
3. recognize what constitutes the architectural vernacular and comprehend its significance within the realm of urban architecture,
4. develop the capacity to view urban architecture through the lens of its vernacular and respective variations,
5. understand the capabilities of AI models in learning architectural form data and employing clustering techniques to identify new architectural types,
6. perform typo-morphological analysis, reinterpreting the results from AI model clustering, to identify novel architectural vernaculars,
7. establish prototypes based on the concepts of the reinterpreted vernaculars, and compose variations that respond effectively to specific sites,
8. concretize the spatial qualities inherent in these variations and proceed to develop comprehensive designs for the structures.

These learning outcomes contribute towards equipping students with a multifaceted understanding of both theoretical concepts and practical applications at the intersection of architectural design and artificial intelligence.

Learning Resources:

There is no textbook for this course but reading material will be provided.

The following are useful resources.

- Carpo, Mario. 2013. The Digital Turn in Architecture 1992–2012. John Wiley & Sons, Ltd.
- Alexander, Christopher. 1964. Notes on the Synthesis of Form. Cambridge: Harvard University Press.
- Bandini, Micha. 1984. "Typology As A Form of Convention." AA Files, no. 6: 73–82.
- Brown, Robert, and Daniel Maudlin. 2012. "Concepts of Vernacular Architecture." In The SAGE Handbook of Architectural Theory, 340–68. London: SAGE Publications Ltd. https://doi.org/10.4135/9781446201756.
- Glassie, Henry. 1990. "Architects, Vernacular Traditions, and Society." Traditional Dwellings and Settlements Review 1 (2): 9–21.
- Jacoby, Sam. 2015. "Type versus Typology Introduction." The Journal of Architecture 20 (6): 931–37. https://doi.org/10.1080/13602365.2015.1115600.
- Kaij-O' Grady, Sandra. 2012. "Formalism and Forms of Practice." In The SAGE Handbook of Architectural Theory, 152–64. Architectural Theory. Los Angeles ; SAGE Publications.
- Kwinter, Sanford. 2003. "Who's Afraid of Formalism?" In Phylogenesis: Foa's Ark, 96–99. Actar.
- Marcus, Leslie F. 1990. "Traditional Morphometrics." In Proceedings of the Michigan Morphometric Workshop, 2:77–122. Ann Arbor MI, The University of Michigan Museum of Zoology: Rohlf and F. L. Bookstein.
- Neumeyer, Fritz. 1991. The Artless Word : Mies van Der Rohe on the Building Art. Cambridge, Mass: MIT Press.
- Reyment, Richard A. 2010. "Morphometrics: An Historical Essay." In Morphometrics for Nonmorphometricians, edited by Ashraf M.T. Elewa, 9–24. Lecture Notes in Earth Sciences. Berlin, Heidelberg: Springer. https://doi.org/10.1007/978-3-540-95853-6_2.
- Rossi, Aldo. 1982. The Architecture of the City. Cambridge, Massachusetts, and London, England: MIT Press. https://mitpress.mit.edu/books/architecture-city.
- Somol, R.E., Fred Koetter, Judith Wolin, Albert Pope, Peggy Deamer, Nadir Lahiji, Michael Graves, et al. 1994. "What Is the Status of Work on Form Today?" ANY: Architecture New York, no. 7/8: 58–65.
- Steadman, Philip, Harry Bruhns, Senino Holtier, Bratislav Gakovic, Peter Rickaby, and Frank Brown. 2000. "A Classification of Built Forms." Environment and Planning B: Planning and Design 27 (February): 73–91. https://doi.org/10.1068/bst7.
- Sullivan, Louis H. 1896. "The Tall Office Building Artistically Considered." LIPPINCOTT'S, 1896. http://archive.org/details/tallofficebuildi00sull.
- As, Imdat, and Prithwish Basu, eds. 2021. The Routledge Companion to Artificial Intelligence in Architecture. 1st ed. New York: Routledge.
- Rhee, Jinmo. 2022. "Urban Form Analysis through Morphometry and Machine Learning." In Artificial Intelligence in Urban Planning and Design: Technologies, Implementation, and Impacts, edited by Imdat As, Prithwish Basu, and Pratap Talwar, 1st ed., 86–116. Elsevier. https://www.elsevier.com/books/artificial-intelligence-in-urban-planning-and-design/as/978-0-12-823941-4.

- Rhee, Jinmo, and Ramesh Krishnamurti. 2024. "Latent Space to Support Virtual 3D Models." In Cultural Space on Metaverse, edited by Ji-Hyun Lee, 41–52. Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-99-2314-4_3.
Other readings will be added to this list.

Technology Requirements (D2L etc.):

To ensure a productive and enriching learning experience at the University of Calgary, students enrolled in online, remote, and blended courses must have reliable access to the following technology:

- A computer with a supported operating system, equipped with the latest security and malware updates.
- A current and updated web browser to access course materials and online resources.
- A webcam, either built-in or external, to actively participate in virtual sessions and collaborative activities.
- A microphone and speaker (built-in or external) or a headset with a microphone for effective communication during online interactions.
- Current antivirus and/or firewall software enabled to safeguard against potential security threats.
- A broadband internet connection to ensure seamless access to online content and virtual classrooms.

Additionally, this course will utilize specific software tools, namely Grasshopper in Rhinoceros. Students are required to have Rhinoceros version 6.0 or higher (preferably 7.0) and Grasshopper installed on their laptops to fully engage in the course activities.

As the primary platforms for online learning, D2L and Zoom will play essential roles in delivering course materials, conducting virtual lectures, and facilitating interactive discussions. Prioritize ensuring that you have access to D2L and Zoom to make the most of the online learning opportunities provided.

Additional Classroom Conduct and Related Information

Q&A Sessions and Office Hours

D2L has a section for Discussion which will be used for Q&A sessions. Students can post questions about concepts and assignments. Other students can reply to the post to share their experience or ideas and logic about a problem. However, the D2L Discussion is not a place to catch up on missed classes. In necessary circumstances where you are unable to attend class, please make sure to inform us via email and the instructor will address the situation accordingly.

Office hours and supplementary sessions can be conducted remotely through Zoom. The links for these meetings will be announced in D2L or via email.

Digital Works and Back-up Requirements

In this computation course, the majority of the materials and assignments will be in digital format. Therefore, it is imperative for all students to take responsibility for maintaining back-up

files of their digital works and productions. Regardless of the nature of the issue, such as data loss due to electrical problems or the misplacement of storage devices, these circumstances cannot serve as excuses for missed assignments or late submissions.

To ensure the safety and accessibility of your work, it is highly recommended to utilize OneDrive, the cloud storage service provided by the University of Calgary. OneDrive offers a reliable platform with no size limitations, making it an ideal solution for safeguarding your files. By diligently backing up your work, you can confidently approach the course knowing that your progress and efforts are secure and protected from unexpected data loss incidents.

Plagiarism Policy

Copying any materials without citation is considered plagiarism and is strictly prohibited in this course. Code plagiarism refers to using code from external sources without proper attribution to the original authors. Any instance of code plagiarism will be treated as a breach of academic integrity, leading to severe consequences as per University policies. Please ensure all code submissions are your own, properly cited, and demonstrate your understanding of the material. If you have questions about using external code or proper citation, seek clarification from the instructor.

Communication Guidelines

Please reserve email communication for crucial queries and important concerns. For software-related questions or inquiries about the course content, it is recommended to ask the instructor during office/lab sessions or use the D2L Discussion section. By following these communication guidelines, we can ensure a more efficient and effective means of addressing your inquiries and fostering a collaborative learning environment.

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
Phase 1	Ideation of Space, Form, Types, Typology, Morphology and Vernacular	20	1,2, and 4
Phase 2	Investigating and re-interpreting the	30	3,4,5 and 6

	current vernacular in Calgary		
Phase 3	Designing a new vernacular in Calgary	25	6,7, and 8
Final Documentation	Documentation of the entire works	15	7 and 8
Participation	Class attendance and active engagement.	10	1,2, and 5

Assessment and Evaluation Information

Attendance and Participation Expectations:

For in-person classes, punctuality is essential, and it is expected that students attend all sessions on time. The course will feature desk crits and small group discussions, and your active engagement in these activities, including asking and answering questions, will be considered as part of your participation. Additionally, your performance in in-class activity sessions, which will occur 1-3 times during each class and last for 20-50 minutes, will also contribute to your overall participation assessment.

Guidelines for Submitting Assignments:

Every assignment will include specific submission instructions provided in the assignment handouts and template files. Please ensure that you read and follow these instructions carefully when submitting your work. Following the specified guidelines for submission is crucial for the successful evaluation of your assignments.

Final Examinations: There will be no final exam for this course. Instead, we will have a comprehensive 3-hour review session dedicated to the final projects. During this session, students will have the opportunity to present and discuss their final projects in detail. The review will serve as a culmination of your efforts and provide a platform for showcasing your achievements throughout the course.

Expectations for Writing:

Expect collegial-level writing. Follow [university guidelines](#).

Late Assignments:

A 5%-point deduction will be applied *for each day* an assignment is submitted late. For instance, if a student submits an assignment (15 points max.) *two days late*, the highest achievable score for that assignment will be *90%* (13.5 points). Please ensure timely submission to avoid any deduction in your scores.

Final Project will have different breakdown and late submission policy, referring to the final project handout.

Criteria that must be met to pass:

Successful completion of assignments is a vital requirement for passing this course. Each assignment should not take more than 2 hours at most to complete. It is strongly recommended to aim for a score of over 70% on each assignment to ensure satisfactory progress.

In the event that you do not meet the desired scores in the assignments, the Final Project presents an additional opportunity to compensate for any low grades. Make the most of this chance to improve your overall grade in the course.

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

The School of Architecture, Planning and Landscape will not permit the Flexible Grade Option (CG Grade) for any course offered by the School.
https://www.ucalgary.ca/pubs/calendar/current/f-1-3.html

CACB Student Performance Criteria (for Architecture courses only)

The following CACB Student Performance Criteria will be covered in this course at a primary level (other criteria will be covered at a secondary level): A2: Design Skills; A3: Design Tools; B1: Critical Thinking and Communication; B3: Architectural Theory.

Topic Areas & Detailed Class Schedule

		Topic	Assignments / Due Dates
Week 01	**8-Jan** **11-Jan**	**Phase 1** *Form/Space*	**Readings 1**
Week 02	**15-Jan** **18-Jan**	**Phase 1** *Type/Typology, Morphology*	**Readings 2**
Week 03	**22-Jan** **25-Jan**	**Phase 1** *Architectural Vernacular*	**Readings 3** **A1 Due: 25 Jan**
Week 04	**29-Jan** **1-Feb**	**Phase 2** *Investigating Vernaculars in Calgary*	**City Exploration**
Week 05	**5-Feb** **8-Feb**	**Phase 2** *Vernaculars and Variations*	**Interpreting Vernacular and Types** **A2-1 Due: 8 Feb**
Block Week	12-Feb 15-Feb	No Class	
Spring Break	19-Feb 22-Feb		
Week 06	**26-Feb** **29-Feb**	**Phase 2** *Building Form Types from AI Model*	**Exploring data space**
Week 07	**4-Mar** **7-Mar**	**Phase 2** *A New Vernacular 1*	**Form generation and interpreting new vernacular**
Week 08	**11-Mar** **14-Mar**	**Phase 2** *A New Vernacular 2*	**A2-2 Due: 14 Mar**
Week 09	**18-Mar** **21-Mar**	**Phase 3** *Design Development 1*	
Week 10	**25-Mar** **28-Mar**	**Phase 3** *Design Development 2*	
Week 11	1-Apr **4-Apr**	**Phase 3** *Design Documents 1*	**Final (Physical) Models** **Drawings, Perspective**
Week 12	**8-Apr** **11-Apr**	**Phase 3** *Design Documents 2*	**A3 Due: 11 Apr**
Week 13	**TBD**	**Final Review**	

University of Calgary Policies and Supports

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/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-

[Procedure.pdf](). 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://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-policy]()
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 ([https://www.ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy]()) 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 AND GENDER-BASED 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/legal-services/university-policies-procedures/sexual-and-gender-based-violence-policy .

UNIVERSITY STUDENT APPEALS OFFICE

If a student has a concern about a grade that they have received, they should refer to Section I of the Undergraduate Calendar (https://www.ucalgary.ca/pubs/calendar/current/i-3.html) which describes how to have a grade reappraised. In addition, the student should refer to the SAPL's Procedure for reappraisal of grades

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