

**BUILDING CONSTRUCTION 2:
Material Concerns of Mid to Large Scale Construction**

Professor: Vincent Hui

Lectures: Wednesdays **10:00 am to 1:00 pm** Main Auditorium (ARC 1001)

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Please feel free to contact me anytime via email and I will do my best to get back to you within a few hours. More pressing issues may be dealt with via phone.

Teaching Assistants: TBA

Objectives:

This is a study of the more advanced aspects of building construction, dealing with the intrinsic connection between conceptual design and technological aspects of a building's structural materiality: reinforced concrete, precast and prestressed concrete, steel framing systems; building envelope: building science, curtain walls, window walls, glazing and roofing systems; fire protective design and the evolution of an industrialized method of designing and assembling buildings.

Students will

- keep a detailed sketchbook of examples and details addressed in class,
- complete a series of quizzes
- submit a series of large scale building detail drawings throughout the term
- complete an end of term major project.

The term's knowledge will focus on a major design project that requires the students to design and detail a simple span structure. This term's project will focus on the design of a "footbridge" sponsored by the Steel Structures Education Foundation Student Design Competition. <http://www.cisc-icca.ca/ssef.html#void>

Submissions will consist of (minimum requirements) a plan @ 1:50, a wall section @ 1:10 and a structural axonometric @ 1:25.

PLEASE CHECK THE COURSE WEB SITE FOR ADDITIONAL UPDATES AND REFERENCE LINKS.

SCHEDULE OF LECTURES:

Jan 5

Lecture 1: ***Iron and Steel: The Creation of The Structural Skeleton***
An historical investigation of the invention of iron and steel framing systems and the ramifications on modern architectural conceptual design theories and implementation.
READ:
Allen: Chapter 11: Steel Frame Construction
Course Notes: Steel
http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/172-ch5.pdf

- Jan 12
Lecture 2: **Modern Steel Framing Systems:**
An examination of current steel framing design, systems, detailing and case studies.
READ:
Allen: Chapter 12: Light Gauge Steel Frame Construction
Hand out Detail #1
- Jan 19
Lecture 3: **Quiz #1: Steel 5%**
The Evolution of Reinforced Concrete and its Contribution to Modernism:
An historical investigation of the invention of reinforced concrete and the ramifications of the monolithic structure on modern design theories and construction practices.
READ:
Allen: Chapter 13: Concrete Construction
Course notes: Reinforced Concrete
http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/172-ch6.pdf
- Jan 26
Lecture 4: **Modern Reinforced Concrete:**
An examination of reinforced concrete construction practices, available systems, detailing and case studies.
READ:
Allen: Chapter 14: Sitecast Concrete Framing Systems
Hand out Detail #2
- **Jan 31: DETAIL#1 DUE PRIOR TO ARCH 125 CLASS.**
- Feb 2
Lecture 5: **Precast and Prestressed Concrete:**
An examination of construction practices, case studies and the design and detailing of precast and prestressed systems.
READ:
Allen: Chapter 15: Precast Concrete Framing Systems
Chapter 20: Cladding With Masonry and Concrete
- Feb 9
Lecture 6: DETAIL #2 DUE
Glass, Glazing, Windows:
An in depth investigation of the properties and detailing of the materials and systems.
READ:
Allen: Chapter 17: Glass & Glazing
Chapter 18: Windows and Doors
Canadian Wood Frame House Construction: p. 148 – 158
http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/insolati.pdf
Hand out Detail #3
- Feb 16
Quiz #2: Concrete 5%
Curtain Wall Systems
Curtain wall cladding systems are examined.
READ:
Allen: Chapter 19: Designing Cladding Systems
Chapter 21: Cladding With Metal and Glass Hand out Detail #3
- Feb 23
READING WEEK
- **Feb 28: DETAIL#3 DUE PRIOR TO ARCH 125 CLASS.**
- Mar 2

Lecture 7:

Roofing Systems:

An in depth investigation of flat and pitched roofing systems; BUR, inverted roofs; decision making regarding system choices; building failures.

READ:

Allen: Chapter 16: Roofing

Canadian Wood Frame House Construction: p. 115-129

Course notes: Roofing

http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/172-ch7.pdf

Mar 9

Lecture 8:

The Residential Project:

An examination of the applications of wood and timber framing to various cold climate residential case studies, of both new construction and renovations.

Fire Protective Design: The Codes and Authorities Having Jurisdiction "The Residential Project"

A discussion regarding life and fire safety in building design and the ramifications of the Building Code on Architectural Design choices and practice.

Interior Considerations:

Interior design objectives; interface with mechanical and electrical systems; fire protective design implications.

READ:

Allen: Chapters 22, 23 and 24: Interiors and Finishes

Course notes: Residential Standards and Fire Protective Design

http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/172-ch9.pdf

http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/172-ch8.pdf

Canadian Wood Frame House Construction: p. 216-222

Mar 16

SITE VISITS: Participation (5%)

YOU WILL HAVE THE OPPOSING TRIP THAT YOU HAD IN ARCH 172

Arriscraft Corporation Plant Tour, Cambridge

OR

Ontario Masonry Training Centre:

A hands on masonry cavity wall building session

The class will take a bus to Mississauga for the session. Departure time will be posted.

Cost of the trip is \$10 per person. Dress to get dirty. Wear construction boots or sturdy boots (beware of falling concrete blocks on your toes!!!)

Mar 23

Lecture 9:

Quiz #3: Fire Protective Design and the Codes 5%

Advanced Building Science:

Heat loss, Air Barriers and specific envelope detailing

HAND OUT: Heat Loss Assignment 5%

READ:

Canadian Wood Frame House Construction: p. 198-215

Course notes: Building Science

http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/172-ch3.pdf

Mar 30

Heat Loss Assignment due

The Architecture of Assembly:

A study of the impact of industrialized building processes on architectural design strategies.

Course notes: Architecture of Assembly

http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/172-ch3.pdf

Reference Texts:

CMHC. Canadian Wood Frame House Construction.

Allen, Edward. Fundamentals of Building Construction: Materials and Methods.

Third Edition preferred. If you are using the Second Edition, please refer to the chapter titles (rather than numbers) and read the appropriate sections. The Fourth Edition is also recently out... Honestly, whatever you can get your hands on will do.

Course notes. Available online.

http://www.fes.uwaterloo.ca/architecture/faculty_projects/terri/crsnotes.html

Avoidance of Academic Offenses

Students are expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for their actions. Students who are unsure whether an action constitutes an offense, or who need help in learning how to avoid offenses (e.g., plagiarism, cheating) or about rules for group work / collaboration should seek guidance from the course professor, TA, academic advisor, or the Undergraduate Associate Dean. For information on categories of offenses and types of penalties, students should refer to Policy #71, Student Academic Discipline, <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>

Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance, <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>

EVALUATION:

The final term grade will consist of an average of submitted work as follows, however, FAILURE TO ACHIEVE A PASSING GRADE IN THE TERM PROJECT WILL CONSTITUTE FAILURE OF THE COURSE.

QUIZZES: 15% 3 tests @ 5% each

MASONRY TRAINING or ARRISCRAFT: 5%

SKETCHBOOK: 10% You are required to keep a sketchbook of a series of overhead transparency detail drawings that will be done in class. The sketchbook will be able to be used during the quizzes for reference. You will also be expected to keep preliminary idea drawings for the Final Project in the sketchbook. It will be handed in concurrently with the Final Project for evaluation.

DETAILS: 15% Three at 5% each

HEAT LOSS: 5%

FINAL DESIGN: 50% a set of drawings

large scale wall section @1:10
structural axonometric @ 1:25
floor plans @ 1:50
perspective view

THE FINAL PROJECT AND COMPLETED SKETCH BOOK ARE DUE Thursday, April, 21, 2005 @ noon. Late projects will be downgraded 3% per day of lateness.