

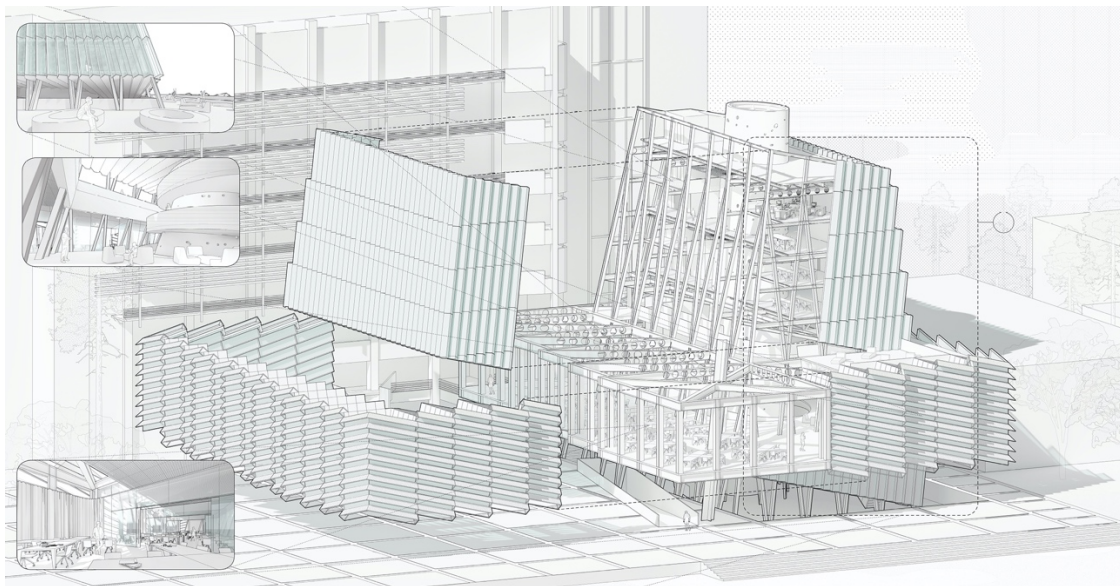


Winter 2024

Course Number	ARCH 508	Classroom	CBDL Event Hall
Course Name	Building Science and Technology I		
Pre/Co-Requisites	Admission to the Minor in Architectural Studies or the Master of Architecture Programs. Credit for Architecture 508 and Design 431 will not be allowed.		
Instructor	Assistant Professor Chad Connery	Office Hours	By appointment at CBDL or PF4188 on campus
	Email: chad.connery@ucalgary.ca		Phone: 204 298 7150
Class Dates	In-Person, Tuesdays and Fridays, Jan 8 – Apr 9, 9:00am to 10:30am		
Instructor Email Policy	All course communications must occur via @ucalgary email. Emails received are addressed with 24-48 hour response time.		
Name and Email of Teaching Assistant(s)	Carrie Richardson: carrie.richardson@ucalgary.ca		

Course Description:

Functioning of the building enclosure: demonstration of the behaviour of building elements and their sub-assemblies under differential temperature and pressure stresses; fundamentals of acoustics; nature and use of building materials; response of building materials to climatic cycles radiation, precipitation, heating, and cooling.



Exploded Façade Study, Cullen Fu, UCLA. 2020.



Casa Steila Mar deep energy renovation, Atelier Werner Schmidt, Switzerland, 2014.

“...to understand construction not only as a question of technique or technology, but as tekne, as the urge to create, which needs the presence of an artist or creative, human expression of will or intent, which is the starting point for the creation of every artifact. ‘Understanding’ construction means to grasp it intellectually after grasping it materially, with all our senses.”

- Andrea Deplazes, The Importance of Material ¹

This course comprises an introduction to basic technical aspects of building materials, construction, and performance. The course emphasizes the inherent interrelations of building techniques and tectonics utilized in the assessment and selection of materials and assemblies. The study of material and tectonic complexity will form the basis for exploring how to conceptually integrate the intrinsic workings and composition of building systems and evaluate their capacity to affect material and spatial performance.

The course term is split into three asymmetrical and interconnected unit themes of lecture and assignment content. The first presents **MATERIALS** through their characteristics, origin, tooling, and application to assemblies that affect architectural configuration and behaviour. The second engages building **SYSTEMS** as nested interdependencies that construct and coordinate architectural form and performance. Fundamental to this is the historical development of building systems and a contemporary understanding of how resources are transformed and utilized, recognizing buildings’ impact on our environment. The last brief unit presents **STANDARDS** of construction, codification, and manufacturing as metrics by which architectural materials and systems are applied with deference to life safety, longevity, sustainability, and climatic or environmental performance.

Course work is assignment based using a variety of deliverable formats (examination, writing, drawing, and making) to engage both abstract technical thinking and the analogous applied technique. The final project is an extended group research and design project culminating as an analogous and analytical model of a constructed architectural assembly. ²

“...Architectural technology in its many expressions, be they historical, physical or metaphysical, needs a theoretical basis primarily in order to establish and document its existence.”

Norman Wienand, Theory and Architectural Technology³

Notes:

- 1 Deplazes, Andrea, and Eidgenössische Technische Hochschule Zürich. Departement Architektur. Constructing Architecture : Materials, Processes, Structures : A Handbook. Basel, Switzerland, Birkhäuser, 2012.
- 2 Course description, assignments, and materials have been conceived in consultation with and adapted from previous course iterations constructed by Professor Mauricio Soto Rubio.
- 2 Emmitt, Stephen. Architectural Technology. John Wiley & Sons, 25 Mar. 2013.

Course Hours: 3 units; (3-0)

Course Learning Outcomes:

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

1. An understanding of the tectonic levels of a building system including site, foundation, structure, and envelope.
2. Knowledge of the basic construction systems utilized in Western traditions, including masonry, timber, concrete, steel.
3. An understanding of the basic material properties and configuration of assemblies.
4. An understanding of the basic envelope systems including light, heat and moisture transfer.
5. Recognition of the relationship between manufacturing processes, components, and assemblies.
6. A recognition of how resources are transformed, utilized, and recycled.

Learning Resources:

Suggested readings and published resources below.

- Allen, E., & Iano, J. (2017). *The architect's studio companion : rules of thumb for preliminary design*. John Wiley & Sons, Inc.
- Allen, E., & Iano, J. (2019). *Fundamentals of building construction : materials and methods* (7th ed.). Wiley.
- Burry, M., & Burry, J. (2016). *Prototyping for architects*. Thames & Hudson Ltd.
- Ching, F. D. K. (2020). *Building Construction Illustrated*. John Wiley & Sons.
- **Deplazes, A. (2005). *Constructing Architecture*. Springer Science & Business Media. (Textbook)**
- Lewis, P., Tsurumaki, M., & Lewis, D. J. (2016). *Manual of section*. Princeton Architectural Press, Cop.
- Lewis, P., Tsurumaki, M., & Lewis, D. J. (2022). *Manual of Biogenic House Sections*. Oro Editions.
- Rudofsky, B. (2002). *Architecture without architects : a short introduction to non-pedigreed architecture*. University Of New Mexico Press.
- Watson, J., & Taschen GmbH. (2019). *Lo-TEK : Design by Radical Indigenism*. Taschen.

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
- 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
- Most current laptops will have a built-in webcam, speaker and microphone.

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
Weekly Quiz	Brief online quiz using multiple question formats to confirm receipt and comprehension of lecture materials.	10 x 4% (40% total)	1,2,3,4,5,6
Interim Report: <i>Emergent Materials</i>	A brief written research report demonstrating an understanding of basic material principles through examination of the changing architectural material landscape.	20%	1, 2, 3.
Final Project: <i>Constructed Assemblies</i>	A phased and extensive group research and design project examining and physically simulating a specific building-scale architectural assemblage.	40%	1, 2, 3, 4

Assessment and Evaluation Information

Attendance and Participation Expectations:

Students are expected to complete all assignments, be present in class for the full class time and attend all lectures and working periods. This includes producing or preparing content necessary for discussion and contributing to individual and class-wide discussions and/or conversations/assessments with the Course Instructor. Meaningful engagement with the dialogue of class is expected as a criteria for healthy academic behavior in a pre-professional program.

Excused Absences: In the event of an exceptional circumstance (e.g., illness, bereavement, etc.) or an exceptional opportunity (e.g., varsity athletic competition, national conference or awards ceremony, pow wow, etc.) up to four excused absences (for courses that meet twice or more per week) and up to two excused absences (for courses that meet once per week) are allowable per semester before jeopardizing one's own course grade and ability to pass the course. However, any such accommodations must be approved by the Instructor with advance notice by the student.

Unexcused Absences: Attendance at all class sessions and participation in all assessments is mandatory. Unexcused absences in excess of two per semester (for courses that meet twice per week) and one per semester (for courses that meet once per week) are grounds for failure in the course.

Total Number of Absences: The combined total number of excused or unexcused absences per semester cannot exceed four per semester (for courses that meet twice per week) or two per semester (for courses that meet once per week). Any number in excess are grounds for failure in the course.

Guidelines for Submitting Assignments: All work is to be submitted by the deadlines stated in the relevant D2L Portal and assignment brief. Generally, all work, quizzes, and documentation is to be submitted via the D2L platform, though physical models are to be submitted for panel grading in person at the location designated in the project brief.

Final Examinations: The course will not use a final examination, but instead culminate in a submitted research and fabrication group project.

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

All materials submitted should use APA citation format as is conventionally appropriate for scientific and technical texts.

All submitted texts (as well as images) are assumed and required to be generated without the assistance of generative AI software. Any and all instances of suspected unauthorized generative AI content will be investigated and, if deemed deserving, considered an automatic failure of the assignment (Letter grade of F).

Late Assignments: Late assignments will be penalized automatically and without consultation according to deadlines listed on assignment briefs and D2L. Pre-arranged exemptions and substantial grounds of empathy are the only means of deadline deferral. All unexcused late assignments are penalized by the reduction of a half letter grade after time of submission, and a complete letter grade for each 24 hours beyond deadline turning over at 12:00 am each day.

Criteria that must be met to pass: Students must receive a passing grade of B- or greater for any assignment worth 30% or greater.

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 with other criteria will covered at a secondary level:

C1. Regulatory Systems: The student must have an understanding of the applicable building codes, regulations, and standards for a given building and site, including universal design standards and the principles that inform the design and selection of life-safety systems.

C2. Materials: The student must have an understanding of the basic principles used in the appropriate selection and application of architectural materials as it relates to fundamental performance, aesthetics, durability, energy, resources, and environmental impact.

C4. Envelope Systems: The student must have an understanding of the basic principles used in the design of building envelope systems and associated assemblies relative to fundamental performance, aesthetics, durability, energy, material resources, and environmental impact.

C5. Environmental Systems: The student must have an understanding of the basic principles that inform the design of passive and active environmental modification and building service systems, the issues involved in the coordination of these systems in a building, energy use and appropriate tools for performance assessment, and the codes and regulations that govern their application in buildings

Topic Areas & Detailed Class Schedule

*Please note that dates and phasing of course materials are subject to change as negotiated with guest speakers and discussed in class.

Course Schedule Date	Topic	Assignments/Due Dates
Jan 8 – 12	First Class – Course Intro/ Materials	
Jan 15 – 19	Materials 1 – Earth / Stone	Weekly Quiz (4%)
Jan 22 – 26	Materials 2 – Wood / Fiber	Weekly Quiz (4%)
Jan 29 – Feb 2	Materials 3 – Masonry / Concrete	Weekly Quiz (4%)
Feb 5 – 9	Materials 4 – Metals / Glass	Weekly Quiz (4%)
Feb 12 – 16	<i>Winter SAPL Block week</i>	
Feb 19	<i>Family Day Observed</i>	
Feb 19 – 23	<i>Winter Term Break</i>	
Feb 26 – Mar 1	Systems 1 – Site Sys. / Foundation	Weekly Quiz (4%) Interim Report due (20%)
Mar 4 – 8	Systems 2 – Structures / Envelope	Weekly Quiz (4%)
Mar 11 – 15	Systems 3 – ‘Low’ Tech / ‘High’ Tech	Weekly Quiz (4%)
Mar 18 – 22	Systems 4 – Acoustics / Human Sys.	Weekly Quiz (4%)
Mar 25 – 28	Systems 5 – Circularity / Workshop	Weekly Quiz (4%)
Mar 29	<i>Good Friday – University closed</i>	
Apr 1	<i>Easter Monday – University closed</i>	
Apr 2 – 5	Standards 1 – Building Code	Weekly Quiz (4%)
Apr 8 – 9	Project Workshop – Last Class	
Apr 12		Final Project due (40%)

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