

Dalhousie University - School of Architecture

ARCH 5215.03: FABRICATION APPROPRIATE TECHNOLOGY: THE EVALUATION AND APPLICATION OF DESIGN AND CONSTRUCTION METHODOLOGIES USING ARCHITECTURAL SYSTEMS ECOLOGY

Course Outline - Fall 2023

Classes: Tuesdays, 9:30am-12:30pm; Room HB4
Instructor: Eric Stotts (eric.w.stotts@gmail.com) www.stottsassarchitecture.com
Office hours: Tuesday, 1:00pm-2:00pm
Brightspace: <https://dal.brightspace.com/d2l/home/285255>

ACADEMIC INFORMATION

ARCH 5215 Fabrication

CREDIT HOURS: 3

This course studies the sequence of trades involved in building construction. It examines the material processes of various construction industries and considers their implications for design, with an emphasis on relations between convention and innovation.

FORMAT: Seminar

RESTRICTIONS: Graduate students — Architecture

Additional Course Description

Fifty years ago, E.F. Schumacher, in his seminal book Small is Beautiful, laid out a compelling case for the use of intermediate - or appropriate - technologies.

Appropriate technology is defined as any object, process, ideas, or practice that enhances human fulfillment through satisfaction of human needs.

A technology is deemed to be appropriate when it is compatible with local, cultural, and economic conditions (i.e., the human, material and cultural resources of the economy), and utilizes locally available materials and energy resources, with tools and processes maintained and operationally controlled by the local population.

Technology is considered thus "appropriate" to the extent that it is consistent with the cultural, social, economic, and political institutions of the society in which it is used.

-Francis Vanek, [Field Guide to Appropriate Technology](#), 2003

Fast forward to the present day and we find ourselves in the midst of a Climate Crisis of our own making, and confronted with extremely consequential decisions as to which technological methods are appropriate and best suited to address the myriad challenges we face as a society - and species.

How do we, as Architects, make these decisions? What framework(s) should we adopt to help us clearly identify the problems - and opportunities - before us and what technological approach is most compatible with the local, cultural and economic conditions here in Nova

Scotia? How best to understand, assess and balance the benefits of low tech and high tech approaches in the service of ever-more demanding human and ecological requirements?

CLASS STRUCTURE

Students will be introduced to the concepts and theory related to Architecture and Systems Ecology, as presented in the textbook of the same name by William W. Braham, which is based on the pioneering work of ecologist Howard T. Odum and others. Braham's analysis of "Buildings in Three Parts" will form the basis of the investigations moving forward.

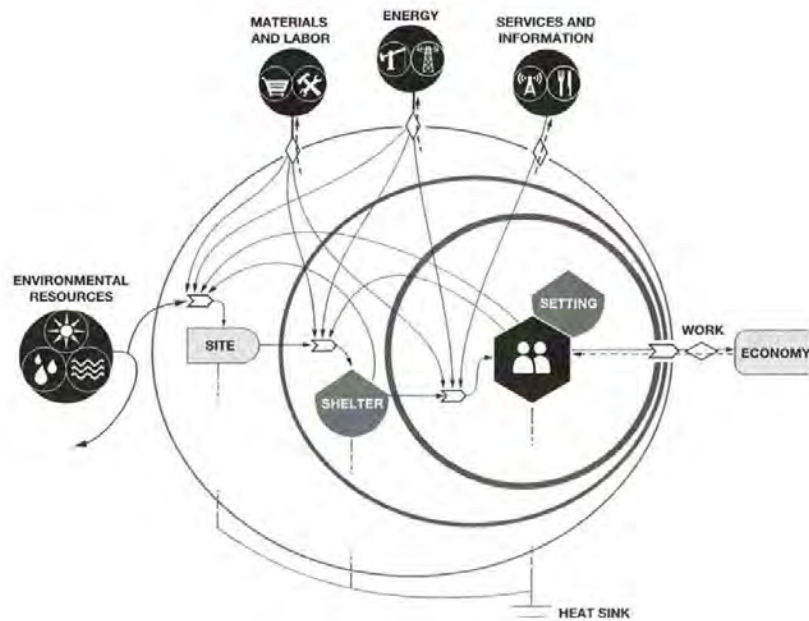


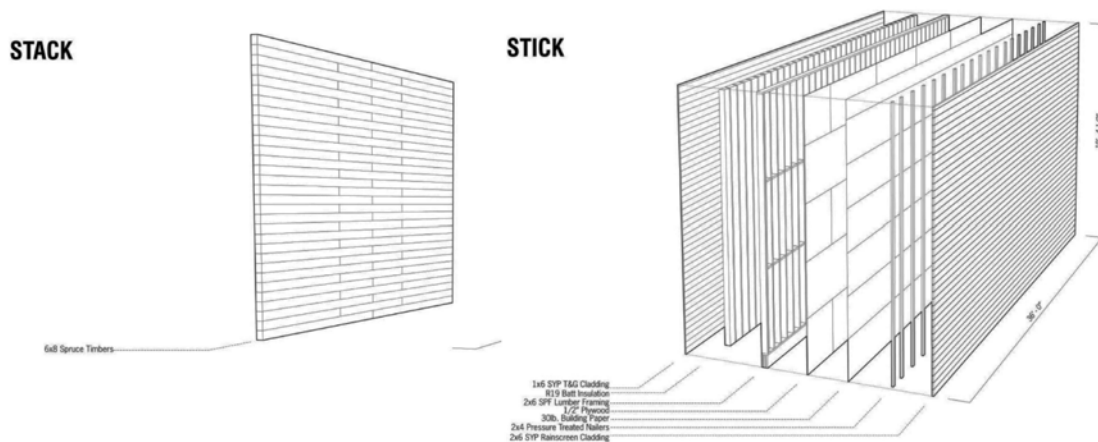
Figure 2.3: Diagram of the three, nested scales of purpose for the construction and use of buildings: intensification of a site, shelter from the climate, and setting for work and living

PRESCRIPTIVE VERSUS PERFORMANCE BASED SOLUTIONS

Students will be introduced to the concept of Prescriptive and Performance-Based Solutions both in a Building Code context and with regards to various sustainable building and compliance systems and learn the usefulness – and limitations – for evaluating the "appropriateness" and overall environmental impacts of the technologies utilized in their buildings.

FABRICATION AND CONSTRUCTION

Two primary wood construction approaches - panelized light timber frame and mass timber - referred to by Architect Kiel Moe as "Stick and Stack" - will be the primary focus of our investigations.



The class will study both technological approaches which are already being utilized to address the acute need for affordable housing in the Province of Nova Scotia.

MAIN STAGES

- **ASSIGNMENT 1 – BUILDING-AS-SHELTER FROM THE CLIMATE**
DUE DATE: WEEK 6 - Oct. 17, 2023
Weight: 20%

Using the concepts presented in Chapter 3 of Architecture and Systems Ecology, students will describe and evaluate their proposed building in relation to six different kinds of environmental flow and service:

- Construction and Maintenance
- Heating
- Cooling
- Air Conditioning
- Ventilation
- Illumination

Deliverable: Report – format TBD in conjunction with Eric

- **ASSIGNMENT 2 – BUILDING-AS-SETTING FOR WORK AND LIVING**
DUE DATE: WEEK 8 - Oct. 31, 2023
Weight: 20%

Using the concepts presented in Chapter 4 of Architecture and Systems Ecology, students will describe and evaluate their proposed building in relation to material services: water, wastewater, food, supplies, trash and concentrated flows: fuels, power, information and money

Deliverable: Report - TBD in conjunction with Eric

- **ASSIGNMENT 3 – BUILDING-AS-SITE IN URBAN AND ECONOMIC LOCATIONS**

DUE DATE: WEEK 12 - Dec. 5, 2023

Weight: 20%

Using the concepts presented in Chapter 5 of Architecture and Systems Ecology, students will identify and describe spatial, social and economic hierarchies at the site level

Deliverable: Report - TBD in conjunction with Eric

Note: This will be developed concurrently with fellow classmates in ARCH 5004 and will be determined in conjunction with Eric.

- **FINAL – APPROPRIATE TECHNOLOGY ASSESSMENT**

DUE DATE: Submitted by last day of classes – Dec. 8, 2023

Weight: 40%

Deliverable: Present a coherent thermodynamic narrative using the principles introduced in the Architecture and Systems Ecology textbook, demonstrating your understanding and application of the concept of appropriate technology. Demonstrate your ability to critically assess the relative degree of success of your appropriate technological approach in meeting the goals set out in the Living Building Challenge. This shall be in the form of a report and shall include the previous three assignments

Integration with Other Courses

Co-Requisite Course: ARCH 5004 Urban Systems

Class Format

lectures, seminars, tutorials, reviews, [potential] site visit

Weekly Hours

For this 3-credit-hour course, an average of 9 hours per week is expected for all course-related activities, including classes. If most students are spending substantially more time, please notify the instructor.

Schedule

Week	Date	Topic or Event	Due
1	Sept. 12	Lecture: Intro	
2	Sept. 19	Lecture: Appropriate Technology	
3	Sept. 26	Lecture: Building in Three Parts	Homework: Read Ch. 3
4	Oct. 3	Desk Crits	
5	Oct. 10	No class (Thanksgiving)	
6	Oct. 17	Seminar	Assignment 1
7	Oct. 24	Desk Crits	Homework: Read Ch. 4
8	Oct. 31	Desk Crits	Assignment 2
9	Nov. 7	No class (study break)	Homework: Read Ch. 5
10	Nov. 14	No class (Remembrance Day)	Homework: Read Ch. 6

11	Nov. 21	Lecture: Design of Thermodynamic Narratives	
12	Nov. 28	Desk Crits	
13	Dec. 5	Desk Crits	Assignment 3
	Dec. 8		Assignment 4

Student Learning Experience Questionnaires (SLEQ) will be scheduled during class time in the last two weeks.

Required References

Schumacher, E.F. Small is Beautiful: Economics as if People Mattered. New York, Hagerstown, San Francisco, London: Harper & Row, 1973

Braham, William W. Architecture and Systems Ecology: Thermodynamic principles of environmental building design in three parts. London and New York: Routledge, 2016

ASSESSMENT

Components and Evaluation

	Assignment	Weight	Authorship	Evaluated by
1	Report	20%	individual	instructor
2	Report	20%	individual	instructor
3	Report	20%	individual	instructor
4	Final Report	40%	individual	instructor

Mid-term Standing

Students shall be informed of their current standing in the course at Midterm

Submission of Assignments

Brightspace folder

Criteria and Standards for Assessment

See Assignments

University Standards for Individual Assignments

Letter	Percent	Definition	Description
A+	90–100%	Excellent	Considerable evidence of original thinking; outstanding capacity to analyze and synthesize; outstanding grasp of subject matter; evidence of extensive knowledge base.
A	85–89%		
A–	80–84%		
B+	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	73–76%		
B–	70–72%		
C+	65–69%	Satisfactory	Evidence of some understanding of the subject matter; ability to develop solutions to simple problems.
C	60–64%		

C–	55–59%		
D	50–54%	Marginal pass	Evidence of minimal familiarity with the subject matter; minimal analytical and critical skill.
F	0–49%	Fail	Little evidence of understanding of the subject matter; weakness in analytical and critical skills; limited or irrelevant use of the literature.
INC		Incomplete	(counts as zero in GPA calculation)
W		Withdrew after deadline	(neutral in GPA calculation)
ILL		Compassionate reasons, illness	(neutral in GPA calculation)

In a graduate course, a final grade below B– will be recorded as an F.

Calculation of Final Grades

Letter grades for individual assignments will be converted to their mid-point percentage, multiplied by their weight, added, then converted to a final letter grade.

Grading Format

Issued to students: as grades, written comments, and/or oral comments

Note: Assignment grades must be issued privately to students. Posting a list of student numbers and grades is not permitted.

COURSE-SPECIFIC POLICIES

Due Dates and Late Submissions

Deductions for late submissions encourage time management and maintain fairness among students.

[Customize the contents of the table to suit the course.]

	Due date	Is a late assignment accepted?	If so, what is the deduction per weekday?*	Is there a final deadline for a late submission?	What happens after that?
Assignment 1	Oct. 17	yes	3%	Oct 24	receives 0%
Assignment 2	Oct. 31	yes	3%	Nov 7	receives 0%
Assignment 3	Dec. 5	no			
Assignment 4	Dec. 8	no			

* For example, if an assignment is evaluated at 75% before applying a 3%-per-weekday deduction, it would receive 72% for being 1–24 hours late; 69% for 25–48 hours late; etc.

Note: The following University or School policies take precedence over course-specific policies:

- No late assignments are accepted after the last day of weekly classes (the Friday before review week).
- With a Student Declaration of Absence (maximum two per course), an assignment may be submitted up to three weekdays late without penalty. An SDA cannot be used for the final assignment.
- With a medical note submitted to the School office, a course assignment (including a final assignment) may be submitted more than three weekdays late without penalty. The number of weekdays depends on how long you were unable to work, as indicated in the

medical note. If more than one course is affected, you should consult with the Undergraduate/Graduate Coordinator to set a new schedule of due dates.

- A student with an accessibility plan that allows for deadline extensions does not need to submit an SDA.

Lecture Notes or Recordings

Lectures will be posted to Brightspace

FACULTY POLICY

Equity, Diversity and Inclusion

The Faculty of Architecture and Planning is committed to recognizing and addressing racism, sexism, xenophobia and other forms of oppression within academia and the professions of architecture and planning. We, the faculty, are working to address issues of historic normalization of oppressive politics, segregation, and community disempowerment, which continues within our disciplines today.

UNIVERSITY POLICIES AND RESOURCES

This course is governed by the academic rules and regulations set forth in the University Calendar and the Senate. For university regulations, go to

<https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=82&chapterid=4741&loaduseredits=False>.

A. University Statements

Academic Integrity

http://www.dal.ca/dept/university_secretariat/academic-integrity.html

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Read more:

[https://www.dal.ca/content/dam/dalhousie/pdf/dept/university_secretariat/Syllabus_Statement_\(Aug%202015\).pdf](https://www.dal.ca/content/dam/dalhousie/pdf/dept/university_secretariat/Syllabus_Statement_(Aug%202015).pdf)

Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of: a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (NS, NB, PEI, NFLD). Read more: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. Read more:

https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/student-life-policies/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Read more: <http://www.dal.ca/cultureofrespect.html>

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office in the McCain Building (room 3037) or contact the programs at elders@dal.ca or 902-494-6803 (leave a message).

B. University Policies and Programs

- Important Dates in the Academic Year (including add/drop dates):
http://www.dal.ca/academics/important_dates.html
- University Grading Practices: Statement of Principles and Procedures:
https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html
- Scent-Free Program:
<http://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>
- Student Declaration of Absence:
https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/academic-policies/student-absence.html

C. Learning and Support Resources

- General Academic Support – Advising:
https://www.dal.ca/campus_life/academic-support/advising.html
- Fair Dealing Guidelines:
<https://libraries.dal.ca/services/copyright-office/guidelines/fair-dealingguidelines.html>
- Dalhousie University Library:
<http://libraries.dal.ca>
- Indigenous Students:
https://www.dal.ca/campus_life/communities/indigenous.html
- Black Students:
https://www.dal.ca/campus_life/communities/black-student-advising.html
- International Students:
https://www.dal.ca/campus_life/international-centre.html
- Student Health Services:
https://www.dal.ca/campus_life/health-and-wellness.html
- Counselling:
https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html
- Copyright Office:
<https://libraries.dal.ca/services/copyright-office.html>
- E-Learning website:
<http://www.dal.ca/dept/elearning.html>
- Dalhousie Student Advocacy Services:
<http://dsu.ca/dsas>
- Dalhousie Ombudsperson:
https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html
- Writing Centre:
https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html
- Faculty or Departmental Advising Support: Studying for Success Program:
http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

D. Safety

- Biosafety:
<http://www.dal.ca/dept/safety/programs-services/biosafety.html>
- Research Laboratory Safety Policy Manual:
<http://www.dal.ca/dept/safety/documents-policiesprocedures.html>
- Faculty of Architecture and Planning: Work Safety:
<https://www.dal.ca/faculty/architecture-planning/current-students/inside-building/work-safety.html>

Eric Stotts
26 Sept 2023