

Building Systems Integration

Course Information

Brian Lilley	Instructor/Coordinator	
	office hours: by e-mail appointment	Brian.Lilley@dal.ca
William Loasby	Guest Instructor - Structures	
Emanuel Jannasch	Instructor - Acoustics	jannasch@dal.ca
Jordan Gallant	Teaching Assistant	tm273148@dal.ca
Ayatalla Elgendi	Teaching Assistant	ay393253@dal.ca
Meetings	B015, B102 Mondays	9:30 - 12:30
	B015 Wednesdays	11.00 – 12.30
SLEQs	Week 10	Monday July 8
Required Texts	Allen and Iano - The Architect's Studio Companion	at Library / online
	Allen and Iano - Fundamentals of Building Construction	at Library / online
	Other Readings If required, will be uploaded to Brightspace	
Brightspace	https://ljdal.brightspace.com/	
Tools and Media	You are free to use any software, studio media, and imaging tools. All submissions to be in .pdf format	
Time Commitment	A 3-credit-hour course calls for about 9 hours per week, including class time	

Calendar Description

This course investigates structural design in heavy construction, long spans, and specialized forms such as shells and tents. It addresses related envelope performance issues and construction methods. It also explores how structure can organize a plan, characterize a section, and accommodate building services.

Term Modules

The course comprises four modules, generally on a Wednesday-to-Monday cycle:

1. Structural Span + Typology: materials, structural possibilities, construction

processes, envelope performance - in association with the Design case studies.

2. BSI Integration - refining and enriching technology aspects of a composition. Coursework on Acoustics.

3. Structural Forces and Forms: Group work, larger scale design and modeling of a long-span structural bay

4. Section Integration and Material Palette composition, relating back to the Design Studio project.

Please Note:

Substantial changes to this outline require approval of two thirds of enrolled students.

Changes will be made in Brightspace, where appropriate, but not in this pdf.

Class Format

By and large, content will be presented on Wednesday and the first part of Monday classes.

The second half of Monday classes generally take the form of open reviews of work in progress.

Students requesting private desk crits or any other individual matter are encouraged to contact Brian Lilley by email to set up an appointment, possibly by Zoom.

There will be two afternoons with building site field trips, planned in weeks 5+6.

Overview of Grading Components

Detailed handouts, requirements, and rubrics will be posted under Assessments

1. Module projects

Structure + Span Report:

-describe design and technology aspects of longer-span structures, worth 10%

2. BSI Integration:

- define patterns and interfaces among key support systems, structure and façade, worth 15 %

-Acoustics coursework, worth 10%

3. Structural Refinement:

- Group / Individual work: design and model a long-span structural bay and size members, worth 25 %

4. Section Integration:

- In conjunction with your Design Project, a sectional drawing and diagrams containing key support systems, structure and façade, worth 25%

5. Material Palette journal:

- observations, research, questions, experiments made over the course of the term, worth 15 %

Time and Format for Submissions

Projects are to be formatted as 17" x 11" pdfs and submitted on Brightspace as per the deadlines in the calendar.

Learning Objectives by Module

Overview of structure and long-span

- differentiate bearing walls from panelized and framed curtain walls, and these from cladding systems with backup walls

- transfer envelope control layers and detailing from residential to heavier construction
- diagram the structural schemes of larger buildings
- identify attitudes to materials and building methods

Patterns of Integration, Building Systems Integration

- Coursework on Acoustics
- Sketch out spatial organization of structure, envelope, mechanical, and interior systems
- Draw the relationship between mechanical and structural systems at the assembly level
- Draw critical integrative details in considerable resolution
- Identify four relationships between forms and grid in case studies and design work
- Identify isotropic and anisotropic grids; uniform and patterned grids.

Structural Forces and Forms

- Explain why long spanning members tend to look different than shorter ones
- Differentiate between one-way, two-way, and reciprocal spans
- Distinguish between common modes of structural failure
- Work out problems of static equilibrium in the plane
- Sketch timber, steel, and concrete spanning members according to V and M curves

Spatial and Surface Structures

- explain and apply the geometrical principles underlying tents, shells, domes, and other form-resistant structures.
- Trace viable vertical and horizontal load paths both in gathering and distribution

B3 BSI in the Technology Stream

BEDS technology deals with four topics over four terms: materials, envelope, structures, and environmental control. An appreciation of building processes and methods, of sustainability, and of cultural aspects of technology are developed throughout. The 3000 level courses in B1 and B2 address discrete topics in Building Technology, while the 4000 level courses investigate Systems Integration. In B3, that means the spatial integration or coordination of physical systems while in B5, the focus is on integration for performance.

BSI in the B3 Term

B3 BSI is designed to harmonize with B3 Design.

The first module and exercise are related to the same buildings you're studying in Design.

Group work will be completed in the same teams of 3 or 4 that have been set up for Design Studio.

In Week 8, the Instructors will meet with each of the studio groups for one whole Studio class, to facilitate a structural bay exploration in model form. The final project will help develop an integrated section drawing.

Schedule

-see attachment

ASSESSMENT

Team and Individual Work

All work is marked individually, except the first Materials Report, which is carried out in your Case Study teams of four as organized in the Design studio. All team-members will receive the same mark for this project. That should give you maximum flexibility in apportioning Design and BSI tasks between team-members.

Evaluation

All marking will be done by some combination of the teaching assistants, with assistance and supervision from the Instructor.

Format and submission guidelines will be included in the assignment handouts.

Grades will be released on Brightspace as each component is entered.

Written feedback will be succinct and based on rubrics. Students are encouraged to meet with the instructor or with the TA's if available, for more detailed feedback.

Criteria and Standards

Each assignment includes evaluation criteria and standards expressed as rubrics.

Assignment grades will be numerical and converted to a letter grade for the term, all according to the Dalhousie template.

COURSE-SPECIFIC POLICIES

Late Assignments

An extension to a due date requires a Student Declaration of Absence (for up to three days) sent to the instructor; or a medical note (for more than three days) sent to the Architecture office (arch.office@dal.ca). Otherwise, grades for a late assignment will be reduced by 3% per weekday. The SDA form is available from <https://tinyurl.com/dal-sda-form>.

With a Student Declaration of Absence, a late assignment normally is accepted without a penalty. Up to 2 SDA's can be submitted per term. For the SDA to be valid you must notify Brian of your absence by email, before the deadline to be missed.

When an absence has been granted due to a medical note or an SDA, the new deadline is set by adding the time lost to the date of return to work.

- Deductions apply where no valid SDA or medical note has been submitted or after a revised due date. The instructor may use common search engines to check sources of text and images.

Lecture Notes

The instructor will provide lecture slides and occasionally notes. If the class agrees, students may record lectures and other class activities on the understanding that recordings will be shared via Brightspace.

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>.

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.

Participants in this course should take every opportunity to make genuine progress with respect to this policy, both individually and collectively.

UNIVERSITY POLICIES AND RESOURCES

This course is governed by the academic rules and regulations set forth in the University Calendar and the Senate. See the School's "Academic Regulations" page (<http://tinyurl.com/dal-arch-regulations>) for links to university policies and resources:

- Academic integrity
- Accessibility
- Code of student conduct
- Culture of respect
- Equity, diversity and inclusion
- Student declaration of absence
- Recognition of Mi'kmaq territory
- Work safety
- Services available to students, including writing support
- Fair dealing guidelines (copyright)
- Dalhousie University library

B3 BSI Summer Term 2024 Schedule

Date	Monday BSI	Tuesday Design	Wednesday BSI	Friday Design	
Week 1	May 5th start		08-May		
May 5-10	Course Intro Larger Building Structures Intro 9.30 - 11.30		Acoustics Intro 11.00 -12.30	Design Site Visits	Acoustics Introduction
May 13-17	Larger Building Structures Geometry Overview Structural Spans		Larger Building Structures Material Attributes Structural Spans		Structural Span Typology Case Study Review
May 20-24	May 20 No classes - Victoria Day		Structural Expression Workshop Intro		Geometry + Forces Materials and Form
May 27-31	Frame model workshop Vault model workshop		May 29 St. Thomas Aquinas Site Visit 3.30 -5.00pm	9am Structure report - 20%	Digital Tools 3D Modelling - Rhinovault Parametric Iterations
Jun 3-7			05-Jun		Service Integration Site visit
Jun 10-14	Service Systems lecture		Acoustics		Skin Integration
Jun 17-21	Skin Systems Systems Structure to Façade lecture	BSI June 12, 5pm Integration - 15%	Structure Week Intro potential Site Visit		Site Visit Structure week Intro + Prep
Jun 24-28	Design tutors review Structure			BSI: Structures Week review 1- 3pm	Structural modelling Structures Week Regular Classes in Morning / Workshop in Afternoon Preliminary Bay Modelling
July 1-5	BSI June 24 Bay Structure - 30% 1:20 Section Intro + lecture		26-Jun Systems - Acoustics Review	BSI 28-June, 9am Acoustics Report - 10%	Section Drawing BSI Integration
July 8-12	No classes - Canada Day		Section + Material Palette		
July 15-19	Section - Assembly Drawing feedback		Section - Assembly Drawing feedback	13th Section Integration - 15% Materials Palette 10%	