

B2 Building Technology

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Class times: Tuesday 10:00 am - 11:30 am (B310), and Friday 2:30 pm - 5:30 pm (Ind-121)
Hours/Week: 9 hours/week including class time.
Brightspace site: <https://dal.brightspace.com/d2l/home/248475>

Calendar Description

Credit Hours: 3

This course emphasizes building envelope. It studies the design, construction, and performance of control layers in light wood frame and other forms of construction, including engineered wood. Assemblies and details are investigated through technical drawings and models, applying knowledge of topics and vocabularies.



Course Structure:

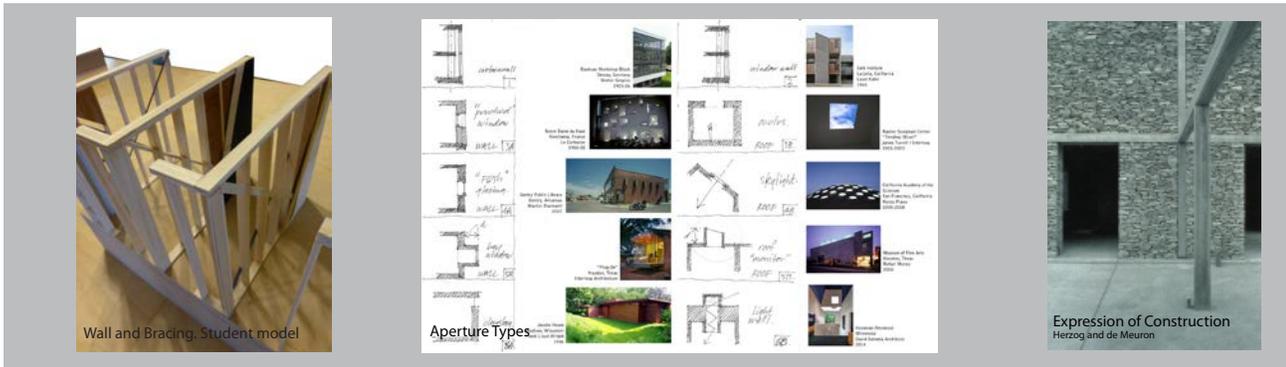
Additional Course Description:

This class introduces key structural, material and environmental principles related to the design and construction of wood buildings. Students will study the unique material qualities of wood and its use as a natural building material. Basic structural principles will be introduced to assist students in utilizing wood members in a systematic way. Construction details, material interfaces and construction sequencing will be studied using drawings and models. Topical lectures shall complement a series of in-class workshops, quizzes and assignments which will allow students to demonstrate and apply their knowledge of these important architectural principles.

B2 Technology investigates building technology at the scale of the House, located in our region. We begin the course studying the ubiquitous construction techniques found in light timber platform and balloon frame construction. This forms a solid base for a broader study of engineered wood, hybrid structural systems and a cursory introduction to mass timber construction. We will also be learning and working with elementary structural principles.

The middle part of the course will cover the basics of building envelope design. In order to mediate between interior and exterior environments, one must understand and design a building's enclosure - or envelope - as a series of layers: thermal insulation, barrier membranes, structure and more. The order in which we layer them up and the ingenuity and skill with which we lead them unbroken through various building junctures is critical to the constructibility, performance, durability, and fitness of our buildings for their intended uses. The requirements of walls in buildings will be introduced, focusing on methods for controlling air flow, heat flow and moisture resistance (both vapor and rain) for standard residential and some commercial wall assemblies. Students are expected to have an awareness of the concepts introduced in the course and apply them to their own design projects as their learning progresses.

Throughout the course we will study fundamental aspects of structure, construction and structural analysis, often through an examination of built projects. In a combination of lectures and studio exercises, we will cover principles of statics, structural systems, structural properties of materials, and issues of construction. Lectures shall complement studio exercises and written quizzes. The course culminates with a series of articulated technical drawings and models that express the structural, architectural, and environmental aspects of your B2 Design project.



Assignments:

(Please note that additional assignment descriptions will be provided)

i. Language of Construction - Due Feb. 17, 2023

Models of building assemblies. These are large enough that even small elements like strapping, siding and the various envelope membranes can be made visible. Each student will be part of 10 classwide groups of 6 and will be responsible for building one assembly model, and three mutually perpendicular CAD sectional drawings with a focus on the juncture. The models will be organized in groups (walls, roofs, thresholds, eaves, etc) and each student will model a unique variant. Models will be at a scale of 1:20 and drawings at 1:10.

ii. Structure and Envelope (Aperture) - Due March 17, 2023

Here students will work in groups to study a series of aperture types typically found in buildings. Students will work to develop, design and build a window opening, paying special attention to the sequencing of the various control membrane layers in the assembly, critical junctures and the technical and programmatic requirements associated with the opening. This assignment work will be installed as a class exhibition, and may include guest critics from the architectural and construction industries. Model scale TBD.

iii. Expression of Construction - Due April 10, 2023 (with Design)

These drawings and models should be integrated with and describe your final B2 Design project, whenever a student's design process supports that kind of resolution. Where this is not the case, students may describe an earlier version of their scheme, in consultation with instructor. Building sections, partial sections and framing models shall fully describe each student's building structure and envelope, and shall demonstrate an understanding and application of the principles learned over the course of the term. Scale 1:10, 1:20. See note under Evaluation and Assignments.

Evaluation and Assignments:

evaluated by instructor and T/As, numerical and written feedback

| | | |
|-----------------------------------|-----|----------------------------------|
| In class assignments and quizzes | 20% | (individual work) |
| Language of Construction | 30% | (15% individual + 15% group) |
| Structure and Envelope (Aperture) | 30% | (15% individual + 15% group) TBD |
| Expression of Construction | 20% | (20% individual) |

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Note:

Any Technology work in a final Design presentation should be identified as such, so that it cannot count toward the final Design grade. (This would be a form of "self-plagiarism.") Students cannot submit the same model, drawing, or written work for evaluation in two different courses. You may present and include work from a one course in another but this needs to be clearly cited as such. Evaluation criteria will be provided with individual assignments.

Course-Specific Policies:

Your final letter grade for the course will be based on the Dalhousie University Undergraduate letter grade to numerical score equivalence chart. Late assignments will be penalized 1/3 of a letter grade (e.g., from A to A-), per weekday except for medical reasons (see the "Student Declaration of Absence" note below).

Student Declaration of Absence:

Students may self-declare illnesses. Please review the university's policy (<https://tinyurl.com/dal-sda-form>). Absences/extensions lasting more than 3 days require a doctor's note. A missed test without an SDA may not be permitted.

Co-Learning:

This course evaluates students individually, yet encourages group learning. For group projects, there will be both an individual mark and a group mark distributed. A small portion of the marks will reflect individual contributions to group work whereas individual works will reflect an individual's work exclusively. The instructors will base this mark on their own observations and advice from the teaching assistants.

Computers:

This course will require students to make rudimentary use of Autocad or VectorWorks and Rhino. Students should have these program on their laptops for in-class work. Basic concepts and functions will be introduced gradually through the term by way of extracurricular workshops and general support provided by the Help Desk assistants. Student trial versions of the program are available online.

Learning Objectives:

Students accumulate a deeper knowledge of the fundamentals of building construction, building structure and envelope assemblies at the scale of single and multi-unit housing in this eastern Canadian climate. Students will develop a proficiency to design and integrate knowledge systematically in the context of B2 term design project as well as an ability to represent building information in a technical manner that reflects professional practice standards.

Additional Academic Support:

Software support for Brightspace and TEAMS is available through the Dalhousie ITS site <https://www.dal.ca/dept/its/current.html> as well as the School of Architecture's Computer Help Desk. The links to the library and copyright office are below.

- Dalhousie Libraries: <http://libraries.dal.ca>

- Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

University Policies and Resources:

This course is governed by the academic rules and regulations set forth in the University Calendar and the Senate: <https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog>
See the School's "Academic Regulations" page (tinyurl.com/dal-arch-regulations) for links to university policies and resources:

- Academic Integrity
- Accessibility
- Code of Student Conduct
- Diversity and Inclusion – Culture of Respect
- Student Declaration of Absence - go to <https://tinyurl.com/dal-sda-form>
- Territorial Acknowledgement: Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.1
- Work Safety
- Fair Dealing policy
- Important Dates in the Academic Year (including add/drop dates): http://www.dal.ca/academics/important_dates.html
- Dalhousie Grading Practices Policy: https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

CACB Student Performance Criteria

The BEDS/MARCh program enables students to achieve the accreditation standards set by the Canadian Architectural Certification Board. They are described at <https://tinyurl.com/cacb-spc-2017> (pages 14–17). This Dalhousie ARCH course addresses the CACB criteria and standards that are noted on the “Accreditation” page of the School of Architecture website: <https://tinyurl.com/dal-arch-spc>.

University Grade Standards (Undergraduate)

Assignments will be evaluated according to the University Undergraduate Grading Standards.

| Grade | Grade Point Value | Percent Equivalent | Definition | Notes |
|-------|--------------------------------|--------------------|--------------------------------|---|
| A+ | 4.3 | 90-100 | Excellent | Considerable evidence of original thinking; demonstrated outstanding capacity to analyze and synthesize; outstanding grasp of subject matter; evidence of extensive knowledge base |
| A | 4 | 85-89 | | |
| A- | 3.7 | 80-84 | | |
| B+ | 3.3 | 77-79 | Good | Evidence of grasp of subject matter, some evidence of critical capacity and analytical ability; reasonable understanding of relevant issues; evidence of familiarity with the literature. |
| B | 3 | 73-76 | | |
| B- | 2.7 | 70-72 | | |
| C+ | 2.3 | 65-69 | Satisfactory | Evidence of some understanding of the subject matter; ability to develop solutions to simple problems; benefitting from his/her university experience |
| C | 2 | 60-64 | | |
| C- | 1.7 | 55-59 | | |
| D | 1 | 50-54 | Marginal Pass | Evidence of minimally acceptable familiarity with subject matter, critical and analytical skills |
| F | 0 | 0-49 | Inadequate | Insufficient evidence of understanding of the subject matter; weakness in critical and analytical skills; limited or irrelevant use of the literature assignments. |
| INC | 0 | | Incomplete | |
| W | Neutral and no credit obtained | | Withdrew after deadline | |
| ILL | Neutral and no credit obtained | | Compassionate reasons, illness | |

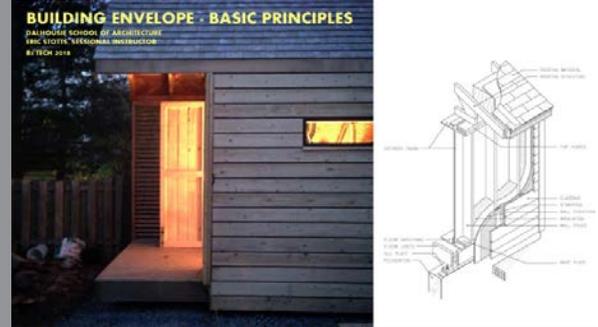
SRI (Student Rating of Instruction):

Student rating of instruction will occur in class on March 28 (week 12).

Format and Schedule

Lectures, workshops, quizzes and tutorials occur on Tuesday from 10:00 am to 11:30 pm and on Friday from 2:30 to 5:30 pm.

*denotes 3 major assignment due dates.



| Term Schedule | | | Tuesday 10:00am-11:30am | Friday 2:30pm-5:30pm |
|---------------|---------------------------------|--|---|--|
| Week 1 | Wednesday / Friday Jan 10/13 | | INTRO | Wood Construction I |
| 2 | | | PROFESSIONAL PRACTICE WEEK | |
| 3 | 24/27 | | Introduction of LOC assignment Modelling Fundamentals I | Envelope Basics I / Wood Construction II |
| 4 | 31/03 | | New Carbon Architecture Energy Quantification I - Matchbox | [Munro Day - no classes] |
| 5 | Feb 07/10 | | Introduction to Statics Quiz #1 (10%), | LANGUAGE OF CONSTRUCTION in-class workshop/ Modelling Fundamentals I |
| 6 | 14/17 | | Introduction of Aperture Assignment | *LANGUAGE OF CONSTR due (30%) |
| 7 | | | WINTER BREAK | |
| 8 | 28/03 | | Building Envelope Basics II | Aperture research - Q&A workshop |
| 9 | March 07/10 | | Building Enclosure Details | Aperture in-class tutorials |
| 10 | 14/17 | | "Sustainability" Lecture and Expression of Construction intro | *APERTURE assignment due (30%) |
| 11 | 21/24 | | Building Enclosure Details II | Modelling Fundamentals II / workshop |
| 12 | 28/31 | | Energy Quantification II - Matchbox | EOC in-class tutorials / Quiz 2 (10%) |
| 13 | Apr 04/ | | Last class *EOC assignment (20%) due with Design | {Good Friday - no classes} |
| 14 | | | END OF TERM | REVIEWS |

