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|--------------------------------|---|--|--|
| <b>Course Number</b>           | ARCH 508  | <b>Classroom</b>                         | PF 2160 and online                                       |
| <b>Course Name</b>             | Building Science and Technology 1   |  |  |
| <b>Pre/Co-Requisites</b>       | Admission to the Minor in Architectural Studies or the Master of Architecture Programs.   |  |  |
| <b>Instructor</b>              | Mauricio Soto-Rubio   | <b>Office Hours/Location</b>             | PF4181 Wednesdays<br>1:00 pm – 2:00 pm<br>by appointment |
|                                | <b>Email:</b> Mauricio.sotorubio@ucalgary.ca  |  | <b>Phone:</b><br>403.220.5507                            |
| <b>Class Dates</b>             | <b>Tuesdays</b> 9:00 am – 10:30 am in person (PF2160)<br><b>Fridays</b> 9:00 am – 10:30 am online (via Zoom)  |  |  |
| <b>Instructor Email Policy</b> | Please note that all course communications must occur through your @ucalgary email. I will respond to emails sent via student's @ucalgary emails within 48 hours.                       |  |  |
| <b>Teaching Assistants</b>     | Edun Ayoyimika – <a href="mailto:ayoyimika.edun@ucalgary.ca">ayoyimika.edun@ucalgary.ca</a><br>Sahil Kadiwar – <a href="mailto:sahil.kadiwar@ucalgary.ca">sahil.kadiwar@ucalgary.ca</a> | <b>Office Hrs:</b> Tues & Wed<br>2 - 3pm |  |

## Course Description

This course introduces a process-based framework for understanding the 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.

In a lecture/laboratory format, this course is organized through multiple ways of understanding levels, or nested wholes, of building systems including foundation as site, structure as armature, envelope as enclosure and energy as environment. Each level will explore the interdependence of material and Spatial performance emphasizing the properties and relations active in material assemblages, relations between design actions and material transformations and how more complex understanding of materials and methods affects designers' decision-making.

Lectures focus on the properties of materials and characteristic of assemblies that affect the configuration and behaviour. Fundamental to this is the historic development of building systems and a contemporary understanding of how resources are transformed and utilized, recognizing buildings' impact on our environment. Laboratories focus on precedent studies to explore fundamental principles of assemblies and their potential to generate ordering systems and enable material and environmental performance.

**Course Hours:** 3 units; (2-1Tutorial)

## Online Delivery

This course will take place both online via Desire2Learn (D2L) and Zoom as well as in person. Online lectures will be both synchronous (live) and asynchronous (recorded). 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.

## Course Learning Outcomes

In this course, students will develop:

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 that affect performance of basic gravity support systems
4. An understanding of the basic material properties and configuration of assemblies that affect performance of envelope systems including light, heat and moisture transfer
5. An ability to recognize the relationship between manufacturing processes, components, and assemblies
6. An ability to recognize the relationship between the basic physical abilities of materials and assemblies and their potential to generate ordering systems
7. A recognition of the technical cycle --- how resources are transformed, utilized, and recycled

## Learning Resources Required Books:

-Allen, Edward & Iano, Joseph, ***Fundamentals of Building Construction***, (2013, John Wiley & Sons, NY). 6<sup>th</sup> edition. (7<sup>th</sup> edition from 2019 is also adequate).

The following list include recommended textbooks:

-Simmons, H.L., ***Olin's Construction: Principles, materials, and methods***. 9<sup>th</sup> Ed. John Wiley & Sons, Inc.

- Deplazes, Andrea, ***Constructing Architecture, Materials Processes Structures***, (2005, Birkhauser-Publishers, Basel, Boston, London)

- Canadian Wood Council, ***Wood Reference Handbook***, (1991, Canadian Wood Council, Ontario, Canada)

- DETAIL, Review of Architecture, ***Glass Construction Manual***, (1999, Birkhauser-Publishers, Basel, Switzerland)

- DETAIL, Review of Architecture, ***Steel Construction Manual***, (2000, Birkhauser-Publishers, Basel, Switzerland)

- Herzog, Krippner, Lang, *Façade Construction Manual* (2004, Birkhauser---Publishers, Basel, Boston)

Ching, Francis D.K., *Building Construction Illustrated*, (1991, Van Nostrand Reinhold, New York)

Calkins, Meg, *Materials for Sustainable Sites*, (2009, John Wiley & Sons, Hoboken, New Jersey)

Required readings, textbooks and learning materials:

**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
- [Student IT Resources](#)

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

### Workshop Safety Training Requirement

If a course requires use of the SAPL workshop, both the online Trajectory safety training course as well as in-person workshop training and a grade of pass on the final evaluation project must be completed before a student will be granted access. This training is offered once a year, around the start of Fall term.

## 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 turned off your cellphone and 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 |
|-------------------|---------------------------------|--------|---------------------------------|
| Group Project     | Physical Model                  | 40%    | 1 through 7                     |
| Weekly Quizzes    | In person. Open book            | 40%    | 1 through 7                     |
| Final Exam        | In person. Closed Book          | 15%    | 1 through 7                     |
| Participation     | In class and group contribution | 5%     | 1 through 7                     |

## Assessment and Evaluation Information

### Attendance and Participation Expectations:

Absences will not count towards administrative fail, but students are responsible for any missed work. In-person quizzes must be completed during the first 15 minutes of lecture class. Missed quizzes and exams due to un-excused absences will receive no credit.

### Guidelines for Submitting Assignments:

Group project (physical model) will be presented in person at the below indicated date. Late Assignments will receive no credit.

### Final Examinations:

The final exam will be individual, in person, and closed book. It will cover all material in the course and be designed to last 1.5 hrs. No cellphone use allowed during the exam.

Criteria that must be met to pass: 70%, or a B-.

## 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 (SPCs) will be covered in this course at a primary level: C3 Structural systems. Secondary Level: A2 Design Skills; Building Materials and Assemblies.

## Topic Areas & Detailed Class Schedule

*Include information relevant to the class schedule, such as weekly topics, readings, and assignment due dates. For online, remote or blended courses include whether course activities are synchronous (i.e., real-time/Zoom) and asynchronous (i.e., students complete on their own time such as discussion boards, watching videos, etc.). It is recommended that important dates including the first day of classes, holidays, term breaks and last day of classes also be included.*

| Course Schedule Date   | Topic   | Assignments |
|--|---|-------------|
| <i>Examples below, please adjust to fit your course dates.</i> |   |             |
| Jan 10 (in person)<br>Jan 13 (online)                          | <b>Course Introduction</b><br><b>Lecture: Site and Ground</b>   |             |
| Jan 17 (in person)<br>Jan 20 (online)                          | Lab: Research and Documentation due<br><b>Lecture: Foundations</b>  | Quiz 1      |
| Jan 24 (in person)<br>Jan 27 (online)                          | <b>Lecture: Earth as construction material</b><br><b>Lecture: Reinforced Concrete</b>                                   | Quiz 2      |
| Jan 31 (in person)<br>Feb 3 (online)                           | Lab: Mock up Model due<br><b>Lecture: Monolithic Armatures</b>  | Quiz 3      |
| Feb 7 (in person)<br>Feb 10 (online)                           | <b>Lecture: Steel as construction material</b><br><b>Lecture: Open Armatures</b>  | Quiz 4      |
| Feb 14 (in person)<br>Feb 17 (online)                          | Lab: Ground and Foundations due<br><b>Lecture: Wood as construction material</b>  | Quiz 5      |
| Feb 21 – Feb 24  | No Class – Term Break   |             |
| Feb 28 (in person)<br>Mar 3 (online)                           | Lab: Lab: Project Review. Deskcrits<br>Potential visit to Spray Lakes Sawmill TBC<br><b>Lecture: Filigree Armature.</b> | Quiz 6      |
| Mar 7 (in person)<br>Mar 10 (online)                           | Lab: Project Review. Deskcrits<br><b>Lecture: Glass and Plastics</b>  | Quiz 7      |
| Mar 14 – Mar 17  | No classes. SAPL Block Week   |             |
| Mar 21 (in person)<br>Mar 24 (online/zoom)                     | Group Project: Armature<br><b>Lecture: Envelop and Enclosure</b>  | Quiz 8      |
| Mar 28 (in person)<br>Mar 31 (online/zoom)                     | Lab: Project Review. Deskcrits<br><b>Lecture: Enabling Environments</b>   | Quiz 9      |
| April 4 (in person)<br>April 7 (no class. Good friday)         | Lab: Envelope. Completed Model due  |             |
| April 11 (in person)   | Final Exam  |             |

## 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

Special budgetary requirements are limited to the optional purchase of course readings

# University of Calgary Policies and Supports

**COVID-19 PROCEDURE FOR SICK STUDENTS:** <https://www.ucalgary.ca/risk/covid-19-procedure-for-sick-students>

**UNIVERSITY OF CALGARY COVID-19 UPDATES:** <https://www.ucalgary.ca/risk/emergency-management/covid-19-response>

## **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/](http://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](http://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 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