Teaching Dossier

1 Statement of Philosophy, Objectives and Methods of Teaching

TEACHING PHILOSOPY

My primary assumption about learning is that everyone has the capacity to learn about any subject they desire. I believe the depth of learning depends on several factors.

- *Desire*
  I use the word 'desire' in my primary assumption. Depending on its context, it can mean 'need' all the way to 'longing' – these are two opposite ends of the spectrum. No matter what the situation is, a student needs to feel some type of desire to learn the material s/he is studying. Whether it's the more practical reason of "just having to pass" or the romantic notion of "being passionate about the area of study", the teacher's role is to recognize the desire and harness it to facilitate the optimal learning experience between student and teacher.

- *Confidence*
  People are fragile when first learning a topic. At this point, the potential exists to form a mental block on the subject or a life-long passion. Confidence is built in a nurturing environment where negative stress and illusory expectations do not exist. Confidence is based on positive experiences. An engineering analogy is the concept of strings in a cable. Like building a cable, at the start only a single string exists and the cable is weak. As you add more strings the cable gets stronger and can easily accommodate failed strings (negative experiences).

- *The Subject*
  I believe everything in life, even the most difficult subjects, comprise a number of simple steps. The role of the teacher is to recognize this and deconstruct the question into digestible fragments. Each student has their own level of understanding to which the complexity of the fragments must reflect. When cutting down a tree, its simple when you have the correct tools. But if all you have is your simple set of hands, then you may have to take down the tree one branch at a time. The teacher's role is to identify what level of understanding the student requires when deconstructing the problem.

- *Learning*

  No two people learn in the same manner. We are a diverse population and each one of us is our own unique selves. In line with this thinking I believe that people learn differently from each other. For a teacher to follow a single teaching style is professionally irresponsible. It would be similar to an ice cream parlour only serving strawberry ice cream. Both ventures will fail. I see the teacher's role is to deliver the content in several different styles that will capture a broad spectrum of learning styles.

TEACHING OBJECTIVES

- To assist students in achieving their personal learning goals particular to a specific assignment, project, course or academic career.
- To motivate students to continue to learn outside the classroom.
- To assist students in achieving an understanding of how they learn personally.

The following excerpt, from my BL8100 course outline, provides the specific learning objectives for this course, most of which reflect my teaching objectives in a more detailed manner:

Specific Learning Objectives

Foundational Knowledge

- Students should remember terms associated with psychrometrics, heat and moisture migration and air flow.
- Students should understand the management of energy flows across and within the building envelope (consumption and reduction).
- Students should understand the flow of heat, moisture and air, individually with a preliminary understanding of combined flows.
- Students should identify which processes related to which components of the building or system in question.

Application

- Students should be able to analyze a situation and evaluate the fundamental principles driving the situation (critical thinking).
- Students should be able to design an appropriate solution to a problem encountered (creative thinking)
- Students should be able to assess given situations and create a representative set of mathematical equations and calculate an approximate solution to an observed situation.
- The students should be able to critique other professionals'/academics' opinions both in real time and with an opportunity to present researched support.

Integration

- The students should be able to integrate ideas about building science from architecture, civil, mechanical and environmental engineering.

- The students should be able to identify the interconnection of the course subject matter within itself.
- The students should be able to relate everyday experience and observation to the fundamental concepts taught in this course – start to feel that "building science is all around us."
- The students should be able to identify similarities between the fundamentals and experiences already encountered in their professional life.

Human Dimension

- The students should come to see themselves as professionals or academics that are more educated in a multi-disciplinary field that is building science and sustainable buildings.
- The students should interact with others regarding buildings using sound building science theory to strengthen the concept of energy consumption and reduction.

Caring

- The students should get excited about building science and see it as a multi-disciplinary subject that is one of the roots of energy consumption and reduction.
- The students should value their role in educating society in terms of sustainable buildings.

Learning How to Learn

- The students should be able to frame useful questions regarding an observed situation in order to expose the fundamental principles driving that situation.
- The students should be able to identify sources of information on detailed and broad subjects related to building science and sustainable buildings.

METHODS OF TEACHING

I employ both experiential and theoretical learning through problem-based learning. The excerpt below from my BL8100 course outline highlights this particular method:

This course will use Problem Based Learning (PBL) as the main teaching strategy. The weekly meetings will comprise lectures, group work/discussion, presentations, active learning components and reflection.

PBL Teaching Model

In-Class Activities:	Groups presented with a problem; decide what information and ideas needed		Groups collect and apply new information and ideas to original problem		Groups present solutions to teacher and rest of class.
	Hour 3 of Class 1		Class 2		Hour(s) 1 and 2 of Class 3
Out-of-Class Activities:		Individual students seek new information and ideas.		Students review solutions.	

The excerpt below from my BL8101 course outline highlights how I bring in case studies from my professional engineering consulting and scaffold the students to prepare them to analyze case studies on their own (or in groups) towards the end of the course (i.e. weeks 6 and 7 focus on applied simple 1D problems; weeks 8, through 10 focus on me showing them how to analyze case studies; weeks 11 and 12 shift over to the students solving case studies on their own):

	Oct. 9	**FALL READING WEEK**	
6	Oct. 16	**Envelope Analysis – One Dimensional Solutions 1** • Opaque envelope components • *Assignment 2 distributed*	*Assignment 2 Due*
7	Oct. 23	**Envelope Analysis – One Dimensional Solutions 2** • Opaque and transparent envelope components	
8	Oct. 30	**Envelope Analysis – Case Studies from Practice 1** • Examples of how current tools are used • Opaque envelope components • In-class assignments	*Mid-Term # 1*
9	Nov. 6	**Envelope Analysis – Case Studies from Practice 2** • Examples of how current tools are used • Transparent envelope components • In-class assignments	**Friday, November 16th: Final date to drop a one-term course in Good Academic Standing**
10	Nov. 13	**Envelope Analysis – Case Studies from Practice 3** • Examples of how current tools are used	
11	Nov. 20	**Advanced Envelope Analysis 2**	*Mid-Term # 2*
12	Nov 27	**Advanced Envelope Analysis 3 & Exam Review/Discussion**	
Final Exam During the University Exam Period (Starting December 4, 2018)			

I have and continue to teach using a variety of methods, including:

- Lectures
- Laboratories
- Tutorials
- Group work
- Individual tutorials
- Case studies from projects I have consulted on professionally
- Group and individual critiques
- Various media, such as (blackboards, whiteboards, projected)

DISTINCTIVE FEATURES OF TEACHING

Just as the building envelope filters and relies on the interior and exterior environments, teaching is a two-way street between the students and the instructor.

- Whether teaching adults or children, I always learn something and use this to improve my teaching.
- I strive to obtain the "eureka!" moment when students "get it."
- Traditional engineering learning is "lecture style" learning. I like to introduce aspects of problem-based learning and "tool using" to provoke independent thinking and creative problem solving.
- Having taught for a relatively long time (for someone my age in my field), I've had the ability to experiment with many teaching styles to many different audiences. I bring alternative teaching methods into the typically standard engineering lecture (e.g. group lecture work, demonstrations, practical problems (with no apparent solution)).
- I bridge theoretical problems with practical applications.
- My professional consulting experience provides real-world examples, assignments and projects backed by practical experience.
- I tailor each session to the audience (whether its adults or high school students).
- I provide a nurturing environment that breeds confident learning.
- I am engaging using a variety examples, anecdotes, humour and practical examples to highlight deep theoretical questions.
- I Have fun with concepts. Approach traditional difficult engineering concepts from non-traditional angles.

Teaching doesn't end in the classroom or when the final exam is conducted. I keep in touch with past students to continue down that 'two way street.'

Teaching opportunities are all around us. I challenge my students to figure out everyday situations using fundamental concepts (e.g. how that tree is standing up or why that snow is still present when no snow exists anywhere else)

2 Undergraduate and Graduate Courses, Including Directed Studies and Thesis Supervisions

The following Table outlines my teaching career, showing its origins in high school, gaining experience during my undergraduate years, honing my techniques throughout graduate school, thus providing Ryerson with excellent teaching experience immediately upon being hired as an Assistant Professor. I am proud of my teaching roots and the development of my career. I look forward to further developing my teaching philosophy and pedagogy in future years at Ryerson.

Location	Courses	Comment
North Toronto Collegiate Institute (1993 – 1995)	Math (Grade 9 though 12)	I was a tutor to struggling and exceptional math students.
University of Toronto Department of Civil Engineering (1997 – 2007)	CIV 255 Surveying (1997-2007)	I was a lead teaching assistant responsible for tutorial lecturing and field exercises. I designed the lectures and assisted with field exercise design.
	CIV 320 Introduction to Construction Management (2003, 2004)	I was a TA in this course. I developed and taught isolated lectures in this course.
	CIV 420 Construction Management (2003, 2004)	I was a TA in this course. I developed and taught several lectures in this course.
	CIV 575 Building Science (2001-2007)	I was the lead TA for this course. I developed tutorials.
	CIV 1282 Case Studies in Building Science (2006, 2007)	I was a TA in this graduate course.
	CIV358 Survey Camp (2000-2007)	I have been a co-instructor and have designed and delivered a third of the course.
	CIV425Y Design Project (2007, 2008)	I was one of six professors delivering a full-year design studio to approximately 10-15 fourth year students. I was responsible for creating the design project and mentoring my students.
	CIV576 (graduate) Sustainable Buildings (2010, 2011*) *co-taught with U of T faculty	I co-designed and co-taught this course during its first offering.

University of Toronto DaVinci Engineering Enrichment Program (2003-2005)	Building Science	I designed and developed this course. The course was taught to enriched grade 9 and 10 students.
	Bicycle Choppers	I designed and developed this course. The course was taught to enriched grade 11 and 12 students.
University of Toronto Faculty of Applied Science and Engineering (2004, 2006)	CIV101 Structures, Materials and Design	I was the instructor for a 100 person section of this first year introductory statics course. I designed and delivered lectures and tutorials.
University of Toronto Professional Development Centre/SCS (2004 – 2010)	Building Science II	I designed aspects of this course and developed its pedagogy. The course teaches building science fundamentals to practicing professionals continuing their professional education.
University of Toronto School of Continuing Studies (2014-2017)	BS2 Building Science II (2014)	I assisted with the design of this course and delivered weekly lectures.
	BS1 Building Science I (2015)	I assisted with the design of this course and delivered weekly lectures.
	BS6 Wall and Window Systems (2014, 2015, 2016, 2017)	I designed this course from scratch as it was the first time offered in the BSSO program. I taught the course for four years following the original design.
Ryerson University Department of Architectural Science (2008 – present)	BL8100 (graduate) Building Science Theory (2008, 2009, 2010, 2011, 2012, 2013)	I designed and developed this course from scratch as it was the first time offered in the newly created graduate program in building science. I incorporated many pedagogical techniques based on active learning.
	BL8101 (graduate) Building Envelope Systems (2015, 2016, 2017, 2018)	I completely re-designed this course from its original offering as a 'knowledge-based' course to an 'applied analysis' course. I incorporate my extensive professional experience to teach students how to analyze building envelope systems.
	BL8213 (graduate) Passive House Design and Construction (2017*, 2018) *course development and supervision only	I designed and developed this course from scratch as it was the first time offered in the program. I liaised with Passive House Institute US to allow our students to obtain Certified Passive House Consultant status as a result of successfully passing components of the course.
	BL8204 (graduate) Building Performance Simulation	I designed and developed this course from scratch as it was the first time offered in the

	(2009, 2011*) *co-taught as overload	newly created graduate program in building science. I incorporated many pedagogical techniques based on active learning.
	BSC822 (undergraduate) Advanced Envelopes/Components (2013, 2014, 2016, 2017)	I completely re-designed this course from its original offering when I took over in 2013. I focussed the curriculum on building envelope analysis and real-world applications (i.e. using my own case studies and bringing in 3 of Toronto's top building envelope consultants)
	BSC031 (undergraduate) Building Science Studio II (2009)	I co-taught this studio based course with a faculty colleague to 17 students.
	AR8103 (graduate) Studio in Collaborative Practice (2016)	I co-taught this studio with Prof. Paul Floerke. My experience as a building envelope consultant balanced Paul's professional architectural experience to shape the course as a true collaborative experience.
	ASC520 (undergraduate) Integration Studio I (2009, 2010, 2011, 2012, 2013)	I am 1 of 9 studio professor responsible for a section of 11-13 students.
	ASC620 (undergraduate) Integration Studio II (2010, 2011, 2012, 2013, 2014)	As a continuation of ASC520, this studio course relies on the professor to critique and develop students' individual designs of complex buildings.
	ASC200 (undergraduate) Sustainable Practices (2010, 2011, 2012)	As the professor, I re-developed this course over two years. Currently the course focuses on reduction of consumption, the building envelope and sustainable technologies.

Undergraduate Courses Taught (Ryerson)

- ASC200 – Sustainable Practices
- ASC520 – Integration Studio I
- ASC620 – Integration Studio II
- BSC031 – Building Science Studio II
- BSC822 – Advanced Envelopes/Components

Graduate Courses Taught (Ryerson)

- BL8100 – Building Science Theory
- BL8101 – Building Envelope Systems
- BL8203 – Building Performance Simulation
- BL8213 – Passive House Design and Construction
- AR8103 – Studio in Collaborative Practice

Directed Studies

- (CV8100) Adrian Drozdowski, graduate civil engineering student, fall 2018.

- Ericka Song, undergraduate architectural science student, fall 2012.

Thesis Supervisions

- Yash Vyas (M.A.Sc.), Not known at this time, 2018-present
- Cecilia Skarupa (M.B.Sc.), Not known at this time, 2017-present
- Cameron Lawrence (M.B.Sc.), Not known at this time, 2017-present
- Khaled Khaled (M.B.Sc.), Analysing the Impact of Wind on the Thermal Degradation of EIFS, 2017-present
- Josie Constantini (M.B.Sc.), Developing the Toronto Archetype Project Using a Toronto Neighbourhood, 2017-present (PT)
- Bomani Khemet (Ph.D.), Predicting Air Flow in Residential Buildings Using Stochastic Analysis, 2016-present
- James Henderson (M.A.Sc.), Evaluating the durability potential of a mineral wool based superinsulatedbuilding envelope assembly for use in cold climates, 2016-present
- Ashley Lubyk (M.B.Sc.), Optimizing straw bale construction for use in passive houses in cold climates, 2016-2018
- Kelly Forice (M.A.Sc.), Characterizing wood based insulation board for use in high performance building envelopes, 2016-2018
- Felix Chen (M.B.Sc.), Evaluating the minimal distance of ground loop preheat systems in passive houses, 2016-2018
- Austin Todd (M.B.Sc.), Assessing the air leakage of party walls in single family dwellings using the guarded testing method, 2016-2018
- Deva Veylan (M.B.Sc.), Evaluating the impact of small passive house designs in cold climates, 2016-2018
- Kevin Zhang (Ph.D.), The effect of varied moisture storage functions of hygroscopic materials on the durability of high performance building envelopes, 2015-present
- Jimmy Tang (M.B.Sc.), Analyzing the Impact of the PHIUS HRV/ERV Protocol on North American Passive House Certification, 2013-2015
- Matthew Carlsson (M.A.Sc.), A novel compartmentalization strategy for multi-unit residential building ventilation, 2014-2017
- Mark Flynn (M.A.Sc.), Evaluating the hygrothermal peformance of a novel super-insulated building envelope for use in cold climates, 2014-2017
- Adam Balicki (M.B.Sc.), Reducing Linear Thermal Bridging in Passive House Details, 2013-2014
- Nicholas Erb (M.B.Sc.), Towards Assessing Buildability in Wood Framed, Superinsulated Wall Assemblies, 2013-2014
- Danielle Churchill (M.B.Sc.), Towards Measuring Real-Time Occupant Levels to Reduce Ventilation Fan Energy Consumption in Existing Institutional Gathering Spaces, 2013-2014
- Braden Johnson (M.B.Sc.), A Method for Determining the Relationship Between Increasing Insulation and Potential Freeze Thaw Damage In Brick Masonry Walls, 2013-2016
- Robin Urquhart (M.B.Sc.), The Effect of Enclosure Retrofit on Air Leakage Rates For a Multi-Unit Residential Builidng: Single Case Study, 2012-2013

- Patrick Andres (M.A.Sc.), Assessing Climate Specific Design of Passive House in Canada, 2012-2014
- Denver Jermyn (M.A.Sc.), Evaluating the Potential to Renovate Toronto's Housing Stock to High Performance Levels, 2012-2014
- Cassandra Kani-Sanchez (M.A.Sc.), Evaluating the Field Effectiveness of VRF Systems for High Performance Buildings, 2012-2015
- Matthew Tokarikl (M.A.Sc.), Creating an Archetype for Passive House Dwellings in Toronto, 2012-2015
- Madeleine Craig (M.A.Sc.), A Design Tool to Assist Home Owners with Water Conservation, 2012-2014
- Andrew Stiffman (M.B.Sc.), A Hygrothermal Comparative Analysis of Split-Insulated, High-RSI Wall Assemblies in Three Canadian Climates, 2012-2014
- Tanveer Syed (Ph.D.), Multi-criteria Optimization for Ultra Low Energy House Design, 2012 – present
- Peta-Gaye Ebanks (M.A.Sc.), Evaluating the Performance of High Performance Windows in North America - Improvement Through Simulation, 2011-2014
- David Hawkins (M.A.Sc.), Development of High Performance Building Envelopes in Modular Construction of Passive Houses, 2011-2014
- Blair Williams (M.A.Sc.), Evaluating interior retrofits of brick masonry in high performance homes, 2011-2014
- Nicolas So (M.A.Sc.), Creating a tool to de-aggregate multi-building metering, 2011-2013
- Nicole Chatterton (M.B.Sc.), Evaluating Methods For Reducing Linear Thermal Bridging In Residential Basements in Toronto, 2011-2014 (PT)
- Anthony Guaglioni (M.B.Sc.), Renovation2050: Evaluation of In-Situ Cooling Performance, 2011-2014 (PT)
- Robert Simpson (M.B.Sc.), A Case-Study Comparison Towards Quantifying Energy Saving Strategies in Big-Box Retail Stores, 2011-2014 (PT)
- Kara Green (M.Arch.), An Exploration of Form and Materiality as a Catalysts to Reurbanize and Empower Rural Tanzanian Communities, 2011-2013 (co-supervised)
- Michael Rosada (M.Arch.), Indigenous Inhabitation of the Frozen Landscape: Towards a Responsive Architecture of the Far North, 2011-2013 (co-supervised)
- Cory Brun (M.B.Sc.), Vapour Diffusion Open Arctic Wall: A Comparison of Moisture Accumulation Potential Versus Other Cellulose Superinsulation Strategies
- Amanda Yip (M.A.Sc.), A Tiered Framework and Preliminary Implementation Strategy to Achieve an 80% Reduction in Ontario Residential Heating Energy Consumption by 2030, 2010-2012
- Hayes Zirnhelt (M.A.Sc.), Assessing the Passive Solar Potential for Canadian Housing, 2010-2013
- Susan Putoo (M.B.Sc.), Evaluation of Critical Factors from Residential Adaptive Reuse Projects Within the context of Toronto, Ontario, 2010-2014 (PT)
- Shawn Ruff (M.B.Sc.), , 2010-2014 (PT)
- Runa Das (Ph.D.), Measuring the Effectiveness of Energy Efficiency Strategies Through Energy Literacy, 2010-2015

- Brian Moroz (M.A.Sc.), Towards Development of Policies Enhancing Single Family Residential Dwelling Energy Efficiency in the Ontario Building Code, 2010-2012.
- Blaine Atwood (M.B.Sc.), Comparison of the 2012 OBC to European Countries: Opportunities for Improvement, 2010-2011 (co-supervised)
- Ivo Markiel (M.B.Sc.), Impact of High Performance Envelopes on Typical Homes in Ontario, 2010-2011
- Andrea Mucciarone (M.B.Sc.), Development of a Rating System for High Performance Envelope, 2010-2011
- Loreta Brazukas (M.B.Sc.), Evaluating the Potential to Achieve Passive House with Structural Insulated Panels using a Case Study in Toronto, Canada, 2009-2013 (PT)
- Ian Stahlbrand (M.A.Sc.), Near Passive Solar Collection in the Gemini NTED House Design, 2009-2011
- Chris Phillips (M.B.Sc.), Development of a Decision Matrix Tool for Choosing Green Materials in Renovations, 2008-2013 (PT)
- Matthew Bowick (M.A.Sc.), Life Cycle Analysis of the Canadian Single Family Residential Building Stock, 2008-2011
- Yasmeen Siddiqui (M.B.Sc.), Quantification of EMFs in Sustainable Renovation, 2008-2011
- Katarzyna Blaszak (M.A.Sc.), Towards Sustainability: Prioritizing Retrofit Options for Toronto's Single-family Homes, 2008-2011
- Stuart Fix (M.A.Sc.), Mass Simulation of SFD Performance to Aid Design, 2008-2010
- Erin Dixon (M.A.Sc.), Energy Model Development and Heating Energy Investigation of the Nested Thermal Envelope Design, 2008-2010

3 Currency in Teaching Field(s)

3.1Programs Completed

Prospective Professors In Training (PPIT) Program
Faculty of Applied Sciences and Engineering
University of Toronto
December, 2006 to May, 2007

A graduate level certificate program for Ph.D. students to facilitate the development of essential skill sets outside the realm of research.

The program consisted of ten seminars over two academic terms.

Experienced engineering professors from the Faculty of Applied Science and Engineering offered seminars in the following topics:

- Effective lecturing
- Course design and grading systems
- Classroom management
- Collaborative learning and group work
- Research agenda and grant proposals

Passive House Institute US Training the Trainers
Carnegie Mellon University
May 2011

3.2 Initiatives

Southern Ontario Building Science Network

August 2003 – present

I maintain an informal collaborative group between building science professors at other universities in southern Ontario, including University of Toronto and University of Waterloo. Leading Building Science academics such as Kim Pressnail (U of T), John Straube (UW), Marianne Touchie (U of T) and others are relied on to discuss building science pedagogy.

Passive House Institute US Collaboration

I am part of a continued group of academics and professionals who informally strategize and meet once per year (at the NAPHC) to discuss and formalize how to effectively bring Passive House curriculum into university graduate and undergraduate programs.

Professional Engineering Consulting

My consulting firm, RRCL, allows me to stay active in industry. Throughout my courses, I bring case studies and practical experience that elevate me as a professor. At graduate and undergraduate levels, I consider myself a bridge between practice and academia.

3.3 Courses Taken

THE500 – Teaching in Higher Education
School of Graduate Studies, University of Toronto
January to April, 2006

A graduate level course in graduate and undergraduate university teaching for upper level Ph.D. students about to finish their doctorates.

The course met for two hours each week for thirteen weeks.

Master teachers from the University of Toronto offered sessions in the following topics:

- Course design
- Marking and evaluation
- Interactive lecturing
- Web based instructional support
- Presentation skills
- Sensitivity to student issues including equity, learning problems and life problems

Course activities included:

- Microteaching sessions
  - Videotaped and critiqued a 15 minute teaching session. Students taught a topic to a small group of fellow THE500 classmates and an expert evaluator/facilitator.
- Writing about teaching issues
  - I wrote on: the positive role of a teacher, university support strategy and the relation between teaching, research and consulting.
- Reading in the scholarship of teaching

MIE3002 – Engineering Teaching and Learning
Department of Mechanical and Industrial Engineering
University of Toronto
September to December, 2006

A graduate level course which studies teaching and learning in engineering.

The course meets for two hours each week for thirteen weeks.

Topics were covered included:

- Curriculum: educating undergraduates at a research university
- How people learn: learning styles and what influences learning
- Course design
- Learning objectives
- Assessment and evaluation

Course activities included:

- Completions of a Teaching Material Portfolio
  - I applied learned concepts to materials already created for a course that I taught.
- Weekly readings in the subject of engineering education

4 Examples of Course Revision, Curriculum Development and Teaching Methods

4.1 Course Outlines

The following pages reproduce the course outlines from:

1. BL8101 Building Envelope Systems (Ryerson Graduate)
    a. This course was fully revised from previous years
2. BSC822 Advanced Envelopes/Components
    a. This course was fully revised from previous years
3. BL8100 Building Science Theory (Ryerson Graduate)
    a. This course was fully developed from scratch
4. ASC200 Sustainable Practices (Ryerson Undergraduate)
    a. This course was revised from previous years
5. BL8204 Building Performance Simulation (Ryerson Graduate)
    a. This course was fully developed from scratch
6. CIV101 Structures, Materials and Design (U of T Undergraduate)

4.1.1 BL8101 – Building Envelope Systems

Graduate Program in Building Science: BL8101 Building Envelope Systems

Calendar Description
This course considers the relationship between heritage and environment conservation. Students will develop the theoretical knowledge and the building science principles necessary for extending the life and improving the performance of heritage and other existing buildings. Students will develop an understanding of the theory and role of standards, testing and survey protocols, and will apply this in practice. There will also be a consideration of the economic basis of decision making. Course content is relevant to the OBEC Building Science Specialist designation.
1 Credit

Prerequisite/Co-requisite
BL8100 – Building Science Theory

Date, Time and Location of Course
Time: Tuesdays, 9:00 AM – 12:00 PM
Location: VIC110

1. Instructor Information
Professor Russell Richman
ARC-308
416-979-5000 ext. 6489
richman@ryerson.ca

Scheduled Student Counselling Hours – (by appointment)
Course Website – my.ryerson.ca (D2L)

NOTE: In accordance with the Policy on Ryerson Student E-mail Accounts (Policy 157), Ryerson requires that any electronic communication by students to Ryerson faculty or staff be sent from their official Ryerson email account

2. Course Description

2.1 Course Summary
This course promotes understanding building envelope systems through the lens of analysis. This course applies building envelope fundamentals to understand building envelope performance (e.g. durability, thermal bridging, thermal resistance, management of moisture). The focus will be on opaque and transparent building envelope assemblies.

The ability to analyze a building envelope system will be introduced by the professor and developed further by the student throughout the term.

2.2 Course objectives and intended learning outcomes

Overall Learning Goal

By the end of this course, students should have acquired knowledge of various types of envelope systems through detailed analysis of thermal, hygrothermal and their combined performance.

Specific Learning Goals ******specifically building upon the knowledge gained in BL8100******

Foundational Knowledge

- Students should remember terms associated with psychrometrics, heat and moisture migration and air flow.
- Students should understand the management of energy flows across and within the building envelope (consumption and reduction).
- Students should understand the flow of heat, moisture and air, individually with a preliminary understanding of combined flows.
- Students should identify which processes related to which components of the building or system in question.

Application

- Students should be able to analyze a situation and evaluate the fundamental principles driving the situation (critical thinking).
- Students should be able to design an appropriate solution to a problem encountered (creative thinking)
- Students should be able to assess given situations and create a representative set of mathematical equations and calculate an approximate solution to an observed situation.
- The students should be able to critique other professionals'/academics' opinions both in real time and with an opportunity to present researched support.

Integration

- The students should be able to integrate ideas about building science from architecture, civil, mechanical and environmental engineering.
- The students should be able to identify the interconnection of the course subject matter within itself.
- The students should be able to relate everyday experience and observation to the fundamental concepts taught in this course.
- The students should be able to identify similarities between the fundamentals and experiences already encountered in their professional life.

Human Dimension

- The students should come to see themselves as professionals or academics that are more educated in a multi-disciplinary field that is building science and sustainable buildings.
- The students should interact with others regarding buildings using sound building science theory to strengthen the concept of energy consumption and reduction.

Caring

- The students should get excited about building envelope systems and see it as a multi-disciplinary subject that is one of the roots of energy consumption and reduction.
- The students should value their role in educating society in terms of sustainable buildings.

Learning How to Learn

- The students should be able to frame useful questions regarding an observed situation in order to expose the fundamental principles driving that situation.
- The students should be able to identify sources of information on detailed and broad subjects related to building science and sustainable buildings.

2.3 Topics to be covered

Coming into this course students are expected to have a reasonable knowledge of building envelope theory*. This course will build on these and further explore common and advanced building envelopes by employing analytical means. The topics to be covered include:

- Tools and approaches to analyze building envelopes
- Various opaque building envelope assemblies
- Various transparent building envelope assemblies
- 'Advanced' building envelope systems
- Simulation of heat transfer
- Simulation of combined heat and moisture transport

2.4 Texts and Reading Lists

The textbooks for this course is:

High performance enclosures: design guide for institutional commercial and industrial buildings in cold climates, by John Straube, Published by Somerville, MA : Building Science Press, 2012.

Available for order at: http://www.buildingsciencepress.com/

Hutcheon, N.B. and Handegord, G.O.P., **Building Science for a Cold Climate**, National Research Council of Canada, Ottawa, 1995.
(available in Ryerson, U of T or George Brown College Casa Loma Campus Bookstores)

Straube, J.F. and Burnett, E.F.P., **Building Science for Building Enclosures**, Building Science Press Inc., Westford, Massachusetts, 2005.
(available in Ryerson Library)

In addition, students are encouraged to research various sources and, as needed, consult additional books and other sources. Some of the recommended titles that can be found in Ryerson University Library & Archives (RULA) at Jorgenson Hall include the following (the list is *not* in the order of importance):

Sustainable facades: design methods for high-performance building envelopes, by Ajla Aksamija, Perkins + Will, Published by Wiley (April 25 2013). *This book is available as e-book through online Ryerson library catalogue.*

Designing the exterior wall: an architectural guide to the vertical envelope, by Linda Brock, published by John Wiley&Sons., Hoboken, N.J., 2005 – *placed on reserve for this course at Ryerson University Library, Jorgenson Hall, 2nd floor, at the Reference Desk*

Building Science for Building Enclosures, by John Straube and Eric Burnett, published by Building Science Press Inc., 2005. – *placed on reserve for this course at Ryerson University Library, Jorgenson Hall, 2nd floor, at the Reference Desk*

Façade construction manual, by Thomas Hertzog, Roland Krippner and Werner Lang, published by Basel ; Boston: Birkhauser-Publishers for Architecture, 2004.

Climate Skin – building-skin concepts that can do more with less energy, by Gerhard Hausladen, Michael de Saldanha, Petra Liedl, published by Birkhäuser, 2008. – *placed on reserve for this course at Ryerson University Library, Jorgenson Hall, 2nd floor, at the Reference Desk*

Façades – Principles of Construction, by Ulrich Knaack, Tillman Klein, Marcel Bilow and Thomas Auer, published by Birkhäuser, 2007. *This book is available as e-book through online Ryerson library catalogue.*

In detail series: 15 books of case studies by Detail magazine, Jorgenson library, excellent resource

Detail: review of architecture and construction details journal in Jorgenson library, 5th floor (periodicals). Call #: Per. NA2835.D35

Intelligent skins, by Michael Wigginton and Jude Harris, published by Architectural Press, Elsevier, 2006

Water in buildings: an architect's guide to moisture and mold, by William Rose, published by John Wiley&Sons., Hoboken, N.J., 2005.

The green studio handbook by A. Kwok and W. Grondzik, Architectural Press, Elsevier, 2007

Introduction to architectural science: the basis of sustainable design, 2nd edition, by Steven Szokolay, published by Oxford: Elsevier, 2008

List of other useful books is not exhausted here. Students are encouraged to look for themselves and bring interesting finds to class for sharing and discussion

Out-of-classroom experiences:
Students will be encouraged to visit industry shows and seminars that are offered this Fall in Toronto. Some of the suggested events include:

ONTARIO BUILDING ENVELOPE COUNCIL (OBEC)

https://obec.on.ca/member_applications
Student membership per school year: $30.00 + 5% HST
Strongly recommended to take this opportunity
Once a month, OBEC organises Networking Dinner and Presentation. Check the OBEC website for a schedule.

Various guest speakers from architecture and construction industry organised through classes and within the Department of Architectural Science.

2.5 Teaching Methodology

Theory, lectures, in-class discussions, research work and applications of learned material through assignments. In addition, students' written communication skills will be furthered through report writing. In addition to classroom time, students are encouraged to attend above mentioned industry exhibitions and seminars, where they will have an opportunity to interact with professionals, researchers and manufacturers of components.

3. Expectations / Requirements of the Students

3.1 Assignments / tests / exams and other work and weighting of each

- **Assignment 1:**
  - Applied envelope analysis: heat transfer **P/F**
- **Assignment 2:**
  - Applied envelope analysis: moisture transport **P/F**
- **Assignment 3**
  - Bring in sample material (different than in BL8102) **P/F**
  - Discuss with Greg Labbe (BS Lab Technician)
  - Display it in some workable manner
  - Write up key characteristics
- **Term Work (completion of above 3 assignments) 10%**
- **"Scaffold" Mid-Term Exam 20%**

- **"Pre-final" Mid-Term Exam** **20%**
- **Final Exam** **50%**

TOTAL: 100%

In the event of a medical problem please advise the instructors as soon as possible. Any request for an extension for medical reasons must include an official Ryerson medical certificate within 3 days of the beginning of the illness. All students are expected to take note of the university policies for academic integrity.

3.2 Posting of Grades

All grades will be posted on the course web-site in a confidential manner. Access to one's grades will only be available to the student in question and the professor. Students who wish not to have their grades posted must inform the instructor in writing.

Students will receive their final course grades only from the Registrar. Final course grades may not be posted or disclosed anywhere by the professor.

3.3 Course Schedule and Deadlines

	Week	Content	Task Before Class
1	Sep. 4	**Course management and introduction** • Course structure, planning, etc. • Fundamentals required for weeks 2 through 5	
2	Sep. 11	**Envelope Analysis – Heat Transfer 1 CAD Lab** • Applied heat transfer analysis • THERM 1 • *Assignment 1 distributed*	Complete THERM pre-assignment
3	Sep. 18	**Envelope Analysis – Heat Transfer 2 CAD Lab** • Applied heat transfer analysis • THERM 2	
4	Sep. 25	**Envelope Analysis – HAM Transfer 1 CAD Lab** • Applied moisture transfer analysis • WUFI 1 • *Assignment 2 distributed*	*Assignment 1 Due*
5	Oct. 2	**Envelope Analysis – HAM Transfer 2 CAD Lab** • Applied moisture transfer analysis • WUFI 2	
	Oct. 9	**FALL READING WEEK**	
6	Oct. 16	**Envelope Analysis – One Dimensional Solutions 1** • Opaque envelope components • *Assignment 2 distributed*	*Assignment 2 Due*
7	Oct. 23	**Envelope Analysis – One Dimensional Solutions 2** • Opaque and transparent envelope components	
8	Oct.	**Envelope Analysis – Case Studies from Practice 1**	*Mid-Term # 1*

	30	• Examples of how current tools are used • Opaque envelope components • In-class assignments	
9	Nov. 6	**Envelope Analysis – Case Studies from Practice 2** • Examples of how current tools are used • Transparent envelope components • In-class assignments	**Friday, November 16th: Final date to drop a one-term course in Good Academic Standing**
10	Nov. 13	**Envelope Analysis – Case Studies from Practice 3** • Examples of how current tools are used	
11	Nov. 20	**Advanced Envelope Analysis 2**	*Mid-Term # 2*
12	Nov 27	**Advanced Envelope Analysis 3 & Exam Review/Discussion**	
Final Exam During the University Exam Period (Starting December 4, 2018)			

Any changes in schedule will be discussed in class and announced in advance both in class and on the course website (D2L).

Students are required to immediately inform their instructors of any situation which arises during the semester which may have an adverse effect upon their academic performance, and must request any consideration and accommodation according to the relevant policies as far in advance as possible. Failure to do so may jeopardize any academic appeals.

3.4 Other Expectations and Requirements

Students are expected to attend all scheduled classes and, as appropriate, notify the instructor of any absences. Repeated absences will result in repeated failing grades.

All students are expected to adhere to the professor's personal policy on cell phones.

Attendance to all meetings is highly recommended.

Students will be expected to work in groups for a significant portion of this course. Group work will reflect that in a professional engineering/architecture office. Students are expected to contribute in a relatively equal manner to all group work.

Students are expected to review material as provided on the course website.

4. Variations within a Course

This section is not applicable for this course.

5. Department of Architectural Science Policies

Students are referred to the Department of Architectural Science Student Handbook for information on Department policies. For information about policies specific to the Graduate Program in Building Science program, contact the Program Director, Dr. Mark Gorgolewski.

6. University and School of Graduate Studies Academic Policies

For information on academic policies pertaining to issues such as course management, grading practices, and appeals, students are to refer to the Ryerson Senate Policies: Policy 142 – Graduate Admission and Studies, Policy 151 – Graduate Course Management, and Policy 152 – Graduate Student Academic Considerations and Appeals[1]

7. Student Email Accounts

The University has initiated a policy by which all students are required to have a Ryerson University email account. Students will be requested to activate their account at the start of the academic year and all notices and announcements of an official nature will be sent via this account.

8. Student Accommodations

Students are required to immediately inform their instructors of any situation which arises during the semester, which may have an adverse effect upon their academic performance, and must request any considerations and accommodations according to the relevant policies and well in advance. Failure to do so will jeopardize any academic appeals.

- *Medical certificates* – If a student misses the deadline for submitting an assignment, or the date of an exam or other evaluation component because of illness, he or she must immediately inform the instructor and submit a Ryerson Student Medical Certificate AND an Academic Consideration form within 3 working days of the missed date. Both documents are available at www.ryerson.ca/senate/forms/medical.pdf
- *Religious observance* – If a student needs accommodation because of religious observance, he or she must submit a Request for Accommodation of Student Religious, Aboriginal and Spiritual Observance AND an Academic Consideration form within the first 2 weeks of the class or, for a final examination, within 2 weeks of the posting of the examination schedule. If the required absence occurs within the first 2 weeks of classes, or the dates are not known well in advance as they are linked to other conditions, these forms should be submitted with as much lead time as possible in advance of the required absence. Both documents are available at http://www.ryerson.ca/senate/forms/relobservforminstr.pdf
- *Students who need academic accommodation support* should register with the Academic Accommodation Support office (formerly called the Access Centre). Before the first graded work is due, registered students should inform their instructors through an "Accommodation Form for Professors" that they are registered with Academic Accommodation Support and what accommodations are required.

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[1] Revised Policy 152 in effect as of September 1st, 2017.

9. Academic Integrity and Plagiarism

Ryerson's Policy 60 - Academic Integrity policy, applies to all students at the University. The policy and its procedures are triggered in the event that the there is a suspicion that a student has engaged in a form of academic misconduct.

Forms of academic misconduct include plagiarism, cheating, supplying false information to the University, and other acts. The most common form of academic misconduct is plagiarism. Plagiarism is a serious academic offence and penalties can be severe. In any academic exercise, plagiarism occurs when one offers as one's own work the words, data, ideas, arguments, calculations, designs or productions of another without appropriate attribution or when one allows one's work to be copied.

All academic work must be submitted using the citation style approved by the instructor. Students may refer to the Ryerson Library's list of Citations and Style Guides for more information.

It is assumed that all examinations and work submitted for evaluation and course credit will be the product of individual effort, except in the case of group projects arranged for and approved by the course instructor. Submitting the same work to more than one course, without instructor approval, is also considered a form of plagiarism.

Students are advised that suspicions of academic misconduct may be referred to the Academic Integrity Office (AIO). Students who are found to have committed academic misconduct will have a Disciplinary Notation (DN) placed on their academic record (not on their transcript) and will be assigned one or more of the following penalties:

- A grade reduction for the work, include a grade of zero for the work.
- A grade reduction in the course greater than a zero on the work. (Note that this penalty can only be applied to course components worth 10% or less, that any additional penalty cannot exceed 10% of the final course grade, and that information explaining that such a penalty will be assigned must be included on the course outline.)
- An F in the course
- More serious penalties up to and including expulsion from the University

For more detailed information on these issues, please refer to the full online text for the Ryerson Senate Policy 60: Academic Integrity. For more information on how to avoid academic misconduct situations, for clues and tips, visit the Academic Integrity website.

10. Date of Issue

The date of issue of this Course outline is September 4th, 2018.

4.1.2 BSC822 – Advanced Envelope Components

Bachelor of Architectural Science Program: *Advanced Envelopes/Components*

Calendar Description
This course develops an advanced level of understanding of the design of building envelopes and cladding. Students investigate new and advanced forms of cladding and cladding systems, and develop an understanding of complex detail design. Sustainability aspects of alternative materials and systems are considered.

Prerequisites
None.

Date, Time and Location of Course
Wednesday, 3 pm – 6 pm
VIC210

1. Instructor/Graduate Assistant Information
Instructor: Professor Russell Richman
ARC308
416-979-5000 ext. 6489
richman@ryerson.ca
www.ryerson.ca/richman

Instructor's Scheduled Student Counselling Hours – No specific date/times
(appointments are neceesary and may be requested through email)
Course Website – my.ryerson.ca (D2L Brightspace)

2. Course Description

2.1 Course Summary
This course analyzes building envelopes in an advanced manner. Through analytical measures, students will be able to quantitatively and qualitatively analyze a variety of building envelope systems from a solid foundation in heat, moisture and air transport.

2.6 Course objectives and intended learning outcomes
Overall Learning Goal

By the end of this course, students should have the ability to analyze the performance of any building envelope assembly; to break it down into the fundamentals and then build it back up to form a solid analytical solution.

Specific Learning Goals

Foundational Knowledge
- Students should remember terms associated with psychrometrics, heat and moisture migration and air flow.
- Students should understand the management of energy flows across and within the building envelope (consumption and reduction).
- Students should understand the flow of heat, moisture and air, individually with a preliminary understanding of combined flows.

- Students should identify which processes related to which components of the building or system in question.

Application

- Students should be able to analyze a situation and evaluate the fundamental principles driving the situation (critical thinking).
- Students should be able to design an appropriate solution to a problem encountered (creative thinking)
- Students should be able to assess given situations and create a representative set of mathematical equations and calculate an approximate solution to an observed situation.
- The students should be able to critique other professionals'/academics' opinions both in real time and with an opportunity to present researched support.

Integration

- The students should be able to integrate ideas about building science from architecture, civil, mechanical and environmental engineering.
- The students should be able to identify the interconnection of the course subject matter within itself.
- The students should be able to relate everyday experience and observation to the fundamental concepts taught in this course – start to feel that "building science is all around us."
- The students should be able to identify similarities between the fundamentals and experiences already encountered in their professional life.

Human Dimension

- The students should come to see themselves as professionals or academics that are more educated in a multi-disciplinary field that is building science and sustainable buildings.
- The students should interact with others regarding buildings using sound building science theory to strengthen the concept of energy consumption and reduction.

Caring

- The students should get excited about building science and see it as a multi-disciplinary subject that is one of the roots of energy consumption and reduction.
- The students should value their role in educating society in terms of sustainable buildings.

Learning How to Learn

- The students should be able to frame useful questions regarding an observed situation in order to expose the fundamental principles driving that situation.
- The students should be able to identify sources of information on detailed and broad subjects related to building science and sustainable buildings.

2.7 Topics to be covered,

This course is an advanced course in building envelope analysis and thus covers a specific focus of analytical topics across a broad range of building envelope assemblies. The primary focii of this course is two fold – (i) a solid root in building science theory with analysis as the end goal and (ii) an understanding of several advanced building envelope assemblies. The following list of topics is covered:

- Applied Psychrometrics
- Applied Heat Transport
- Applied Air Transport
- Applied Moisture Transport
- Building Envelope Analysis
- Advanced Building Envelopes

2.8 Texts and Reading Lists

Required Texts

Hutcheon, N.B. and Handegord, G.O.P., Building Science for a Cold Climate, National Research Council of Canada, Ottawa, 1995.
(available in Ryerson/U of T/George Brown Bookstore)

Straube, J.F. and Burnett, E.F.P., Building Science for Building Enclosures, Building Science Press Inc., Westford, Massachusetts, 2005.
(available in Ryerson Library)
Limited copies available through the course instructor @ $25 per copy.

2.9 Teaching Methodology

The course material will be delivered primarily through lectures and workshops. Some guest speakers may present their expertise on a variety of issues. Supplementary literature will be suggested, as noted in lecture or through the course website, on a lecture to lecture basis. With regard to the final exam, students are responsible for all lecture material and supplementary literature.

The primary instructor believes in interactive learning. As such, short group work sessions, peer sharing, debates, presentations, etc. may be a part of the lecture experience. These in-class elements will not be marked and are participatory only. Due to the relatively large class size and number of guest speakers, these elements may be limited.

Above all, your instructor expects you to be in class. There have been many studies that show students who routinely skip lecture fail to achieve a B- grade or higher. Your instructor firmly believes in this research and encourages participation throughout the term.

3. Expectations / Requirements of the Students

3.1 Assignments / tests / exams and other work and weighting of each

Individual Activities	Points
Building Science Quiz	25
Mid-Term Project	15 group
	20 individual
Final Exam	40
Total	100

Building Science Quiz

During the first lecture, you will complete a (rather challenging) quiz. This evaluation will be used to understand the class' overall level of knowledge with respect to building science theory and application. You will have one chance to complete the quiz one more time towards the end of term OR allocate its grade worth towards the final exam.

Mid-Term Project

The mid-term project will comprise creating a set of working drawings and details for an existing single family dwelling. A thermal analysis of a chosen building envelope assembly and/or detail will be performed individually and contextualize it with various cladding options. More information is to follow on this project throughout the first two weeks of term.

Final Exam

The final exam will be 2 hours in length, open book. The exam will comprise short and long answer questions. The focus will be on building envelope analysis. A long answer sample question has been posted on the course website.

3.2 Posting of Grades

All grades will be posted on the course web-site in a confidential manner. Access to one's grades will only be available to the student in question and the professor. Students who wish not to have their grades posted must inform the instructor in writing.

Students will receive their final course grades only from the Registrar. Final course grades may not be posted or disclosed anywhere by the professor.

3.2 Course Schedule and Deadlines

This schedule is final as of the date of this course outline. Any changes will be announced on the course website and in class.

Week	Class Session	Readings (to be completed before class)
1 Jan 18	**Introduction** ▪ Course overview ▪ **Building Science Quiz**	▪ (Pre)Readings: ▪ H&H – Ch. 1, Ch. 2, Ch. 3, Ch. 5.1-5.2, Ch. 6 ▪ Supplementary Readings: ▪ S & B – Ch. 1, Ch. 2, Ch. 3, Ch. 4
2 Jan 25	**Heat Transfer Analysis I** ▪ Rapid review of heat transfer mechanisms ▪ Heat transfer through opaque and transparent surfaces	▪ Readings: ▪ H & H – Ch. 4, 8, 9 ▪ Supplementary Readings: ▪ S & B – Ch. 5
3 Feb 1	**Heat Transfer Analysis II** ▪ THERM **(Workshop in CAD Lab)**	▪ Readings: ▪ THERM Manual ▪ Complete (attempt) THERM Assignment 1
4 Feb 8	**Heat Transfer Analysis III** ▪ Linear Thermal Bridging (THERM) **(Workshop in CAD Lab)**	▪ Readings: ▪ Passive House literature
5 Feb 15	**Air Transfer Analysis** ▪ Rapid review of air transport fundamentals ▪ Condensation due to air leakage ▪ Calculating air flow and resistances ▪ Measuring air flow and resistances **Blower Door Testing (off-site) TBC**	▪ Readings: ▪ H & H – Ch. 7, 10,11 ▪ Supplementary Readings: ▪ S & B – Ch. 7, 11

Feb 20	**READING WEEK**	
6 Mar 1	**Moisture Transfer Analysis I** ▪ WUFI **(Workshop in CAD lab)**	Readings may be issued, if required.
7 Mar 8	**Moisture Transfer Analysis II** ▪ Rapid review of moisture transport fundamentals ▪ Estimating resistances ▪ Predicting condensation	▪ Readings: ▪ H & H – Ch. 5, 12 ▪ Supplementary Readings: S & B – Ch. 6, 8
8 Mar 15	**Building Envelope Analysis** ▪ Approach ▪ Methods ▪ Case studies ▪ **Mid-Term Project Due**	Readings may be issued, if required.
9 Mar 22	**Analyzing and Understanding Windows** ▪ Window components ▪ Evaluating window performance	Investigate a high performance envelope system for Week 11. PGP 1-1.5 hr guest lecture (windows do's and do nots)
10 Mar 29	**Analyzing Commercial Glazing Systems** ▪ Curtain wall assemblies	Investigate a high performance envelope system for Week 11. RJC 1-1.5 hr guest lecture (curtain wall lessons from the field)
11 Apr 5	**Course Review/Wrap Up** Building Science Quiz II	
12 Apr 12	**Analyzing High Performance Envelope Assemblies** ▪ Residential ▪ Commercial ▪ Exam discussion and prep	RDH 1-1.5 hr guest lecture (BE analysis and case studies)
April 17-29	**University EXAM PERIOD** ▪ **Final Exam**	

3.3 Other Expectations and Requirements

Students are expected to attend all scheduled classes and, as appropriate, notify the instructor of any absences.

Missed Classes and/or Evaluations

Students are required to inform their instructors of any situation which arises during the semester
which may have an adverse effect upon their academic performance, and must request any considerations and accommodations according to the relevant policies and well in advance. Failure to do so will jeopardize any academic appeals.

Medical certificates – If a student misses the deadline for submitting an assignment, or the date of an exam or other evaluation component because of illness, he or she must submit a Ryerson Student Medical Certificate AND an Academic Consideration form within 3 working days of the missed date. Both documents are available at www.ryerson.ca/senate/forms/medical.pdf. **If you are a full-time or part-time degree student, then you submit your forms to your own program department or school.**

Academic Integrity and Plagiarism

Ryerson's Policy 60 (now called the *Academic Integrity policy)* applies to all students at the University. The policy and its procedures are triggered in the event that the there is a suspicion that a student has engaged in a form of academic misconduct.

Forms of academic misconduct include plagiarism, cheating, supplying false information to the University, and other acts. The most common form of academic misconduct is plagiarism. Plagiarism is a serious academic offence and penalties can be severe. In any academic exercise, plagiarism occurs when one offers as one's own work the words, data, ideas, arguments, calculations, designs or productions of another without appropriate attribution or when one allows one's work to be copied.

All academic work must be submitted using the citation style approved by the instructor. Students may refer to the Ryerson Library's list of Citations and Style Guides for more information.

It is assumed that all examinations and work submitted for evaluation and course credit will be the product of individual effort, except in the case of group projects arranged for and approved by the course instructor. Submitting the same work to more than one course, without instructor approval, is also considered a form of plagiarism.

Students are advised that suspicions of academic misconduct may be referred to the Academic Integrity Office (AIO). Students who are found to have committed academic misconduct will have a Disciplinary Notation (DN) placed on their academic record (not on their transcript) and will be assigned one or more of the following penalties:

- A grade reduction for the work, include a grade of zero for the work.
- A grade reduction in the course greater than a zero on the work. (Note that this penalty can only be applied to course components worth 10% or less, that any additional penalty cannot exceed 10% of the final course grade, and that information explaining that such a penalty will be assigned must be included on the course outline.)
- An F in the course
- More serious penalties up to and including expulsion from the University

For more detailed information on these issues, please refer to the full online text for the *Academic Integrity policy* and to the Academic Integrity website.

Collection of Student Work

Examples of students' work from all courses will be collected and archived by the Department for Canadian Architecture Certification Board (CACB) accreditation review. The process will be in accord with University and Departmental policies. (While this will not be an issue until we begin preparing for the next CACB visit, please keep the statement in your course outlines.)

[Instructors should indicate what will be required of students beyond the list of graded projects, tests and exams. Other student requirements (attendance, participation, demonstration of process) and instructor requirements (punctuality, food and beverages in the classroom etc.) and course requirements (materials, approximate costs, location of suppliers etc.) should be listed here. If Blackboard is used as a resource, a statement should be included that says "Students are expected to review material and announcements as provided on the course website and through email."]

4. Variations within a Course

No variations are expected. Any variations to this outline will be posted on the course website and announced at lecture.

5. Department of Architectural Science Policies

Students are referred to the Department of Architectural Science Student Handbook for information on Department policies.

6. Ryerson University Academic Policies

Academic matters are regulated by the *Student Handbook* of the Department of Architectural Science, *Student Codes of Academic, Pol#60 and Student Codes of Non-academic Conduct, Pol#61* and the Academic Policies and Procedures of the University as detailed in the *Calendar* of Ryerson University. This material is also available on the University website, http://www.ryerson.ca/senate/policies. Students are referred to these policies.

7. Student Email Accounts

The University has initiated a policy by which all students are required to have a Ryerson University email account. Students will be requested to activate their account at the start of the academic year and all notices and announcements of an official nature will be sent via this account. (http://www.ryerson.ca/accounts/)

8. Student Accommodations

Students with special needs who require accommodation must register with the Access Centre (http://www.ryerson.ca/accesscentre/)and follow their procedure.
Students who require accommodation for religious observance obligations are required to adhere to the University Policy and must submit the Student Declaration of Religious Observance form (http://www.ryerson.ca/senate/forms/relobservforminstr.pdf) within first two weeks of each term.

9. Date of Issue

The date of issue of this Course outline is January 18, 2017.

10. CACB Criteria

None.

4.1.3 BL8100 – Building Science Theory

Graduate Program in Building Science: *Building Science Theory*

Calendar Description
This course allows students to develop an advanced understanding of building science theory as it applies to sustainable design issues, and provides the foundation of technical knowledge for other courses. It includes understanding climate and solar geometry, the environment, advanced heat, air and moisture transfer, durability, and principles of modeling, Course content is relevant to the OBEC Building Science Specialist designation. 1 Credit

Prerequisites
Enrollment in the building science graduate program, or approval of the building science Program Director and course instructor.

Corequisites
BL8101

Date, Time and Location of Course
Scheduled Core Course Hours: Monday, 9 am – 12 am
Scheduled *Tutorial* Hours: Monday, 8:30 am – 9 am[2]
VIC-110

1. Instructor Information
Professor Russell Richman
ARC-308
416-979-5000 ext. 6489
richman@ryerson.ca

Scheduled Student Counselling Hours – (by appointment)
Course Website – my.ryerson.ca (Blackboard Suite)

2. Course Description

2.1 Course Summary
This course studies building science fundamental principals in detail. Focus is placed on psychrometrics, heat transfer, air transfer, moisture transport and combined heat, air and moisture transport.

2.10 Course objectives and intended learning outcomes

Overall Learning Goal

By the end of this course, students should have the ability to analyze any building science question (both in research and practice); to break it down into the fundamentals and then build it back up to form a solid solution.

Specific Learning Goals

Foundational Knowledge

[2] It is recommended that students arrive for the tutorial sessions at or shortly after 8 am in order to have ready specific questions for the professor at 8:30 am.

- Students should remember terms associated with psychrometrics, heat and moisture migration and air flow.
- Students should understand the management of energy flows across and within the building envelope (consumption and reduction).
- Students should understand the flow of heat, moisture and air, individually with a preliminary understanding of combined flows.
- Students should identify which processes related to which components of the building or system in question.

Application

- Students should be able to analyze a situation and evaluate the fundamental principles driving the situation (critical thinking).
- Students should be able to design an appropriate solution to a problem encountered (creative thinking)
- Students should be able to assess given situations and create a representative set of mathematical equations and calculate an approximate solution to an observed situation.
- The students should be able to critique other professionals'/academics' opinions both in real time and with an opportunity to present researched support.

Integration

- The students should be able to integrate ideas about building science from architecture, civil, mechanical and environmental engineering.
- The students should be able to identify the interconnection of the course subject matter within itself.
- The students should be able to relate everyday experience and observation to the fundamental concepts taught in this course – start to feel that "building science is all around us."
- The students should be able to identify similarities between the fundamentals and experiences already encountered in their professional life.

Human Dimension

- The students should come to see themselves as professionals or academics that are more educated in a multi-disciplinary field that is building science and sustainable buildings.
- The students should interact with others regarding buildings using sound building science theory to strengthen the concept of energy consumption and reduction.

Caring

- The students should get excited about building science and see it as a multi-disciplinary subject that is one of the roots of energy consumption and reduction.
- The students should value their role in educating society in terms of sustainable buildings.

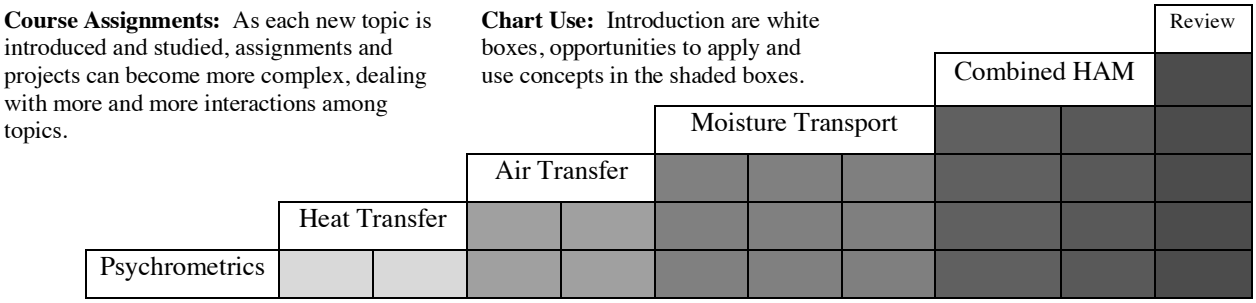
Learning How to Learn

- The students should be able to frame useful questions regarding an observed situation in order to expose the fundamental principles driving that situation.
- The students should be able to identify sources of information on detailed and broad subjects related to building science and sustainable buildings.

2.11 Topics to be covered (Course Structure)

Course Assignments: As each new topic is introduced and studied, assignments and projects can become more complex, dealing with more and more interactions among topics.

Chart Use: Introduction are white boxes, opportunities to apply and use concepts in the shaded boxes.



2.12 CourseTexts

Required Text

Hutcheon, N.B. and Handegord, G.O.P., Building Science for a Cold Climate, National Research Council of Canada, Ottawa, 1995.
(available in Ryerson Bookstore)

Supplementary Texts

Straube, J.F. and Burnett, E.F.P., Building Science for Building Enclosures, Building Science Press Inc., Westford, Massachusetts, 2005.
(available in Ryerson Library)

Hens, H., Building Physics – Heat, Air and Moisture: Fundamentals and Engineering Methods with Examples and Exercises, Ernst & Sohn, Germany, 2007.
(available in Ryerson Library)

2.13 Teaching Methodology

This course will use Problem Based Learning (PBL) as the main teaching strategy. The weekly meetings will comprise lectures, group work/discussion, presentations, active learning components and reflection.

PBL Teaching Model

In-Class Activities:	Groups presented with a problem; decide what information and ideas needed		Groups collect and apply new information and ideas to original problem		Groups present solutions to teacher and rest of class.
	Hour 3 of Class 1		Class 2		Hour(s) 1 and 2 of Class 3
Out-of-Class Activities:		Individual students seek new information and ideas.		Students review solutions.	

3. Expectations / Requirements of the Students

3.1 Course Grading

Individual Activities	Points
'One-minute' papers	1
Learning Portfolio **OR** Term Paper	10
Final Exam	44
Group Activities*	
Student Labs	8
Building Science is All Around	5
Theme Problems	30
Problem Pin-ups	1
In class elements	1
Total	100

*Individual grades for group work will be based on group evaluation of individual contribution. All group work will be accompanied by a **Mark Distribution Contract**.

3.2 Description of Course Activities

'One-minute' Papers
This exercise is a way to quickly and easily reflect on learning for a specific meeting and/or topic. At the end of class, a question will be posed. For example, "what was the muddiest point in today's lecture." Students will write a short answer on a piece of paper and hand it in upon completion. This exercise allows quick feedback and points to any gaping areas of misunderstanding to be corrected and/or re-visited.

Learning Portfolio
If chose, students will create a learning portfolio to reflect on their learning experience in this course. The learning portfolio is a document that describes and illustrates the meaning of the whole learning experience. The learning portfolio is a natural extension of the one-minute papers. Learning portfolios will consist of:

1. A well-written statement about your ability to understand and apply the fundamentals of building science. (This may take several double-spaced pages)
2. An appendix of examples supporting your written statement. These could be (but not limited to) a combination of journal entries, diaries and learning logs. These should be identified by page number and referred to in the introductory statement.

As a general guideline, when preparing your portfolio, you should write about three primary considerations (again, not limited to these):

1. The *content* of the learning: What have you learned about our subject (that is, about he content of the learning experience)?
2. The *context* of the learning: How does your learning fit into the larger context of your individual life, your social/organization life, and/or your professional life?
3. The *learning process*: What have you learned about how you do learn (or how you could learn) more effectively?

Term Paper/Project
If you choose to submit a research paper at the end of the term, this paper should demonstrate your ability to research a specific topic related to this course. The term paper is highly recommended for students who have a good idea(s) for their thesis/MRP topics.

An informal proposal of your topic (and possible sample outline of your paper) is due by week six of this course. The intent of the proposal is to assess the suitability (both in applicability and rigour) of your topic.

These papers will be no longer than 20 double-space pages (or 10 single-spaced pages), using 12-point Times New Roman font (or equivalent). This page limit does include: title pages, table of contents, reference lists or bibliographies and appendices.

The general intent for these papers is to provide a review of the current and high-impact literature on your topic. Specifically, these papers should show a gap in the current literature and thus propose your research project in the best form possible. Objectives and research questions are required.

Final Exam

The final exam will be open book and 120 minutes in duration. The exam will consist of a combination of short answer and calculation style questions. Time, date and location to be determined.

Student Labs

Students will be divided into groups of 5 or 6. Each group will be responsible for preparing a short laboratory demonstration/experiment in front of the class. A lab topic should compliment one of the six major themes in the course. Overlap will be minimized and topics will be approved in a first-come first-served manner. An informal proposal of the lab should be handed into the instructor at the groups discretion – as quickly as possible if you want to secure a particular major theme. These laboratories are expected to be interactive with the class (e.g. handouts, Q&A, etc.).

A laboratory summary report will be handed in following the presentation. This report should contain diagrams, calculations, and fundamental explanations as they apply to your demo/experiment. The report cannot exceed 10 pages – not including title page, table of contents and appendices.

Each group will have 20 minutes to complete their laboratory. All equipment, supplies are the responsibility of the group so be creative!

Building Science is All Around

If you don't already know, building science is all around us in our daily activities. The purpose of this exercise is to use building science fundamentals to explain common phenomenon observed in our daily lives, but usually taken for granted. For example, the condensation pattern on your windows on a cold winter morning or why some areas melt snow faster than others (you can't use these examples now that I've highlighted them! Sorry.)

Students will be doubled or tripled (groups of two or three) for this exercise. Each group will have five minutes to present and explain their observations. In addition, a single page handout (only restriction is that it must be 8.5"X11" or smaller) will be distributed as part of the presentation to your classmates. This handout should efficiently describe the phenomenon and the fundamental explanations (sketches, pictures, calculations, explanations…it is up to you). You can organize your handout in any manner you see fit – once again, be creative!

Theme Problems

For five of the six major course themes (this is not done for climatic design), a capstone problem will be introduced. Using the PBL style outlined above, you will tackle the problem and present/hand-in your solutions. Depending on the problem, students will be in groups ranging in size from 2 to 6. As outlined above, a significant amount of in-class time will be devoted to these problems. Students are expected to come to class prepared to add to discussions and work in an

effective group manner. More information will be distributed with each problem throughout the term.

The instructor will choose the groups for the first two theme problems. The three remaining theme problems will contain one individual and two group efforts. Students will choose their own groups (size to be determined) for the remaining two group theme problems.

Problem Pin-ups
Sample problems have been posted on the course website for each theme. Starting in the second week of each theme, small informal groups of two or three students should organize to post solutions of each problem on the black board. These problems should be written on the board before the start of class during the tutorial. Students may wish to provide handouts for other students to review their solution.

In class Elements
A variety of in class elements will take place throughout the term. These include (but are not limited to): mini case-studies, debates, group discussion, informal pop-quizzes. You will be graded on these elements in a participatory manner.

3.3 Posting of Grades

All grades will be posted on the course web-site in a confidential manner. Access to one's grades will only be available to the student in question and the professor. Students who wish not to have their grades posted must inform the instructor in writing.

Students will receive their final course grades only from the Registrar. Final course grades may not be posted or disclosed anywhere by the professor.

3.4 Course Schedule and Deadlines

Week	Hour	Class Session	Between Classes
1 Sept 9 (psy)	1	▪ Introduction activities/ Course structure ▪ 3 Term Projects ▪ Student Labs ▪ Building Science is All Around ▪ Term paper/project	▪ (Pre)Readings: ▪ H&H – Ch. 1, Ch. 2, Ch. 3, Ch. 5.1-5.2, Ch. 6 ▪ Supplementary Readings: ▪ S & B – Ch. 1, Ch. 2, Ch. 3, Ch. 4 ▪ Learning Portfolio ▪ Theme Problem individual work
	2	▪ Building science quiz (30 min) ▪ Intro of Theme Problem #1 ▪ Psychrometrics fundamentals (30 min)	
	3	▪ Psychrometrics fundamentals (30 min) ▪ Theme Problem # 1 group discussion (30 min) ▪ Wrap-up (1-minute papers)	
2 Sept 16 (psy)	1	▪ Psychrometrics fundamentals	▪ Learning Portfolio ▪ Theme problem meeting ▪ Readings: ▪ H & H – Ch. 4, 8, 9; Hens – 1.3 ▪ Supplementary Readings:
	2	▪ Mini-case study ▪ Mini-presentations	
	3	▪ Group discussions on Theme Problem # 1	

		▪ Wrap-up (1-minute papers)	▪ S & B – Ch. 5;
3 Sept 23 (heat)	1	▪ Presentation on Theme Problem # 1	▪ Learning Portfolio ▪ Readings (required + supplementary) ▪ Theme problem individual work
	2	▪ Intro of Theme Problem # 2 ▪ Heat Transfer fundamentals	
	3	▪ Heat Transfer fundamentals (30 min) ▪ Theme Problem # 2 group discussion (30 min) ▪ Wrap-up (1-minute papers)	

4 Sept 30 (heat)	1	▪ Heat Transfer fundamentals (45 min) ▪ Debate (15 minutes)	▪ Learning Portfolio ▪ Theme problem meeting ▪ Readings: ▪ H & H – Ch. 7, 10,11 ▪ Supplementary Readings: ▪ S & B – Ch. 7, 11; Hens – 2.2
	2	▪ Debate (15 minutes) ▪ Heat Transfer fundamentals (45 minutes)	
	3	▪ Group discussion on Theme Prob. # 2 ▪ Wrap-up (1-minute papers)	
5 Oct 7 (air)			
	1	▪ Hand in Theme Problem # 2	▪ Learning Portfolio ▪ Readings (required + supplementary) ▪ Theme problem individual work
	2	▪ Intro of Theme Problem # 3 ▪ Air transport fundamentals (40 min) ▪ 20 Q's	
	3	▪ Air transport fundamentals (30 min) ▪ Theme Problem # 3 group discussion (30 min) ▪ Wrap-up (1-minute papers)	
Oct 14	**READING WEEK (NO CLASS)**		
6 Oct 21 (air)	1	▪ Confirm Research Question for Term Paper/Project ▪ Building Science is All Around…	▪ Learning Portfolio ▪ Theme problem meeting ▪ Readings: ▪ H & H – Ch. 5, 12 ▪ Supplementary Readings: ▪ S & B – Ch. 6, 8; Hens – 2.3, 2.4
	2	▪ Air Transport fundamentals	
	3	▪ Group discussions on Theme Problem # 3 ▪ Wrap-up (1-minute papers)	

7 Oct 28 (h2o)	1	▪ Hand in Theme Problem # 3 ▪ Moisture transport fund (50 min)	▪ Learning Portfolio ▪ Readings (required + supplementary) ▪ Theme problem individual work
	2	▪ Moisture transport fund (60 min)	
	3	▪ Intro to Theme Problem # 4	

		▪ Theme Problem # 4 group discussion (30 min) ▪ Wrap-up (1-minute papers)	
8 Nov 4 (h2o)	1	▪ Moisture transport fund (50 min)	▪ Learning Portfolio ▪ Theme problem meeting ▪ Readings: HAM Ph.d Thesis ▪ Supplementary Readings: ▪ S & B – 8; Hens – Ch. 3
	2	▪ Create a Quiz or Moisture transport fundamentals (30 min) ▪ Moisture transport fundamentals (30 min)	
	3	▪ Group discussions on Theme Problem # 4 (60 min) ▪ Wrap-up (1-minute papers)	
9 Nov 11 (h2o)	1	▪ Lab Presentations	▪ Learning Portfolio ▪ Term Report
	2	▪ Lab Presentations	
	3	▪ Moisture transport fundamentals (30 min) ▪ Group discussions on Theme Problem # 4 ▪ Wrap-up (1-minute papers)	
10 Nov 18 (ham)			
	1	▪ Theme Problem # 4 hand in ▪ Intro to Theme Problem # 5 ▪ WUFI (50 min)	▪ Learning Portfolio ▪ Readings (required + supplementary) ▪ Theme problem individual work
	2	▪ Class discussion on HAM (20 min) ▪ WUFI (40 min)	
	3	▪ Intro to THERM (60 min) ▪ Wrap-up (1-minute papers)	
11 Nov 25 (ham)	1	▪ THERM (9am-3pm)	▪ Learning Portfolio ▪ Theme problem meeting ▪ Readings: ▪ H & H – Ch. 12, 15 ▪ Supplementary Readings: ▪ S & B – Ch. 10, 11, 12
	2		
	3		
12 Dec 2 (review)	1	▪ Hand-in Theme Problem # 5 ▪ Review	▪ Learning Portfolio ▪ Term Report
	2	▪ Building Science Quiz	
	3	▪ Review	
Finals	Final Exam and Term Report/Project **OR** Learning Portfolio Due		

3.5 Other Expectations and Requirements

Students are expected to attend all scheduled classes and, as appropriate, notify the instructor of any absences. Repeated absences will result in repeated failing grades.

All students are expected to adhere to the professor's personal policy on cell phones.

Attendance to all meetings is highly recommended.

Students will be expected to work in groups for a significant portion of this course. Group work will reflect that in a professional engineering/architecture office. Students are expected to contribute in a relatively equal manner to all group work.

Students are expected to review material as provided on the course website.

4. Variations within a Course
Not Applicable to This Course

5. Department of Architectural Science Policies
Students are referred to the Department of Architectural Science Student Handbook for information on Department policies. For information about policies specific to the Master of Architecture program, contact the Program Director.

6. School of Graduate Studies Academic Policies
For information on academic policies pertaining to issues such as course management, grading practices, and appeals, students are to refer to the web site of the School of Graduate Studies, www.ryerson.ca/graduate .

9. Student Email Accounts
The University has initiated a policy by which all students are required to have a Ryerson University email account. Students will be requested to activate their account at the start of the academic year and all notices and announcements of an official nature will be sent via this account.

10. Student Accommodations
Students with special needs who require accommodation must register with the Access Centre (http://www.ryerson.ca/accesscentre/) and follow their procedures.

Students who require accommodation for religious observance obligations are required to adhere to the University Policy and must submit the Student Declaration of Religious Observance form (http://www.ryerson.ca/senate/forms/relobservforminstr.pdf) within first two weeks of each term.

9. Date of Issue
The date of issue of this Course outline is September 9, 2013.

4.1.4 ASC200 – Sustainable Practices

Bachelor of Architectural Science Program: *Sustainable Practices*

Calendar Description
Principles. This course addresses the means by which the principles of sustainability can be addressed in architectural design. The importance of the environmental, social and economic aspects of sustainability is presented and students become familiar with the process of implementation of environmentally conscious design. Various strategies to reduce the environmental impact of construction are discussed as are the means of measuring their success.

Prerequisites
ASC 102 and PCS 107

Date, Time and Location of Course
Monday, 9 am – 12 pm
ARC108

1. Instructor/Graduate Assistant Information

Instructor: Professor Russell Richman
ARC308
416-979-5000 ext. 6489
richman@ryerson.ca
www.ryerson.ca/richman

Graduate Assistant: Mr. Hayes Zirnhelt
hayes.zirnhelt@ryerson.ca

Instructor's Scheduled Student Counselling Hours – Mondays, 12 pm – 2 pm (appointments outside this hour may be requested through email)
Course Website – my.ryerson.ca (Blackboard Suite)

2. Course Description

2.1 Course Summary
This course introduces sustainable technologies and strategies as they technically apply to buildings. The intent of this course is to build on the concept of sustainability delivered in ACS102 and apply those principles to the building itself. The course will focus on residential single family dwellings, however, the technologies and fundamental principles introduced can be interpolated to other building typologies (e.g. commercial, industrial, etc).

2.14 Course objectives and intended learning outcomes
By the end of this course, students should be able to:

- Describe the philosophical and practical elements of sustainability as it applies to buildings.
- Describe the importance of integrative design when creating sustainable buildings.
- Describe the importance of an effective climate separator when designing sustainable buildings.
- Understand at an introductory level the flows of energy through, around and within the building envelope and the resistances to these flows.
- Identify elements of residential building envelope assemblies and their individual and/or cumulative function to achieving sustainable buildings.
- Critically analyze and compare the benefits of sustainable building practices.
- Understand the difference between passive and active systems and design such systems at an introductory level.

- Utilize effective water and lighting systems to reduce excess usage and waste.
- Describe and quantify (at a preliminary level) the impact of material choice, embodied energy and life cycle analysis.
- Explain the relevance of green rating systems and understand their role in achieving sustainable buildings.

2.15 Topics to be covered,

This course is an introductory course in sustainable practices and thus covers a variety of topics. The primary focus of this course is sustainable practices to residential dwellings. Students should be aware that most, if not all topics, can easily be expanded to other building typologies. The following list of topics is covered:

- Building envelope importance
- Heat, air and moisture issues
- Site influence
- Passive design strategies
- Active design strategies
- Lighting design strategies
- Alternative materials
- Embodied energy implications
- Water systems design
- Building rating systems

2.16 Texts and Reading Lists

There is one formal text for this course. Students will also be notified of required readings throughout lectures. The recommended textbook to purchase is (you will use this in following courses and heavily in the first six weeks of this course):

Straube, J. and Burnett, E., **Building Science for Building Enclosures**, Building Science Press, 2005. *(On course hold in Ryerson Library - available from: http://buildingenclosures.buildingsciencepress.com)*

Supplementary material for lectures can be found in the following resources:

1. Lechner, N., **Heating, Cooling, Lighting: Design Methods for Architects**, J. Wiley, 2001/2009. (available as an electronic reference from Ryerson Library (2001 ed.)).

2. Harvey, L. D. D., **A Handbook on Low-Energy Buildings and District-Energy Systems: Fundamentals, Techniques and Examples**, EarthScan, 2006 *(on course hold in the Ryerson Library - very expensive, but a really great technical resource – available at: http://www.earthscan.co.uk/)*

3. Greater Vancouver Regional District Buildsmart Program: http://www.metrovancouver.org/buildsmart/resources/Pages/Library.aspx

4. Hausladen, G. de Salhanha, M., liedl, P., Sager, C., **Climate Design: Solutions for Buildings that Can Do More with Less Technology**, Basel: Birkhauser, 2005.

5. Hutcheon, N. and Handegord, G., **Building Science for a Cold Climate**, National Research Council of Canada, 1995. *(On course hold in Ryerson Library - may be available in Ryerson Bookstore, University of Toronto Bookstore or George Brown College Bookstore – Casa Loma Campus, always available from NRC: http://www.nrc-cnrc.gc.ca/eng/ibp/irc/catalogue/cold-climate.html)*

2.17 Teaching Methodology

The course material will be delivered primarily through lectures. Some guest speakers will present their expertise on a variety of issues. Supplementary literature will be suggested, as

noted in lecture or through the course website, on a lecture to lecture basis. With regard to the final exam, students are responsible for all lecture material and supplementary literature.

The primary instructor believes in interactive learning. As such, short group work sessions, peer sharing, debates, presentations, etc. may be a part of the lecture experience. These in-class elements will not be marked and are participatory only. Due to the relatively large class size and number of guest speakers, these elements may be limited.

Above all, your instructor expects you to be in class. There have been many studies that show students who routinely skip lecture fail to achieve a B- grade or higher. Your instructor firmly believes in this research and encourages participation throughout the term.

As this is a first year course, there will be an elevated amount of completely new material. In order to digest this material throughout term, your instructor encourages you to review your lecture notes and supplementary literature at least once per week for 15 to 30 minutes. This strategy has been proven to increase knowledge transfer and retention (kind of like BrainAge for the classroom!)

3. Expectations / Requirements of the Students

3.1 Assignments / tests / exams and other work and weighting of each

Individual Activities	Points
Mid-Term Paper	20
Mid-Term Exam	25
Final Exam	40
Group Activities	
Assignment 1	15
Total	100

Assignment 1
This assignment comprises an energy audit of a building that you or one of your group members are living inside currently. Students will work in groups of three or four. The objective of this assignment is to gain an understanding of your building's systems, envelope and plug load demands.

Mid-Term Paper
Each student will submit a term paper on a single aspect of this course. Students are expected to conduct research and write a paper showing a detailed understanding of their topic.

Mid-Term Exam
All students are expected to write a mid-term examination. The questions will be short description type (comparative, definition, etc.) and short answer including calculations. The exam will focus on the building science material learned to date in the course. The exam will be one and a half hours in length.

Final Exam
All students are expected to write a final exam during the university's formal exam period. This exam will be two hours in length and closed book with no aids. Questions are to range from short description type (comparative, definition, etc.) to short and long answer types.

3.2 Posting of Grades
All grades will be posted on the course web-site in a confidential manner. Access to one's grades will only be available to the student in question and the professor. Students who wish not to have their grades posted must inform the instructor in writing.

As shown on the course schedule, it is anticipated that grades will be returned to all students for Assignment 1 and the Mid-Term Paper prior to the Universities official last day to drop courses (March 18, 2010).

Students will receive their final course grades only from the Registrar. Final course grades may not be posted or disclosed anywhere by the professor.

3.2 Course Schedule and Deadlines

This schedule is final as of the date of this course outline. Any changes will be announced on the course website and in lecture.

Week	Class Session	Lecturer	Assignment/Important Dates/Info
1 Jan 17	**Introduction** ▪ Course overview ▪ Sustainability: a review ▪ Building Science: a review	RCR	Assignment 1 distributed Mid-term paper requirements distributed
2 Jan 24	**Building Rating Systems** Guest Speaker: Ms. Marianne Touchie, Ph.D. Candidate ▪ Review of common systems in the market today ▪ How can they be used to support the design of low energy buildings. **Case Study: A SIP House** Guest Speaker: Mr. Steven Gray, M.A.Sc., P.Eng.	MT . . . SG	Professor Richman is away from Jan 21 to Jan 24th for research meetings.
3 Jan 31	**Importance of the Building Envelope** ▪ Introduction to energy flows and the building envelope ▪ Common assemblies, materials and their properties ▪ Introduction to resistances in the building envelope	RCR	
4 Feb 7	**Psychrometrics** ▪ Properties of moist air ▪ Psychrometric chart	RCR	**Assignment 1 DUE**
5 Feb 14	**Heat Transfer Through Assemblies** ▪ Conduction, convection, radiation ▪ Opaque and transparent components ▪ Estimating resistances	RCR	

6 Feb 21	**Reading Week**		
7 Feb 28	**Moisture Transport Through Assemblies** ▪ Types of moisture transport ▪ Estimating resistances ▪ Predicting condensation	RCR	**Mid-Term Paper Due**
8 Mar 7	**Overflow for Weeks 4, 5, 6 & 7** ▪ Completion of various topics from previous weeks ▪ Mid-term exam discussion and review	RCR	Assignment 1 returned
9 Mar 14	**Materials and Assemblies 1** ▪ Resource issues ▪ Waste, recycling, resource efficiency, reuse ▪ Embodied energy and implications	RCR	**Mid-Term Exam** (time and location TBD) Mid-term paper returned
10 Mar 21	**Passive Design and Active Design** ▪ Measures to achieve passive design ▪ Case studies ▪ Introduction to HVAC systems for to achieve low energy residential buildings.	RCR	
11 Mar 28	**Lighting Design** ▪ Importance of day lighting strategies ▪ Lighting and energy	RCR	
12 Apr 3 .	**Materials and Assemblies 2** ▪ Overflow from Materials and Assemblies 1 lecture Guest Speaker: Mr. Christopher Phillips ▪ Alternative materials ▪ Sensitivity ▪ IAQ	RCR CP	Mid-term exam returned
13 Apr 10	**Water Systems** ▪ Water usage ▪ Grey water recovery	RCR	
April 18-30	**University EXAM PERIOD** Final exam will be scheduled within this period		

3.3 Other Expectations and Requirements

Students are expected to attend all scheduled classes and, as appropriate, **notify the instructor of any absences**.

Examples of students' work from all courses will be collected and archived by the Department for Canadian Architecture Certification Board (CACB) accreditation review. The process will be in accord with University and Departmental policies.

Students are expected to review material as provided on the course website.

4. Variations within a Course

No variations are expected. Any variations to this outline will be posted on the course website and announced at lecture.

5. Department of Architectural Science Policies

Students are referred to the Department of Architectural Science Student Handbook for information on Department policies.

6. Ryerson University Academic Policies

Academic matters are regulated by the *Student Handbook* of the Department of Architectural Science, *Student Codes of Academic, Pol#60 and Student Codes of Non-academic Conduct, Pol#61* and the Academic Policies and Procedures of the University as detailed in the *Calendar* of Ryerson University. This material is also available on the University website, http://www.ryerson.ca/senate/policies. Students are referred to these policies.

11. Student Email Accounts

The University has initiated a policy by which all students are required to have a Ryerson University email account. Students will be requested to activate their account at the start of the academic year and all notices and announcements of an official nature will be sent via this account. (http://www.ryerson.ca/accounts/)

12. Student Accommodations

Students with special needs who require accommodation must register with the Access Centre (http://www.ryerson.ca/accesscentre/)and follow their procedure.
Students who require accommodation for religious observance obligations are required to adhere to the University Policy and must submit the Student Declaration of Religious Observance form (http://www.ryerson.ca/senate/forms/relobservforminstr.pdf) within first two weeks of each term.

9. Date of Issue

The date of issue of this Course outline is January 17, 2011.

10. CACB Criteria

1. Research skills – mid-term paper presents students with a research project.
2. Critical thinking skills – applied to building design and analysis required in assignment 1.
5. Human behaviour – aspects of human comfort, occupant use and sustainability presented through various lecture topics.
11. Environmental conservation – this is the main thrust of the course and students are exposed to this criteria on many levels.
13. Site conditions – covered through various lecture topics (geographic considerations, passive design) and applied in assignment 1.
18. Building envelope systems – covered throughout the course and in assignment 1.
23. Building material and assemblies – covered in a specific lecture and integrated in assignment

4.1.5 BL8204 – Building Performance Simulation

Graduate Program in Building Science: *Building Performance Simulation*

Calendar Description
Simulation can be used as a teaching and research tool in the area of air movement, indoor air, wind impact, fire safety, energy efficiency, lighting, etc. Principle of modeling and computational simulation will be explored. This course will make students become familiar with the potential for building simulation programs particularly to improve energy performance and understand the techniques of simulation, why and when such programs can be best used. Students will develop critical skills necessary to assess the appropriate choice of procedure and precision at different stages of the design process. This course may be offered in association with the Department of Mechanical Engineering. 1 Credit

Prerequisites
General – Enrolment in the building science graduate program, or approval of the building science Program Director.
Recommended Courses – BL8100 – Building Science Theory
BL8103 – Energy Efficient Bldg Service
BL8101 Building Envelope Systems

Date, Time and Location of Course
Wednesdays, 10 am – 1 pm EPH105
and/or*
Wednesdays, 10 am – 2 pm ARC303 (computer lab)

**Depending on the course content, all or part of any lecture may be held in the computer lab for hands on active learning.*

1. Instructor Information
Professor Russell Richman
ARC-308
416-979-5000 ext. 6489
richman@ryerson.ca

Scheduled Student Counselling Hours – As requested by email
Course Website – my.ryerson.ca (Blackboard Suite)

2. Course Description

2.1 Course Summary
This course studies building performance through computer simulation. Focus is placed on three industry accepted simulation programs: (i) Therm/Window – a 2D heat flow calculation program, (ii) WUFI – a 1D hygrothermal performance simulation and (iii) Design Builder – a GUI for EnergyPlus, a whole-building simulation software package. Projects will explore aspects of sustainable building design, analysis and performance.

2.18 Course objectives and intended learning outcomes

Overall Learning Goal

By the end of this course, students should have the ability to simulate the performance of a moderately complex building, system and/or element using the appropriate software package introduced throughout the term.

Specific Learning Goals

Foundational Knowledge

- Students should be able to use Therm/Window, WUFI and Design Builder.
- Students should understand the specific building elements including envelope, heating and cooling systems.
- Students should understand the input and output of all programs.
- Students should know the limitations and underlying assumptions for each program introduced.

Application

- Students should be able to analyze a performance question and choose the applicable program required to provide solution(s).
- Students should be able to model the component, system and/or building accurately and efficiently in the chosen software.
- Students should be able to conduct sensitivity and parametric analyses to investigate the effects of proposed alternatives to a given model.

Integration

- The students should be able to integrate design using building science theory stemming from architecture, civil, mechanical and environmental engineering disciplines.
- The students should be able to identify the interconnection of the course subject matter within itself.
- The students should be able to identify similarities between previously learned building science theory and aspects of simulation encountered in this course.
- The students should be able to interpret the output of a simulation and synthesize these results with pending designs or investigations.

Human Dimension

- The students should fully understand the consequences of inaccurate input with respect to the output and simulation accuracy.
- The students should come to see themselves as professionals or academics that are capable of performing accurate and efficient building simulation, when appropriate.

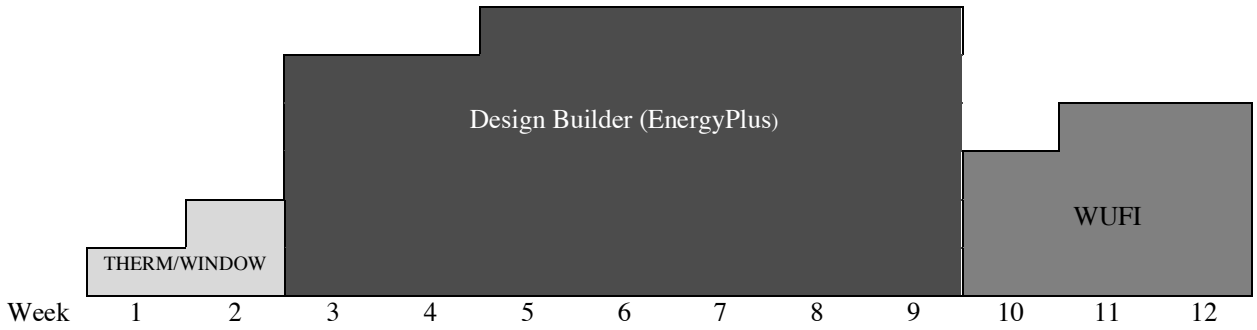
Caring

- The students should appreciate the role of building simulation and care about the accuracy of completed models.
- The students should value their role in educating society in terms of sustainable buildings.

Learning How to Learn

- The students should be able to frame useful questions regarding building simulation.
- The students should be able to identify sources of information on detailed and broad subjects related to building simulation.

2.19 Topics to be covered (Course Structure)



2.20 CourseTexts

Required Text

There is no formal required text for this course. Various software manuals, documentation and research papers will be provided on the course website.

Supplementary Texts

Hutcheon, N.B. and Handegord, G.O.P., Building Science for a Cold Climate, National Research Council of Canada, Ottawa, 1995.
(available in Ryerson Bookstore)

Straube, J.F. and Burnett, E.F.P., Building Science for Building Enclosures, Building Science Press Inc., Westford, Massachusetts, 2005.
(available in Ryerson Library)

2.21 Teaching Methodology

This course will use Problem Based Learning (PBL) as the main teaching strategy. The weekly meetings will comprise lectures, group work/discussion and active learning components.

The simulation assignments/projects will be completed in an individual manner. The software manuals will be completed in a group format, with attention given to individual contribution. Students are expected to build on their existing knowledge of Building Science Theory and enhance their understanding on an individual and group basis.

Parts of this course will comprise lectures on applied building science theory. Other parts of the course will comprise introductory tutorial style lectures focussing on preliminary learning of simulation software packages.

3. Expectations / Requirements of the Students

3.1 Course Grading

Individual Activities	Points
Assignments (expected to be 3 or 4)	5
Therm/Window Project	15
Design Builder Project	30
WUFI Project	25
Software Manuals (individual grade)	20
Group Activities*	
Software Manuals (group grade)	5
Total	100

*Individual grades for group grades will be based on group evaluation of individual contribution. All group work will be accompanied by a Mark Distribution Contract.

3.2 Description of Course Activities

Assignments
Small modelling assignments will be presented at the introduction stages of each software package. These assignments are designed to allow the students to learn the software packages in a hands-on manner. Each assignment will be catered to the specific software package. Currently I expect four assignments of this nature throughout the term – one each for Therm/Window and WUFI in addition to two for Design Builder. Typically, these assignments will be relatively informal and deliverables may include an electronic file and/or print out of desired results. Written components and/or analysis is not anticipated for these assignments.

Failure to complete these assignments will result in a failure of this course.

Projects
For each software package, a substantial project will be completed. These projects will involve simulation in addition to a formal written report, including research, analysis, synthesis and interpretation. Details on each project to follow throughout the term.

Software Manuals
As part of this course, Software Manuals will be created for each software package. These student-help manuals will provide quick reference to common software uses, etc in addition to a summary of software fundamental equations, assumptions, limitations, etc.

3.3 Posting of Grades
All grades will be posted on the course web-site in a confidential manner. Access to one's grades will only be available to the student in question and the professor. Students who wish not to have their grades posted must inform the instructor in writing.

Students will receive their final course grades only from the Registrar. Final course grades may not be posted or disclosed anywhere by the professor.

3.4 Course Schedule and Deadlines

Week	Class Session	Readings to be Completed Before Class**	Due Dates
1 Jan 14 (T/W)	▪ Introduction ▪ Course Outline ▪ Intro to Therm (ARC Computer Lab)		
2 Jan 21 (T/W)	▪ Glazing ▪ Simulating Glazing (ARC Computer Lab)	▪ THERM/WINDOW Manuals	**ASSIGNMENT 1 DUE**
3 Jan 28 (DB)	▪ Intro to Design Builder and Energy Plus (ARC Computer Lab)	▪ Engineering Reference Manual (EPlus) – an ongoing read for the next seven weeks. ▪ DB Literature	**THERM PROJECT DUE (Project # 1)**
4 Feb 4 (DB)	▪ Design Builder systems and capabilities	▪ See week 3	**ASSIGNMENT 2 DUE**
5 Feb 11 (DB)	▪ Simulating Buildings – An Approach ▪ Introduce Project # 2	▪ See week 3	**ASSIGNMENT 3 DUE**
Feb 18	**NO CLASSES – STUDY WEEK**		
6 Feb 25 (DB)	▪ Renovating for Low Impact	▪ See week 3	
7 Mar 4 (DB)	▪ Open TBD	▪ See week 3	

8 Mar 11 (DB)	▪ Open TBD	▪ See week 3	Group meetings to review software manual outline.
9 Mar 18 (DB)	▪ Open TBD	▪ See week 3	
10 Mar 25 (WUFI)	▪ Introduction to WUFI ▪ Software basics	▪ WUFI Documentation	**DESIGN BUILDER PROJECT DUE** **(Project # 2)**
11 Apr 1 (WUFI)	▪ Hygrothermal materials and simulation		**ASSIGNMENT 4 DUE**
12 Apr 8 (WUFI)	▪ Open TBD		**WUFI PROJECT DUE** **(Project # 3)** **SOFTWARE MANUALS DUE**

**This is a tentative reading list and will most likely change as the course progresses.

3.5 Other Expectations and Requirements

Students are expected to attend all scheduled classes and, as appropriate, notify the instructor of any absences.

All students are expected to adhere to the professor's personal policy on cell phones.

Attendance to all meetings is highly recommended.

Students will be expected to work in groups for a portion of this course. Group work will reflect that in a professional engineering/architecture office. Students are expected to contribute in a relatively equal manner to all group work.

Students are expected to review material as provided on the course website.

4. Variations within a Course

Not Applicable to This Course

5. Department of Architectural Science Policies

Students are referred to the Department of Architectural Science Student Handbook for information on Department policies. For information about policies specific to the Master of Architecture program, contact the Program Director.

6. School of Graduate Studies Academic Policies

For information on academic policies pertaining to issues such as course management, grading practices, and appeals, students are to refer to the web site of the School of Graduate Studies, www.ryerson.ca/graduate .

13. Student Email Accounts

The University has initiated a policy by which all students are required to have a Ryerson University email account. Students will be requested to activate their account at the start of the academic year and all notices and announcements of an official nature will be sent via this account.

14. Student Accommodations

Students with special needs who require accommodation must register with the Access Centre (http://www.ryerson.ca/accesscentre/) and follow their procedures.

Students who require accommodation for religious observance obligations are required to adhere to the University Policy and must submit the Student Declaration of Religious Observance form (http://www.ryerson.ca/senate/forms/relobservforminstr.pdf) within first two weeks of each term.

9. Date of Issue

The date of issue of this Course outline is January 14, 2009.

4.1.6 CIV101 – Structures, Materials and Design

General Course Information:

CIV101F Structures, Materials and Design – Section C
September, 2004

Instructor: R. C. Richman, GB333, 416-978-5964, richman@ecf.utoronto.ca

TA's: Sabrina Spatari, GB319F, sabrina.spatari@utoronto.ca
Susana Saiz Alcazar, GB418, susana.saiz.alcazar@utoronto.ca

Lectures: Monday,2-3 pm,GB248
Tuesday, 9-10 am, GB248
Thursday, 11am -12 pm, GB248

Tutorial: Wednesday, 3-5 pm, HA403

Website for Section C: ccnet.utoronto.ca/civ101fsectionc/

Website for CIV101F: ccnet.utoronto.ca/civ101h1f/

Course Outline: See Course Content Handout

Course Schedule:
(tentative)

Week of	Content
September 6	Intro, Ch. 1
September 13	Ch. 2
September 20	Ch. 3 (2-D)
September 27	Ch. 4 (2-D)
October 4	Ch. 3 (3-D)
October 11	Ch. 4 (3-D)
October 18	Ch. 6
October 25	Ch. 10 (Supplementary Notes)
November 1	Ch. 5
November 8	Ch. 7
November 15	Ch. 11/12 (Supplementary Notes)
November 22	Ch. 9
November 29	Design, Wrap-up, Review

Grade Composition:

Description	Marks
Weekly Tutorials (Best 9 of 10)**	5
Bridge Design Competition (Reasonable entry)**	2
Quiz on **October 6** (50 minutes)**	5
Mid-term test on **November 3****	28
Final Exam	60
	100%

** The term work component will be normalized in each section to an average of 70% (i.e. 28/40 marks)

The quiz, mid-term test, and final examination will be "closed book", that is, no aids are allowed except for the following **non-programmable** calculators: Casio 260, Sharp 520, and TI 30.
(continued on back)

Some Notes on Tutorials

1. Tutorials must be done **NEATLY** in pencil on one-side only of the engineering problem paper sold in pads by the Engineering Society Stores (basement of Sanford Fleming building.) A straight edge is required for **ALL** drawing lines buy scales and protractors are not required (i.e. it is a **sketch**.) Sloppy work (as deemed by the TA's and Instructor) will not be accepted.

2. The tutorial problem sheet will be handed out at the end of lecture on the day before the tutorial (i.e. Tuesday). The solution (excluding the problem sheet) must include all necessary diagrams and be reasonably neat. The pages of the completed problem set including the original problem sheet as the last page **MUST** be stapled together – problem sets fastened with paper clips or by folding the corners of paper will **NOT** be accepted.

3. Completed tutorial must be handed in at the end of the tutorial session the next day (before 5:00 pm EST.) Late tutorials will normally not be assessed nor will tutorials which are incomplete.

4. The tutorials will be graded on a scale of 10 and returned at the beginning of the next week. **All or some** of the problems will be marked for each problem set. **Re-submitted** tutorials will not be accepted.

5. The best 9 out of 10 tutorial problem sets will be used to determine the term mark out of 5.

6. If you feel there exists a **blatant error** in marking, you may approach the TA's or myself. Only situations deemed '**blatant**' will be accepted for reconsideration.

4.2 Sample Assignments

Ryerson

In-class Materials

Case Study # 1 from BL8101

Case Study # 2 from BL8101

Case Study # 3 from BL8101

- The above case studies stem from my professional consulting experience as they were real projects. Students work in groups to solve the problems. This occurs towards the end of the course.

Mid-Term Project from BSC822

- For this project, groups of students visit real houses in Toronto to understand various building envelope contexts. The students then solve various problems, as outlined in the project.

Theme Problem # 4 from BL8100

- One of five capstone projects in the course

Theme Problem # 2 from BL8100

- One of five capstone project in the course

Case Study # 2 from BL8100

- An in-class group case study project where students analyze, solve and present their solutions

Assignment # 2 from ASC200

- One of two term assignments in the course

WUFI Project (Project # 3) from BL8204

- One of four term projects in the course

Pre-Ryerson

In-class Materials

The following four pages outline three assignments I created for the following courses:

1. CIV101 (2004) as the Instructor
2. CIV575 (2005) as the head TA
3. CIV420 (2003) as the TA

The next fourteen pages outline a major project I created for the following course:

1. CIV425 (2007/2008) as the Instructor

Case Study # 1 – St. John's (NFLD) Membrane Mess-up

A client asks you to provide an opinion regarding the as-built exterior wall assembly of a recently renovated building in St. John's, NFLD. The building was recently retrofitted and all above grade brick and glazing was removed.

The project drawings and specifications required the installation of a vapour barrier membrane. Refer to Figure 1 for the general configuration of the exterior wall.

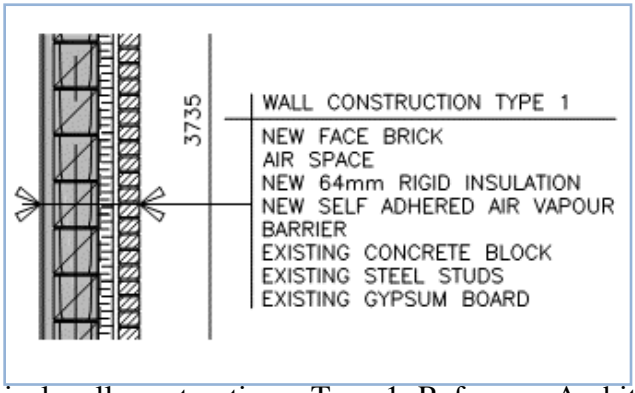


Figure 1: Typical wall construction – Type 1; Reference Architectural Drawings

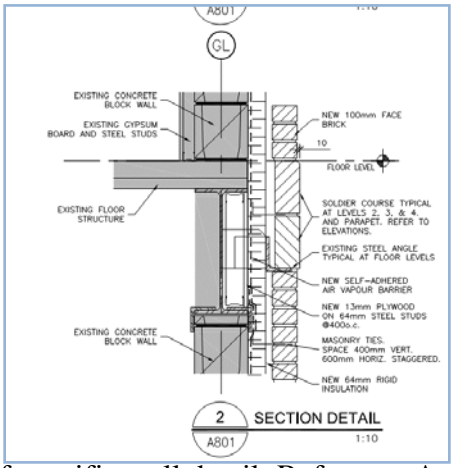


Figure 2: Example of specific wall detail; Reference Architectural Drawings

The problem (maybe) is that a vapour permeable membrane was installed instead of a "vapour barrier." Project details are:

The exterior insulation that was installed consisted of:

- Johns Manville AP™ Foil-Faced Foam Sheathing board consists of a closed-cell polyisocyanurate foam core bonded on each side to a foil facer. The vapour permeance of the insulation board is 2.86 ng/Pa•s•m^2 (0.05 perm). The thermal resistance of the 64mm board is R-16.
- Joints were sealed with foil tape.

The vapour permeable membrane that was installed consisted of:

- SOPRASEAL STICK VP (by Soprema) is a self-adhesive vapour permeable air barrier membrane composed of a tri-layer laminated polypropylene facer. The vapour permeance of the membrane is 972 ng/Pa•s•m^2 (17 perm) /629 ng/Pa•s•m^2 (11 perm).

The City is demanding the exterior components be removed and a "vapour barrier" needs installation. Your client wants you to analyze the situation and make a recommendation regarding the vapour permeable membrane.

Case Study # 2 – Fort McMurray Fire Wall

A client asks you to provide an opinion regarding a proposed fire wall retrofit for a heavy industrial warehouse/machining facility in Fort McMurray, Alberta.

The building is an industrial unit and your client is considering the installation of a rated shaft wall in addition to the existing exterior wall on the exterior face of part of the building (full height) to prevent any business interruption.

The proposed wall assembly is attached on the next page.

For clarity, they provided the following details:

1. The existing metal cladding will be removed and re-installed on top of the new shaft wall. The shaft wall with the insulation will be constructed on the interior side of the exterior metal panel wall inside the conditioned space to prevent interruption to business operations.

2. The assembly will be permanent.

3. The wall is an exterior wall.

4. The insulation material is not rigid as shown but the UMBI by John Mansfield

What is your recommendation for this project. Would you go with this wall? If so, why? If not, what changes would you recommend?

Case Study # 3 – Interior Insulation on Window Wall Systems

A client asks you to provide an opinion and recommendations for installing insulation inboard of a window wall spandrel panel in multi-storey condominium towers in Toronto (ON).

The four wall types are:

Assembly 7AE	Assembly 7AH
• Aluminum window wall system with single glazed spandrel glass	• Aluminum window wall system with single glazed spandrel glass
• Type 3c insulation (50 mm)	• Type 3c insulation (75 mm)
• Galvanized metal back pan	• Galvanized metal back pan
• Type 5a insulation (64 mm) between metal studs (64 mm) at 600 mm O.C.	• Type 5a insulation (64 mm) between metal studs (64 mm) at 600 mm O.C.
• Gypsum wall board (13 mm)	• Gypsum wall board (13 mm)
Assembly 7AX	**Assembly 7AX(variation)**
• Aluminum window wall system with single glazed spandrel glass	• Aluminum window wall system with single glazed spandrel glass
• Type 3c insulation (75 mm)	• Type 3c insulation (50 mm)
• Galvanized metal back pan	• Galvanized metal back pan
• Air space (13 mm)	• Air space (13 mm)
• Type 7b insulation (64 mm) between metal studs (64 mm) at 600 mm O.C.	• Type 7b insulation (64 mm) between metal studs (64 mm) at 600 mm O.C.
• Gypsum wall board (13 mm)	• Gypsum wall board (13 mm)

Table 1 – Summary of Subject Standard Exterior Wall Assemblies

The material characteristics provided are:

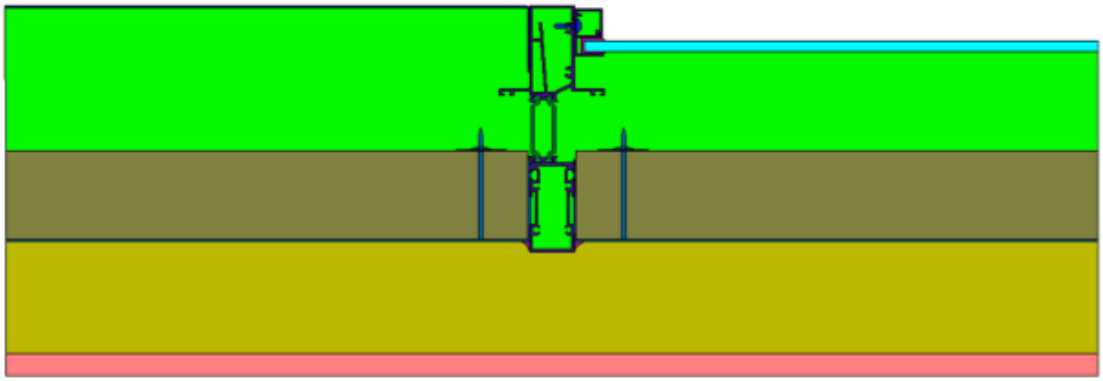
Type	Description	Conductivity, [W/mK], λ
3c	Fibrous glass or mineral wool rigid board. Minimum density of 56 kg/m³.	0.034
5a	Fibrous glass or mineral wool meeting CAN'ULC s702, preformed batts of indicated thickness, unfaced, friction-fit.	0.042
7b	2lb closed cell spray foam insulation.	0.024

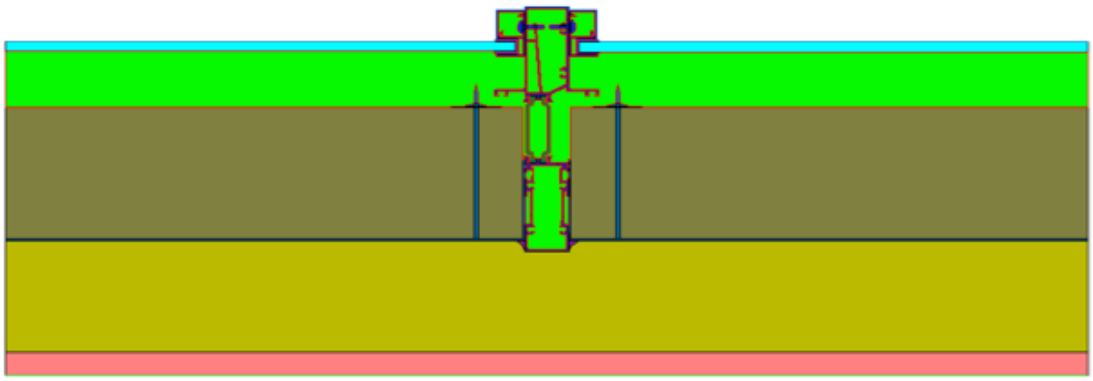
Table 2 – Insulation Description and Conductivity

What are your initial thoughts of the proposed wall assemblies?
Provide a recommendation based on hygrothermal analysis.

The client would also like to know whether it is recommended to include a vapour barrier (e.g. 6-mil poly) on the outboard side of the gypsum wall board (i.e. dry wall).

Some pictures from a THERM analysis:





BL8101 - Mid-Term Project

Introduction

Your mid-term project comprises the thermal and hygrothermal analysis of advanced residential building envelopes (walls, roofs, slabs) typically utilized in a building aiming to be designed and constructed to a Passive House Standard[3]. As part of the project, your group will visit your case study house, conduct site measurement and assessment, and produce a set of drawings to base your project on.

Group Component (15% of overall course grade)

Once you form your group (5 students per group), you will contact me to be introduced to your case study house Owner. Within the next two to three weeks, your group will schedule a single site visit when the Owner is home. You will organize this site visit so that you can quickly measure and necessary aspects of the house in order to produce a full set of drawings. Questionnaires, etc. should be created, used and submitted as part of this group component.

Deliverables:

- Full set of drawings including, but not limited to: all floor plans, roof plan, all elevations, transverse and longitudinal section details as needed to convey the house construction, schematic details of your individual chosen thermal bridge details.
- Electronic copy of drawing set (ACad preferred)
- Electronic copy of drawing set (PDF fully formatted for printing)
- All questionnaires, site notes (organized please), etc. used to complete this component.

Individual Component Details (20% of overall course grade)

Each student will choose one building envelope detail to be analyzed **(it is suggested your details be approved by me)**. Based on your site visit, you shall estimate the existing condition of your detail. Your ultimate goals will be to:

[3] For more information, visit: www.passivehouse.us http://passiv.de/en/ http://www.passivehouse.ca/

1. Determine the as-built condition of your detail.
2. Re-design the detail using assemblies capable of supporting a house designed to a passive house standard.
3. Determine the ψ-factor (i.e. linear thermal bridge coefficient) for your envelope detail (existing and passive house). The passive house detail must be thermal bridge free.
4. Conduct a hygrothermal analysis of one existing and one proposed passive house envelope (i.e. wall, slab, roof, ceiling).
    a. Model it in WUFI in its specific climate.
    b. Conduct a parametric analysis for both the interior and exterior boundary conditions to investigate how your wall performs.
    c. Modify several elements of your envelope assembly to 'force fail' it.

Deliverables:

- Individual report showing all required analysis stated above. The report shall allow Prof. Richman to understand your approach, all assumptions and your method(s) to reach your conclusions. Allow me to "*get in your head.*"
- Existing and passive house THERM files.

Both components will be completed using the following rubric:

- Accuracy of results 20%
- Elegance of solution 20%
- Methods 20%
- Completeness of reports/drawings 20%
- Assumptions 10%
- Quality (i.e. presentation) of deliverables 10%

Good Luck,
Prof. Russell Richman

RYERSON UNIVERSITY
DEPARTMENT OF ARCHITECTURAL SCIENCE

BL8100 – BUILDING SCIENCE THEORY

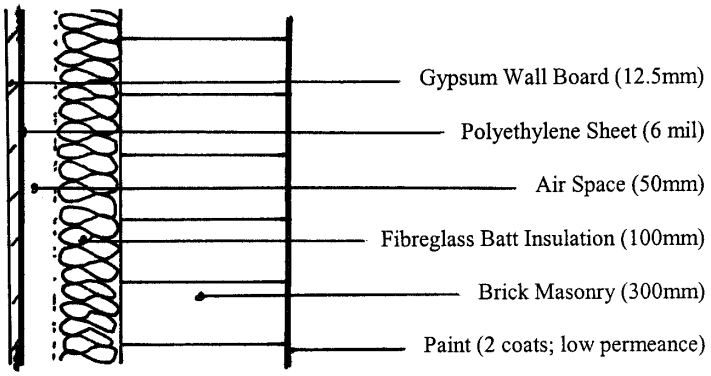
PROF. RUSSELL RICHMAN

Assigned: 10-28-2009 Due: 11-18-2009

Theme Problem # 4

Theme – Moisture Transport

A local independent grocery store recently purchased a building with a typical exterior wall assembly as shown below. Calculate and plot the relative humidity profile through the wall in February if the average indoor and outdoor conditions are respectively: 19°C, 50% R.H. and -5°C, 85% R.H. Comment on the effectiveness of the wall assembly in these conditions.



When visiting the store, you notice the south east corner to be experiencing significant deterioration, including brick and paint spalling.

A subsequent investigation reveals an area of the store contains a walk-in fridge along the south east exterior corner (i.e. two of the four fridge walls are exterior). An investigation of the fridge exterior walls revealed the assembly shown below. It seems that someone installed an additional 'fridge wall' over the original exterior wall assembly. Moreover, the air barrier in this assembly seemed to be the inboard polyethylene sheet (at the extruded insulation) and the fridge was generally pressurized with respect to the exterior. When reviewing the exterior for a second time, you confirmed the observed deterioration to be exactly within the limits of fridge location and the deterioration is worst on the south elevation.

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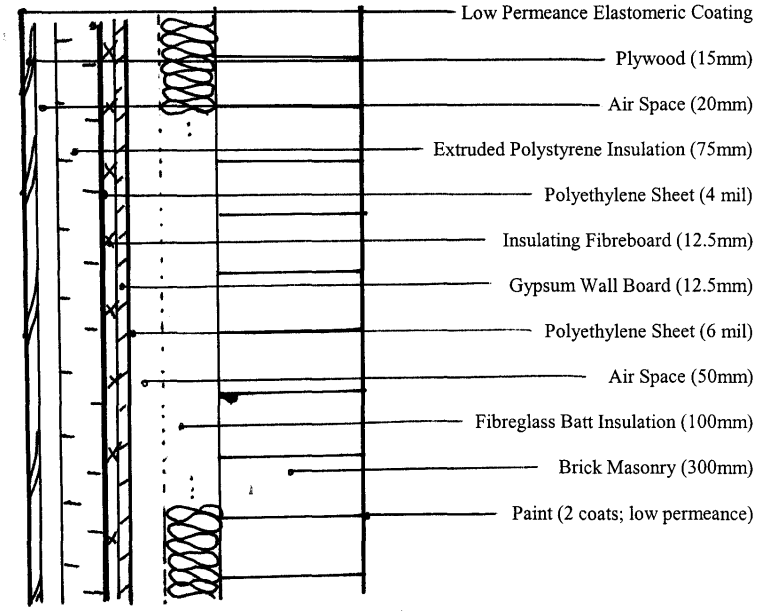
BL8100 – BUILDING SCIENCE THEORY

PROF. RUSSELL RICHMAN

Assigned: 10-28-2009 Due: 11-18-2009



Using your building science fundamental knowledge to date, explain the observed phenomenon. You may make intelligent and thoughtful assumptions. Your explanations should be backed by calculations, where possible. Use and list references, where applicable.

You will work in groups of two or three to complete this project and are responsible for their formation. Your overall mark will be graded based on the following rubric:

Description	Percentage
Accuracy of problem cause(s) ▪ Identification of potential causes ▪ Systematic ruling out of some causes ▪ Depth of analysis ▪ Assumptions	60%
Calculation support	35%
Overall Presentation of Package	5%
Total	**100%**

As with all group work, a Mark Distribution Contract will be handed in as part of your submission.

RYERSON UNIVERSITY
DEPARTMENT OF ARCHITECTURAL SCIENCE

BL8100 – BUILDING SCIENCE THEORY

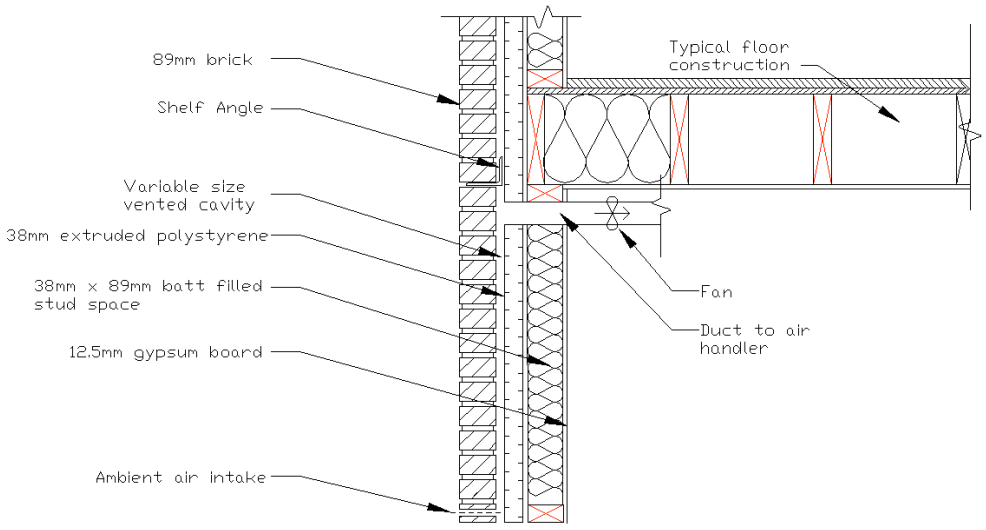
PROF. RUSSELL RICHMAN

Assigned: 9-27-2009 Due: 10-18-2009

Theme Problem # 2

Theme – Heat Transfer

An innovative solar air-collecting masonry façade has been developed as part of a M.A.Sc. thesis in the Master's of Building Science program at Ryerson University. Below is a schematic cross-sectional representation of the system.



Your task is to create a numerical model of the heat transfer mechanisms within this assembly. Your model will consist of heat balance equations for the following five surfaces/elements:

1) exterior brick surface
2) interior brick surface
3) cavity air stream
4) extruded polystyrene (cavity side)
5) gypsum wall board (interior side)

Your numerical model must be capable of being solved by a common numerical analysis procedure (i.e. Newton-Rhapson method). That is, you must reduce your unknown variables to five (i.e. five equations with five unknowns).

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BL8100 – BUILDING SCIENCE THEORY

PROF. RUSSELL RICHMAN

Assigned: 9-27-2009 Due: 10-18-2009

Your submission for this problem will comprise a package with the following elements:

- An 8.5″X11″ sheet showing the heat transfer mechanisms on a cross-sectional schematic.
- A list of all assumptions with justification(s) for each.
- A short form of your numerical model (i.e. showing each heat balance equation, but leaving the heat transfer coefficients in short form)
- A listing of each heat transfer coefficient, the resulting equation for each coefficient and your justification and/or process for the resulting equation. Please show all references at pertinent locations within your justification.
- A complete listing of all variables in the model and coefficients.
- A methodology of how the group approached this problem.
- A list of all references used.

Your overall mark will be graded based on the following rubric:

Description	Percentage
Completeness/Elegance of Model	25%
Justification of Coefficients	50%
Methodology	10%
References	10%
Overall Presentation of Package	5%
Total	**100%**

As with all group work, a Mark Distribution Contract will be handed in as part of your submission.

RYERSON UNIVERSITY
DEPARTMENT OF ARCHITECTURAL SCIENCE

BL8100 – BUILDING SCIENCE THEORY

PROF. RUSSELL RICHMAN

Assigned: 9-16-2008 Presented: 9-16-2008

Case Study # 2 – Making Snow

You have been asked to conduct a site review of a multi-storey residential building in Ottawa, ON. It is January 7, 2008 and you visit this building. You are with a team and have finished your review of the building envelope. It is cold outside, but well above freezing, approximately 6°C. Even though, it is very damp and you decide to walk with your structural engineering colleague to warm up while she investigates the two storey on grade parking garage. It is there that you witness something special.

It has been a typical cold, snowy Ottawa January up to now. Even though the snow all around you is melting (above left) reinforcing the temperature to be well above freezing, you notice frost, ice and snow crystals forming on the underside of the concrete deck (above right). You think, how on earth is this possible…

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DEPARTMENT OF ARCHITECTURAL SCIENCE

BL8100 – BUILDING SCIENCE THEORY

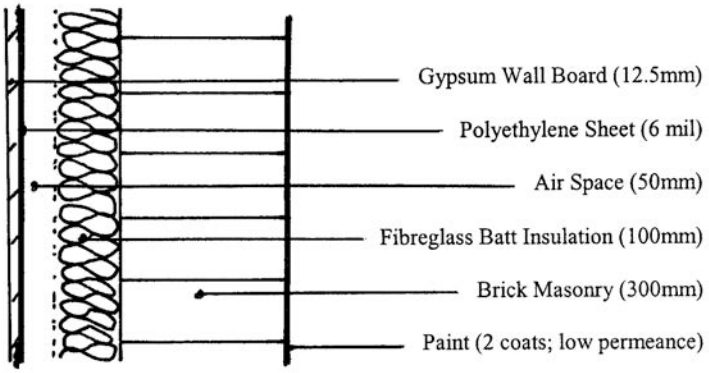
PROF. RUSSELL RICHMAN

Assigned: 10-21-2008 Due: 11-04-2008

Theme Problem # 4

Theme – Moisture Transport

A local independent grocery store recently purchased a building with a typical exterior wall assembly as shown below. Calculate and plot the relative humidity profile through the wall in February if the average indoor and outdoor conditions are respectively: 19°C, 50% R.H. and -5°C, 85% R.H. Comment on the effectiveness of the wall assembly in these conditions.



When visiting the store, you notice the south east corner to be experiencing significant deterioration, including brick and paint spalling.

A subsequent investigation reveals an area of the store contains a walk-in fridge along the south east exterior corner (i.e. two of the four fridge walls are exterior). An investigation of the fridge exterior walls revealed the assembly shown below. It seems that someone installed an additional 'fridge wall' over the original exterior wall assembly. Moreover, the air barrier in this assembly seemed to be the inboard polyethylene sheet (at the extruded insulation) and the fridge was generally pressurized with respect to the exterior. When reviewing the exterior for a second time, you confirmed the observed deterioration to be exactly within the limits of fridge location and the deterioration is worst on the south elevation.

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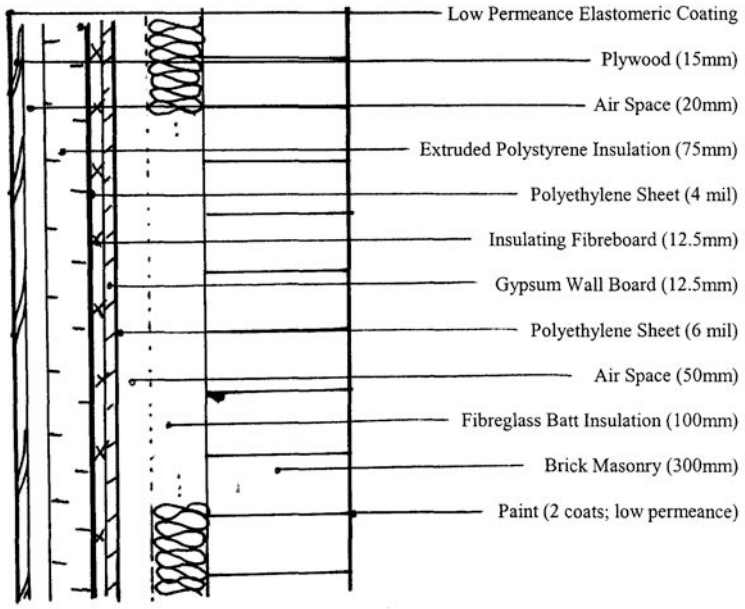
DEPARTMENT OF ARCHITECTURAL SCIENCE

BL8100 – BUILDING SCIENCE THEORY

PROF. RUSSELL RICHMAN

Assigned: 10-21-2008 Due: 11-04-2008



Using your building science fundamental knowledge to date, explain the observed phenomenon. You may make intelligent and thoughtful assumptions. Your explanations should be backed by calculations, where possible. Use and list references, where applicable.

You will work in groups of two or three to complete this project and are responsible for their formation. Your overall mark will be graded based on the following rubric:

Description	Percentage
Accuracy of problem cause(s) ▪ Identification of potential causes ▪ Systematic ruling out of some causes ▪ Depth of analysis ▪ Assumptions	60%
Calculation support	35%
Overall Presentation of Package	5%
Total	**100%**

As with all group work, a Mark Distribution Contract will be handed in as part of your submission.

RYERSON UNIVERSITY
DEPARTMENT OF ARCHITECTURAL SCIENCE

BL8100 – BUILDING SCIENCE THEORY

PROF. RUSSELL RICHMAN

Assigned: 9-16-2008 Presented: 9-16-2008

Case Study # 1 – The Wet Basement

A home-owner comes to you as a budding building scientist with a problem. Their basement carpet was saturated and they want your opinion of why it happened and what they can do about it. Here is their story:

> In late July, early August, your client noticed the basement carpet floor in the main "activity" room (see above) to be quite damp and almost wet to the touch. When your client opened the basement window to dry out the carpet on a Friday, they were astounded when two days later after returning from the cottage, the carpet was completely saturated as if someone poured buckets of water on it. They need your help.

You decide to take them on and make the following observations during your site visit:

- You notice the laundry utility room is located behind the far door. Water stains are on the floor, but not an incredible amount.
- There is no staining on the base board trim in the area.
- The carpet is indeed wet as can be.
- The basement window is still open to dry things out.
- The house is located on a slope. The slope is from back to front.
- A mature willow tree is located adjacent to the back of the house.

Back at your office, you check a few things out and find this:

- It did not significantly rain over the weekend (you were at the cottage too!)
- The client had the municipal drains cleaned due to excessive willow roots blocking them.
- The days had been typical late July/early August muggy, hot, Toronto weather.

What is the mechanism? How can you fix it?

RYERSON UNIVERSITY
DEPARTMENT OF ARCHITECTURAL SCIENCE

BL8204 – BUILDING PERFORMANCE SIMULATION

PROF. RUSSELL RICHMAN

Assigned: 1-14-2009 Presented: 1-28-2009

THERM/WINDOW PROJECT
(Project # 1)

A Simulated Study on Thermal Bridging

A client has come to you with a "situation." A building has been designed, tendered and awarded. You have been approached to complete a peer-review of the building envelope design. During this review, you take note of a particular gutter detail at the roof/wall interface that disturbs you (Refer to Project 1 drawings).

You have a sneaking suspicion that this detail represents a massive thermal bridge. Further, you worry that interstitial condensation may be a significant issue. Knowing the interior and exterior design environments to be 22 °C, 40% RH and -18 °C, 80% RH respectively, you conduct your analysis.

Your investigation must answer the following questions:

I. Is there a potential for interstitial condensation at this location, given the design environmental conditions?
II. Will increasing the insulation on the steel outrigger gutter support eliminate any potential for condensation and/or thermal bridging?
III. What is the best alternative* for this design? (You must come up with three separate strategies** and show results of each one and a combination of them, if applicable)

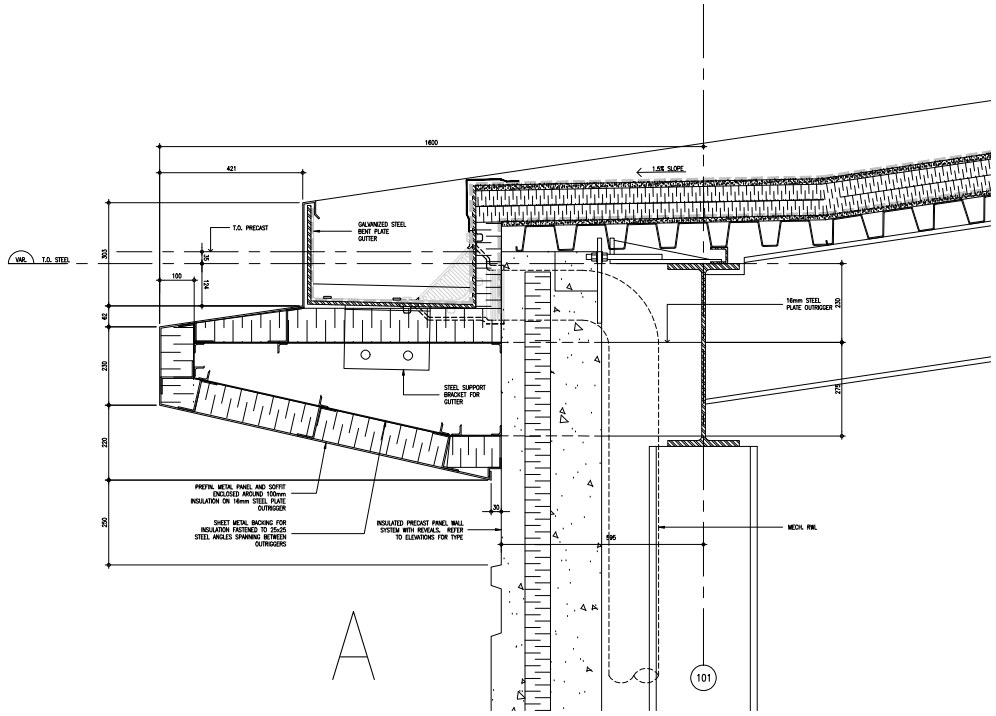
*Unfortunately the contractor has nearly completed production of these steel outriggers. Changing the shape will be costly. Further, the Architect likes the look of this gutter detail (i.e. elimination of the outrigger is not on the table).

**Strategies must be discussed and approved with the Prof. prior to conducting simulation.

Using THERM 5.x, you must simulate the answers to the above questions. The deliverable of this project is a letter report to your client outlining your approach, analysis, results, discussion and conclusion (a sample letter report template is available on the course website). You must provide screen shots supporting your observations, etc. In addition, you must submit your THERM model files.

Your project will be graded using the following rubric:

THERM model(s)	**20%**
(accuracy, elegance, approach & errors)	
Report	**80%**
(communication, analysis, conclusions, layout (flow and form), professionalism)	



adamson
ASSOCIATES | ARCHITECTS

DRAWING TITLE

DETAIL - PART OF A5-41
ROOF EDGE / GUTTER

DRAWN T.B.

SCALE 1:10

PROJECT NO. 0712-

PROJECT NAME

MGCS NEW DATA CENTRE

DRAWING NO. ***SKA5-41-***

RYERSON UNIVERSITY
DEPARTMENT OF ARCHITECTURAL SCIENCE

ASC200 – SUSTAINABLE PRACTICES

PROF. RUSSELL RICHMAN

Assigned: 2-05-2010 Due: 4-02-2010 @ 1:10 PM

Assignment # 2

Theme – Applying the Course to a Real Project

Your first step in this assignment is to choose your party of 5 students. Next, you must submit by email your group to Prof. Richman by Thursday, February 11th, 2010 (complete with full names and student numbers).

Focus Areas

This project contains five general focus areas (one for each group member). These areas are:

- Site influence (passive strategies and lighting)
- Building envelope
- Active systems (HVAC)
- Water systems
- Materials

In addition to the overall submission requirements for the group, each group member must choose a specific focus area and concentrate her/his contribution towards that area.

Part 1 – Project Evaluation

You must evaluate your building/site through analysis of the drawings and at least one site visit. As a minimum, you must address the five focus areas in this evaluation. Your evaluation should present the current state and proposed plans for the project all the while keeping in mind potential sustainable design strategies (refer to Part 2) that may apply. For all projects, the proposed plans are that which satisfies the current Ontario Building Code. As such, you will familiarize yourself with the pertinent sections applying to your building.

Part 2 – Proposed Design Strategies

For each focus area, as a minimum, conceptualize, design and analyze possible strategies to reduce the project's environmental footprint upon completion of construction, throughout its life and at the end of its service life. For each strategy proposed, you must provide a detailed design to a level that you are capable of. For example, just listing "an improved building envelope" is insufficient – you must address material choice, improved resistance, performance issues, estimated benefits, etc. Focus should be placed on all aspects (envelope, lighting, appliances, etc.). Finally, you must estimate the overall reduction in environmental footprint from adopting your proposed strategies versus the original current state.

Submission

Your submission will comprise a report outlining your approach, assumptions, findings, analyses and results. There is no page limit for this report, however,

keep in mind that all information contained in the report must contribute to the overall goal of the report – do not put text or images in the report for the sake of filling space. Photographs should be incorporated into your submission especially to highlight your site visit(s) and surrounding analysis. All submissions should be of a 'form and quality' that you would proudly present to a prospective employer.

Evaluation

For this assignment, you will receive both a group and individual grade. The group grade will focus on areas of the report outside your chosen focus area. As such, your individual grade will focus on your contribution within your focus area. It is necessary to identify only to address what focus area you contributed and place your name on those pages only. All other contribution in the report will be regarded as "group contribution".

Your grades will be based on the following rubric:

Group Component	
Flow of the information (Is the information well laid out? Does the report read in a logical, continuous manner?)	20%
Level of detail (Is the level of technical and non-technical detail adequate? Are the details accurate?)	15%
Presentation, layout and formatting	10%
Grammar and spelling	5%
Total (group)	**50%**
Individual Component	
Level of detail investigated	10%
Innovation of proposed strategies	15%
Analysis of proposed strategies	20%
Organization of thoughts, grammar and spelling	5%
Total (individual)	**50%**

RYERSON UNIVERSITY
DEPARTMENT OF ARCHITECTURAL SCIENCE

BL8204 – BUILDING PERFORMANCE SIMULATION

PROF. RUSSELL RICHMAN

Assigned: 3-25-2009 Presented: 4-8-2009

WUFI PROJECT
(Project # 3)

A Simulated Study on Condensation and Mould Potential

A client has come to you with another "situation." A residential building, approximately 15 years of age is experiencing significant moisture related deterioration. Specifically, plywood sheathing in the parapet wall was completely compromised (i.e. mould, rot and decay) due to excessive moisture accumulation. The attached photos and observed as-built construction detail summarize the existing condition.

Based on the as-built condition and observed deterioration, your client (the home owner's engineer) has prepared a proposed repair detail for the typical parapet/roof interface. As a building scientist, you question the installation of foam insulation inboard of the inner plywood sheathing (parapet wall) and plywood decking (roof) amongst other items.

To make things more interesting, several bathrooms exist on this floor. One particular has a steam shower. Your client is worried about this area and wants to place a vapour retarder (i.e. 6 mil poly) on top of the dropped gypsum board ceiling.

Your client requests an analysis of the situation and recommendations for remedial repairs.

Your analysis must address the following items:*

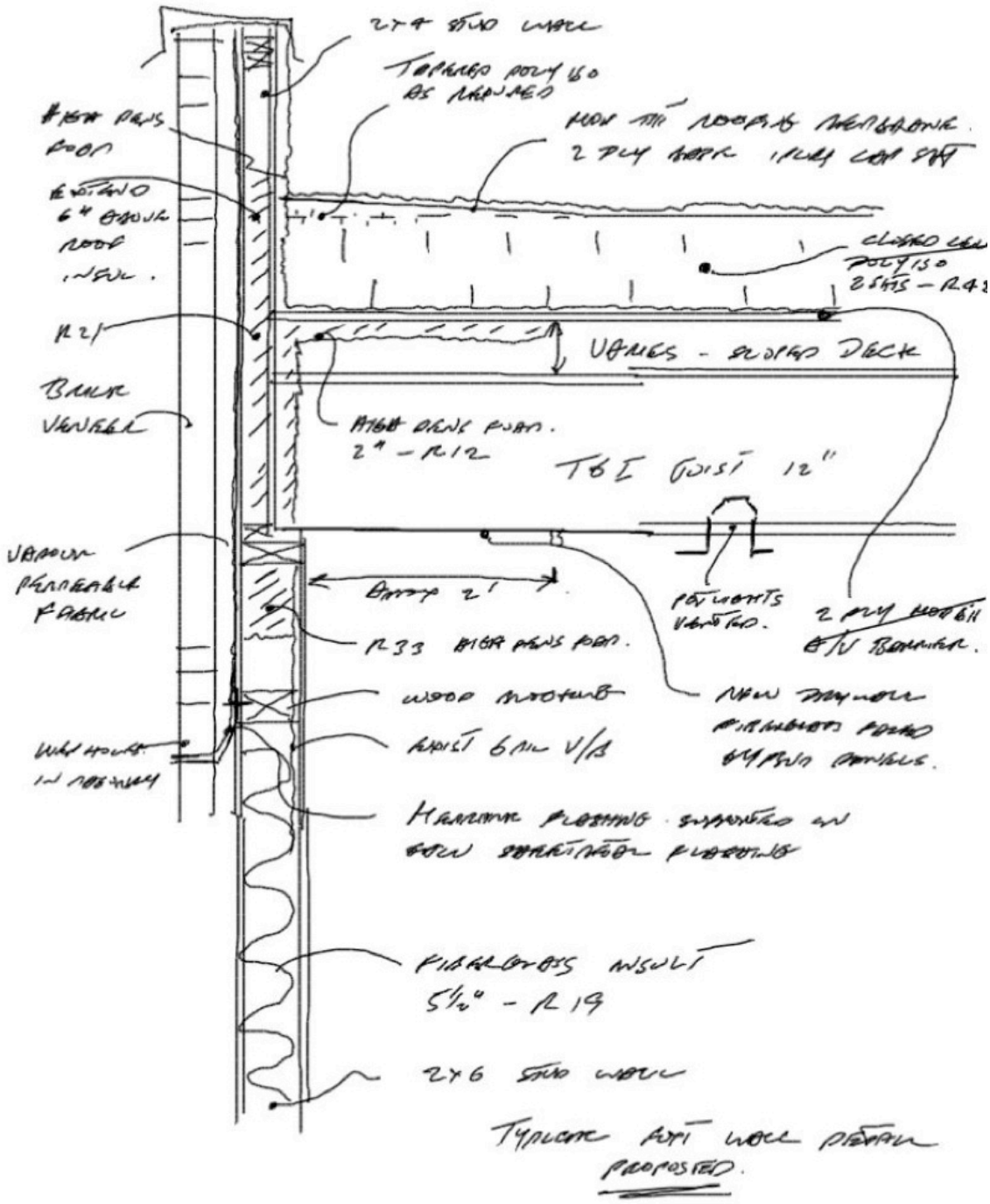
I. Why the original deterioration occurred in the first place?
II. Feasibility of the proposed detail in general. You may mark up the original detail and/or sketch up a modified approach.
III. Feasibility of installing spray foam insulation on the inboard side of the noted plywood sheathing/decking. You must analyze these questions using WUFI. It is your professional responsibility to recognize the key problems/situations defining your analysis.**
IV. Continuity of the air barrier, thermal and vapour retarding planes.

*Your professor has intimate knowledge of this project. You may use him as a resource.
**HINT…HINT…! A single analysis will not answer this multi-variable situation.

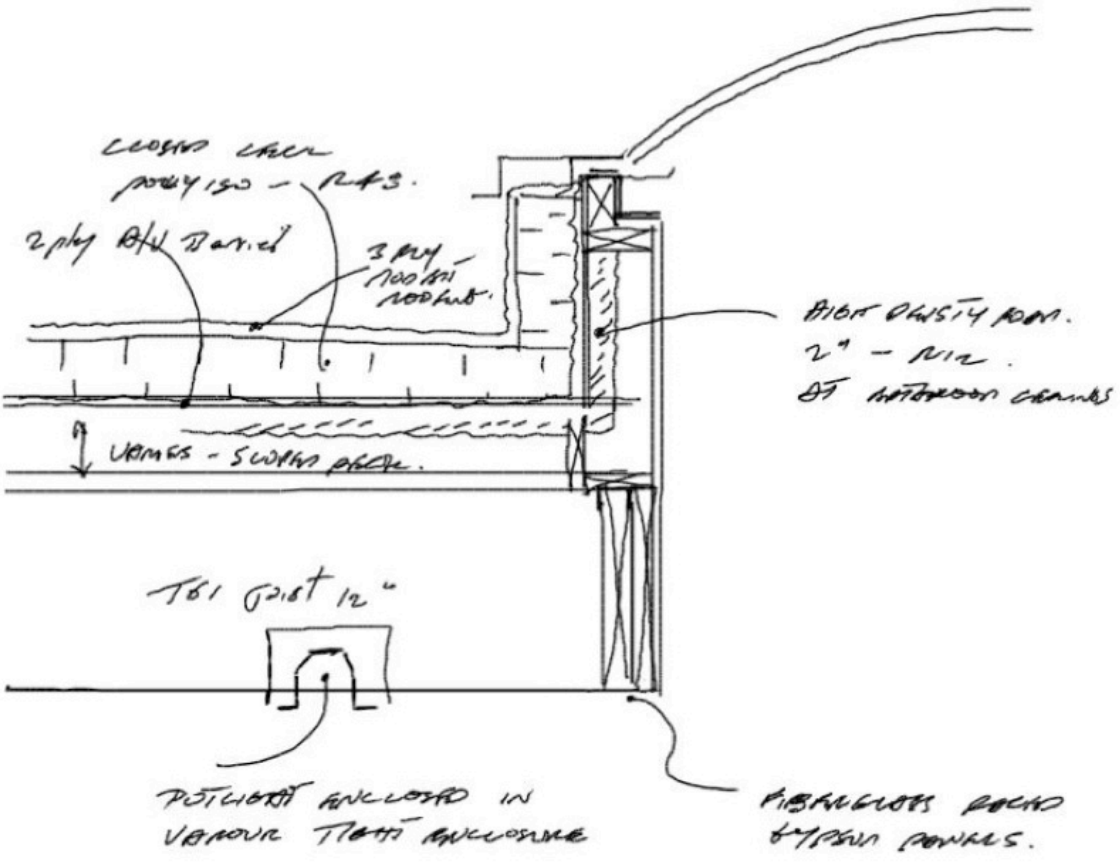
Using your general knowledge of heat, moisture and air transfer in addition to WUFI, you must provide answers to the above items. The deliverable of this project is a letter report to your client outlining your approach, analysis, results, discussion, conclusions and proposed repair details. You must provide screen shots supporting your observations, etc. In addition, you must submit your WUFI model files.

Your project will be graded using the following rubric:

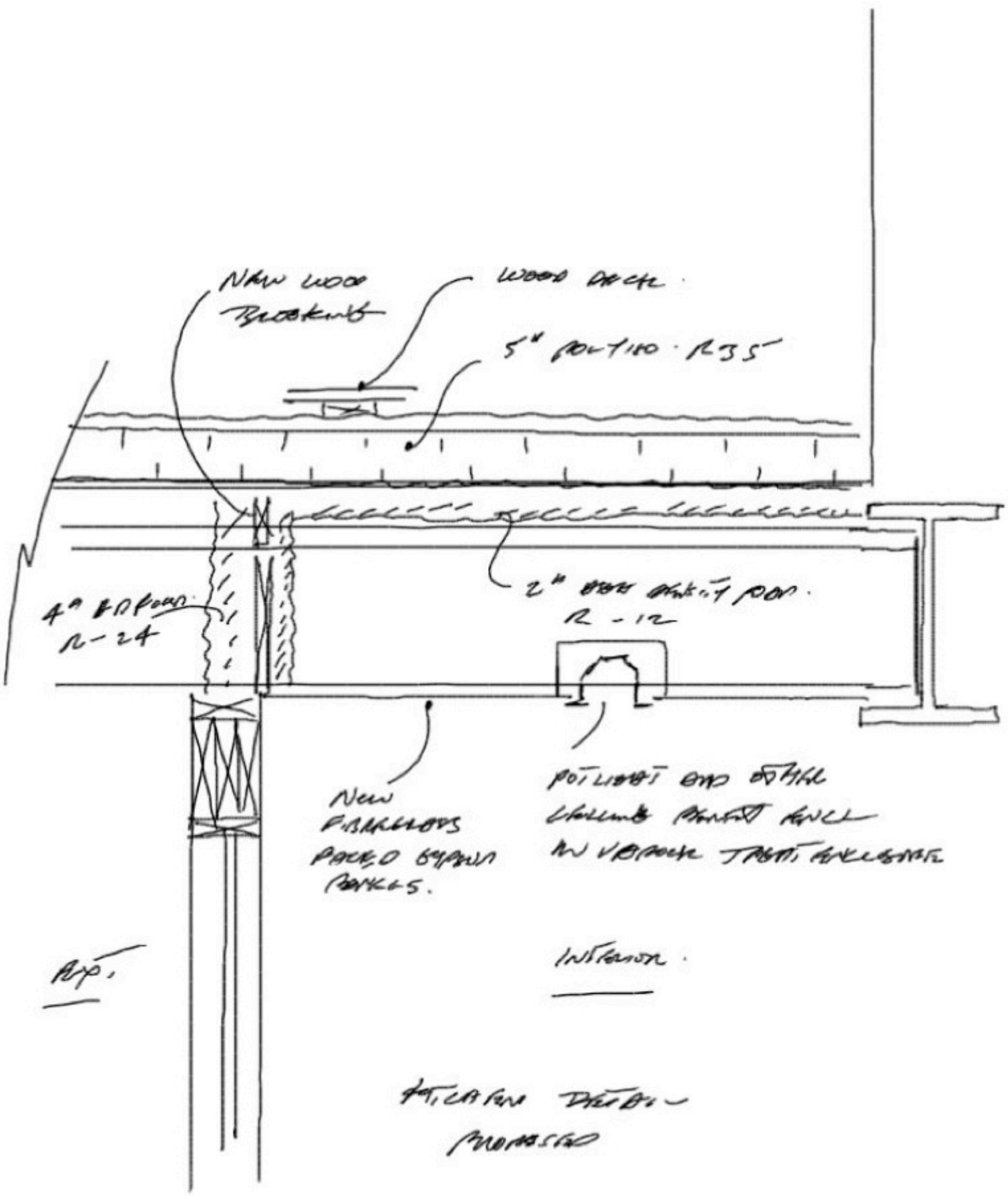
WFUI model(s)	**20%**
(accuracy, elegance, approach & errors)	
Report	**80%**
(communication, analysis, conclusions, layout (flow and form), professionalism)	



TYPICAL ATT WALL DETAIL PROPOSED.



BATHROOM DETAIL
PROPOSED.


WOOD DECK.
R-12
R-24
EXT.
INTERIOR.

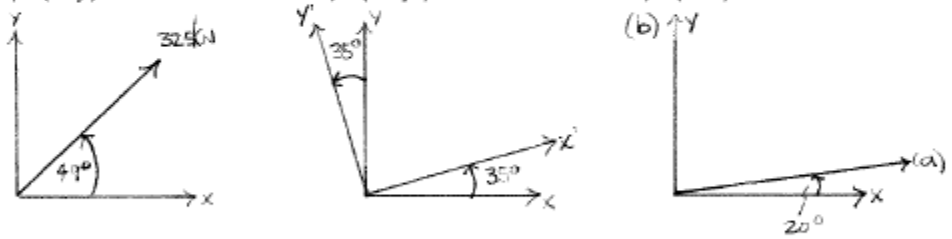
UNIVERSITY OF TORONTO
Department of Civil Engineering

CIV101F STRUCTURES, MATERIALS AND DESIGN (SECTION E)

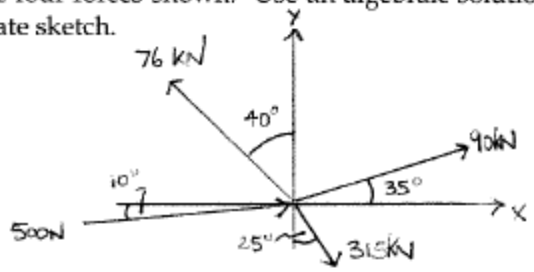
Tutorial Problem Set # 1

Assigned: 9-14-2006 Due: 9-20-2006, 10:10 a.m.

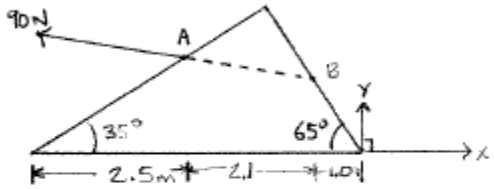
1. Determine the components of the 325 kN force with respect to:
   a) (x, y) axes b) (x′, y′) axes c) (a, b) axes



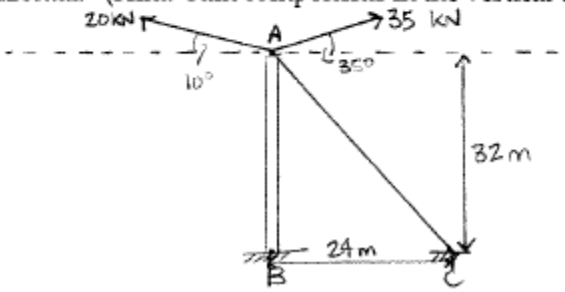
2. Determine the resultant of the four forces shown. Use an algebraic solution. Show the resultant on a separate sketch.



3. A line between points A and B gives the direction of the 90 N force. Determine the x and y components of the force.



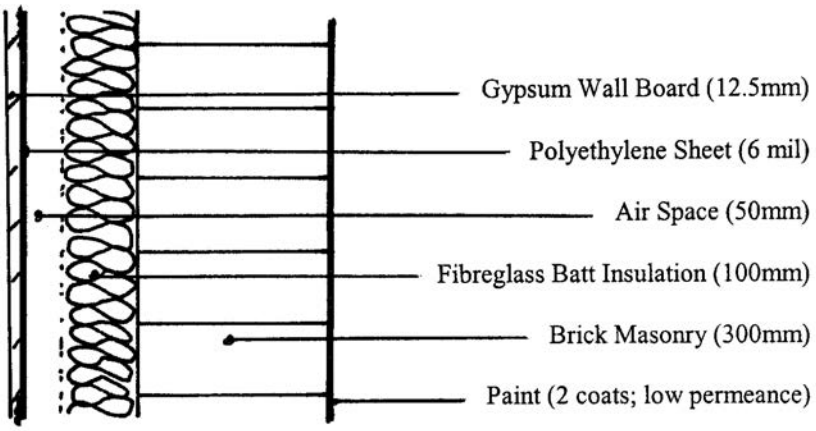
4. Two cables, which have known tensions, are attached to the top of pylon AB. A third cable AC is used as a guy wire. Determine the tension in AC, knowing the resultant of the forces exerted at A by the three cables must be horizontal. (Hint: sum components in the vertical direction.)



CIV 575 Building Science
Tutorial # 6
Fall, 2005

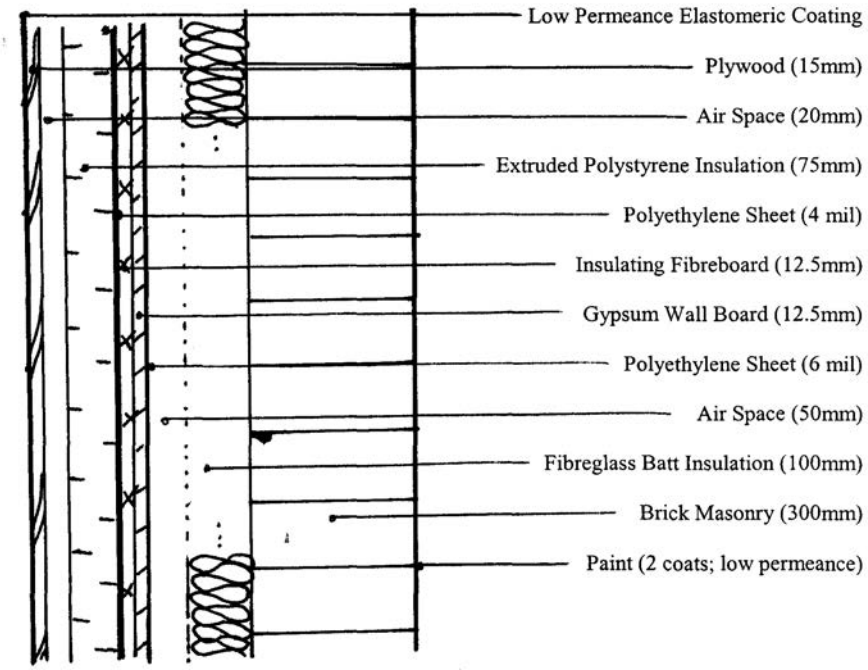
1a) A local independent grocery store recently purchased a building with a typical exterior wall assembly as shown below. Calculate and plot the relative humidity profile through the wall in February if the average indoor and outdoor conditions are respectively: 19°C, 50% R.H. and -5°C, 85% R.H. Comment on the effectiveness of the wall assembly in these conditions.

Interface	Temperature
Air/Gypsum	17.5 °C
Gypsum/Poly	15.8 °C
Poly/Air .	15.8 °C
Air/Glass Insul.	13.1 °C
Glass Insul./Brick	-3.1 °C
Brick/Paint	-4.6 °C
Paint/Air	-4.6 °C



1b) An area of the store contains a walk-in fridge along an exterior corner. An investigation of the fridge exterior walls revealed the assembly shown below. It seems that someone installed an additional 'fridge wall' over the original exterior wall assembly. Moreover, the air barrier in this assembly seemed to be the inboard polyethylene sheet (at the extruded insulation) and the fridge was generally pressurized with respect to the exterior. Calculate and plot the relative humidity profile through the wall in August if the average indoor (fridge) and outdoor conditions are: 2 °C, 30% R.H. and 28 °C, 80%. Will there be a problem with this assembly in the summer months?

Interface	Temperature
Air/Elasto	2.0 °C
Elasto/Ply	2.0 °C
Ply/Air	2.0 °C
Air/Extruded	2.0 °C
Extruded/Poly	2.2 °C
Poly/Fibre	2.2 °C
Fibre/Gypsum	3.2 °C
Gypsum/Poly	4.1 °C
Poly/Air .	4.1 °C
Air/Glass Insul.	5.5 °C
Glass Insul./Brick	25 °C
Brick/Paint	26.8 °C
Paint/Air	27.4 °C



CIV 575 Building Science
Tutorial # 6
Fall, 2005

1c) As expected (and calculated!), the area between the extruded polystyrene insulation and brick masonry was wet. Given the information from this question and what you've learned in CIV575 up to now, briefly summarize your 'best practice' solution to be presented to the owners of the store. Keep in mind that the repair budget is slim as they are competing with a Loblaws down the road.

CIV420 Construction Engineering Assignment #3

Assigned 03/10/31
Due 03/11/14

Group Members:

_____

_____

You and your partner were selected as the General Contractor on a job in a small northern Ontario town with limited transportation access. The town has a small population and limited construction supply outlets.

A considerable amount of formwork (i.e. gang forms) is required to complete the job. You have become aware of another Contractor completing a separate project in town. They are willing to sell you all their available lumber at a good price; you accept and purchase the following lumber:

- **¾" douglas fir plywood (7 plies);**
- **4" X 4" X 12' SPF (No. 2 grade), and**
- **4" X 6" X 10' SPF (No. 1 grade).**

After careful consideration, you decide that gang forms for a wall height of 2.8m and a form length of 4.0m require to be built. The concrete temperature is assumed to be 20^{8}C. Design the formwork (using equations), using the above available lumber, for a concrete placement of 2.0 m/h using a crane and bucket placement technique.

In addition, you may have the opportunity to pump the concrete on this job. Due to this, you estimate concrete placement to be increased to 3.5 m/h. Design the formwork for this condition using equations. Explain how this change effects your estimate?

Please show a sketch (using a straight-edge) of one of the formwork designs (plan and elevation views).

If the weather was cooler than expected when you designed the formwork, how could you compensate for the likely concrete temperature decrease?

State all assumptions during your analysis.

Dear Student,

Re: Design Project

As you know, this term you will be responsible for the design and presentation of a term project.

The requirement for your project will be to design a building, capable of providing housing for 50 average families at a chosen site in Toronto, Canada. The objective of this project is to design your building toward the goal of net-zero impact – leaving no impact of your building on the biosphere.

The project will study both technical and social implications of your design. Depending on your specific interests, you will decide to what degree your final design addresses specific aspects of sustainable design.

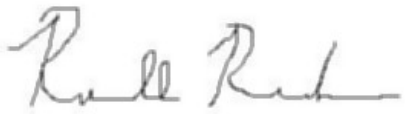
The pages contained in this package present the requirements and deliverables for your design. I have attempted to keep this project as open-ended as possible, however, given the fact that a tangible grade is required upon completion, some restraints have been introduced.

This project is intended to replace the traditional thesis within the department. As such, you should expect to work between 5 and 10 hours a week on your project until the end of term.

Please review the information contained herein carefully. I trust this is the information you require at this time. If you have any questions, you know how to reach me.

Good luck, have fun and learn along the way!

Regards,



Russell Richman, M.A.Sc., P.Eng.
President
RRCL

Overview of Design Project - Requirements

Your building will be one of several similar buildings located in a City of Toronto net-zero community proposed to be constructed in Leaside, near Eglinton Avenue and Laird Avenue (map attached). The area shaded is the allowable development area proposed for your building.

Assumptions Common to All Projects

Based on only the following two assumptions, you will be required to submit a conceptual building design, outlining all systems, materials, dimensions, etc. to be continued on for a final detailed design.

1. Average family size is 3.0 persons per family[4].
2. Use 1975 required living area of 325 square feet per person[5].

Deliverables

The following is a list of deliverables associated with your design project. Each deliverable is outlined further in attached documentation with details on objectives, requirements and due dates.

1. Literature Review
2. Photographic Essay
3. Proposal
4. Final Design Project Report
5. Final Design Presentation
6. Final Design Poster

Global Marking Scheme

The following table provides a breakdown for contribution of each deliverable to your overall final mark for you design project.

Description	Percentage
Literature Review	5%
Photographic Essay	5%
Proposal	15%
Final Design Project Report	60%
Final Design Project Presentation	10%
Final Design Project Poster	5%
Total	**100%**

[4] http://www40.statcan.ca/l01/cst01/famil40.htm
[5] http://www.hallidayhomes.ca/resource_docs/HH_BigIdeasSmallHomes_Paper_27-06-06_v3.pdf

Studio Work

Every second week I will meet with you on a one-on-one basis for approximately 15 minutes to discuss your progress and answer any questions. I expect you to have completed satisfactory levels of work for each meeting.

On weeks without meetings, you are expected to bring work related to your project to studio.

All rough work should be completed in a single, hard-cover laboratory style, notebook (or more, if required). You can purchase such a notebook at the book store. You will hand in your notebook(s) at the end of term for evaluation and supplementary analysis.

Your performance during studio work time, studio meetings and your notebook(s) will be the basis for this term's studio mark representing 9% of your final grade for this course.

Tentative Studio Schedule

Primary Meeting Time – Fridays 1-4 pm (Room TBD)
Secondary Meeting Time – Mondays 2-5 (Room TBD)

January 4	Design project intro
January 11	NO STUDIO (Conducted on Jan 4th)
January 18	Studio meetings (literature review due)
January 25	Studio work time (photo essay due)
February 1	Studio meetings
February 8	Studio work time
February 15	(proposal due)
February 22	NO STUDIO – READING WEEK
February 29	Studio work time (leap year!) Proposal Presentations
March 7	Studio meetings
March 14	Studio work time
March 21	Studio meetings
March 28	Final report presentations
April 8	FINAL REPORT DUE – REPORT POSTER DUE

CIV425Y DESIGN STUDIO – BUILDING SCIENCE & SUSTAINABLE BUILDINGS

Assigned: 1-4-2008 Due: 1-18-2008

Literature Review

You are required to submit a literature review summarizing key literature that you find interesting and will aid in your final design. This process is necessary to get you started and heading in the correct direction.

Your literature review should include a minimum of 15 references from academic sources (journals, text books, educational web-sites). You are required to read pertinent portions of these references and comment on their applicability to your preliminary design approach.

A literature review generally summarizes the information contained in the literature with some general added information, thoughts and critical analysis contributed by the author of the review – you.

The literature review should be between 5 and 10 pages (not including reference page(s)), single spaced text, Times New Roman 12 point font, with 1 inch margins on all sides.

Remember, the objective of this document is to start your design process and show that some research has been completed. The literature review will be graded based on the following:

- Applicability of references
- Summary of key points in the literature
- Contribution(s) by you

If you have any additional questions, the internet and our library have some excellent resources discussing literature reviews and their content. I recommend the following websites as a start:

http://www.utoronto.ca/writing/litrev.html
http://www.unc.edu/depts/wcweb/handouts/literature_review.html
http://library.ucsc.edu/ref/howto/literaturereview.html

CIV425Y DESIGN STUDIO – BUILDING SCIENCE & SUSTAINABLE BUILDINGS

Assigned: 1-4-2008 Due: 1-25-2008

Photograph Essay

You are expected to visit site at least once and document the topography, obstructions, existing buildings, etc. through a photographic essay.

I have brought in two samples of excellent photographic essays appearing in an award winning Canadian magazine. In general, photographic essays attempt to present a story told through images often accompanied by text captions.

The purpose of your photographic essay is to visit the proposed site and get a feel for the obstacles and benefits that may act to affect your design. As such, it is recommended that you have some preliminary design ideas to use as criterion when examining the site.

The photographic essay should consist of 8 to 16 photos of the site. Each photo should include a caption explaining the picture and giving the reader an idea to its overall relevance in your essay. No more than a page of single spaced text, 12-point font Times New Roman, should be included at the beginning of the essay to outline the scope, importance and key findings of your essay. Although part of your mark for this essay will be based on it's professional layout and presentation, **you are not required to print colour photos**, as I understand every student does not have similar access to such facilities.

Remember, your photographic essay is telling a story about the proposed site. Your photographic essay will be graded using the following criteria:

- Relevance of the photos to this project
- Effect of conveying key site features
- Presentation and grammar

CIV425Y DESIGN STUDIO – BUILDING SCIENCE & SUSTAINABLE BUILDINGS

Assigned: 1-4-2008 Due: 2-15-2008

Proposal

You are required to submit a proposed design for your project. Your proposal will outline your global design for your building. At this point in the design project, you are expected to have completed your initial queries and review. Your proposed design should represent your final project completed to approximately 40% to 60%. As such, I expect all the major decisions, such as materials, size, form, orientation, major systems, etc. to have been researched and chosen based on order of magnitude analysis.

The intent of your proposal is to present your design and gain feedback from both me and a panel of industry experts. As such, your proposal will comprise two components: a written component submitted to me and a presentation given to a select panel of experts in the field of building science, sustainable buildings and construction.

Your final grade for the proposal portion will be equally split between the written component and presentation.

Written Component

Your written proposal will consist of a maximum of 10 pages, single spaced, Times New Roman 12-point font (not including title page and any appended data, if required). Your proposal will be graded based upon and should include the following:

- List of all materials
- List of major systems (HVAC, walls, roofing, windows)
- List of additional energy savings/efficient systems (such as wind turbines, waste water diversion, etc.)
- Building shape, form and orientation
- Chosen computer program to complete energy analysis (refer to Design Report)
- Justification of all choices presented above
- Your chosen detailed design aspects to be further analyzed and designed for your final project submittal

Presentation

You will present your global design in a 10-minute presentation, power-point format, to a panel of industry experts for critical review. A 5-minute question period will follow your presentation in which you will be graded based on your responses.

The panel is interested in your global design and key aspects of your building. You should outline what you have done and why you have chosen it. Some detail may be presented, although it must be carefully placed and delivered so not as to bore your audience. Remember, they will be sitting through 3 hours of presentations. In addition to being professional and informative, your presentation should be entertaining in a way to captivate your audience and stimulate academic discussion following it's conclusion.

CIV425Y DESIGN STUDIO – BUILDING SCIENCE & SUSTAINABLE BUILDINGS

Assigned: 1-7-2008 Due: 4-8-2008

Final Design Project Report

Your report will present your final design in detail through inclusion of the following aspects that are listed below and described in greater detail in the following sub-sections:

- Design Summary (text component)
- Detailed Design
- Drawings
- Computer Energy Analysis
- Cost Comparison
- Course Feed Back

Design Report Marking Scheme

The following table provides a breakdown for contribution of each component to your overall final mark for you design project report.

Description	Percentage
Design Summary	40%
Detailed Design	20%
Drawings	10%
Computer Energy Analysis	20%
Cost Comparison	10%
Course Feed Back	0%
Total	**100%**

Design Summary (Text Component)

An imperative component of your final design project report is the design summary. In this summary, you will include a detailed description of the overall design (hint…working diligently on your proposal will reduce the required time spent on this portion of the summary). This description is focused on the global design of your building.

In your summary, you want to convey why specific decisions were made, using academic references and sample calculations, where applicable. Your summary should be a full-circle, with minimal holes or unexplained dead-ends. It is critical that you address each decision made and it's relative importance to the overall design.

Your summary should be no longer than 25 pages, single spaced, Times New Roman 12-point font, with 1-inch margins on all sides, including all figures, tables and pictures. This does not include the cover page or table of contents, etc. It must be stressed that you are not required to use all 25 pages. Some of the best dissertations in modern history have been completed in under 100 pages. Extraneous information used as filler will serve to reduce your final grade. Content should be included in a thoughtful, efficient manner.

Detailed Design Aspects

You are required to choose three aspects of your final design and continue to design these in detail. For example, the building envelope, roofing, waste water system, etc. As a minimum requirement, two of these aspects must be deemed technical and quantifiable. Your final list of aspects must be approved by me and be included in your proposal.

The detailed design of these components must be completed in it's entirety in the sense that a contractor should be able to take your information and construct, develop it. As such, your detailed design must be supported by calculations and/or assumptions and detailed analysis. Where applicable, detail drawings presenting your final design must be included.

Drawings

Your final design project must include, at a minimum, plan and elevation drawings showing building layout, geometry, orientation and major systems.

These drawings should be completed using a CAD type drawing program (such as AutoCAD) and in an architectural style. Final submission of these drawings should be in half-size or 11"X17" format.

Computer Energy Analysis

As part of your final report, you are required to complete a computer energy analysis of your building using an industry accepted software package such as eQUEST, Energy10, EnergyPLUS or any other approved by me.

Your analysis should present the energy consumption of your building in Toronto's climate or one similar. Your final value should be an energy usage per square meter of floor area in your building.

Any and all assumptions used in your analysis should be listed and verified.

Cost Comparison

You are required to research and calculate the relative increased cost of your design compared to a building of similar shape and form, using traditional materials and techniques.

Many references, such as Yardsticks or the Mean's guide can provide a square foot cost for a standard building type similar to your final design.

Your cost analysis is to calculate the incremental cost associated with your energy reducing and energy efficient design.

Once again, the final value should be a cost per square meter of floor area in your building.

Any and all assumptions used in your analysis should be listed and verified.

Course Feed Back

In a separate, sealed envelope, you will provide a one page summary of your experience in this course. In addition to any praise for this course (if any), I would appreciate you providing constructive criticism in which the course (as taught by me) can be improved.

You have my promise that I will not look at these pages until your final mark has been submitted to ROSI and cannot be altered (not that you have anything to worry about…just to ensure complete fairness for all).

CIV425Y DESIGN STUDIO – BUILDING SCIENCE & SUSTAINABLE BUILDINGS

Assigned: 1-7-2008 Due: 3-28-2008

Final Design Project Presentation

A twelve minute presentation of your final design in Power Point format will be given to your classmates and potentially additional university and industry members.

Your presentation should be informative, professional and outline the philosophy, merits and possible drawbacks associated with your design.

CIV425Y DESIGN STUDIO – BUILDING SCIENCE & SUSTAINABLE BUILDINGS

Assigned: 1-7-2008 Due: 3-28-2008

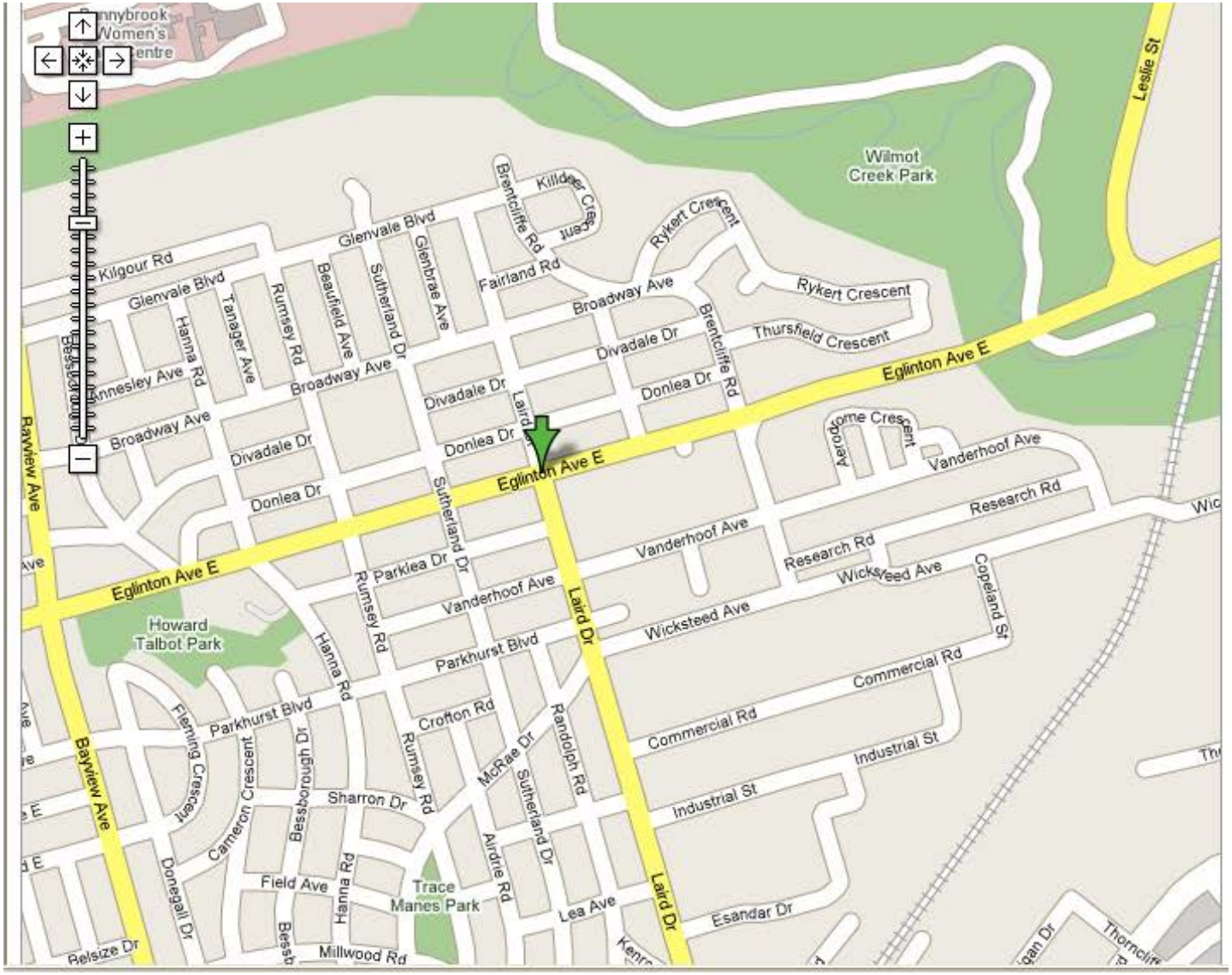
Final Design Project Poster

You are required to prepare a poster type presentation of your final design. This component is common across all sections of CIV425.

More information on this requirement to follow.

Area Maps


Aerodrome Crescent
Thomas Elgie Dr
Aerodrome Crescent
Brian Peck Crescent
Vanderhoof Ave
Proposed Site
Vanderhoof Ave
Research Rd
Research Rd
Research Rd
Clarke St
Wicksteed Ave
200 ft
100 m
©2007 Google - Imagery ©2007 DigitalGlobe, First Bas


Wilmot Creek Park
Leslie St
Glenvale Blvd
Killdeer Crescent
Brentcliffe Rd
Rykert Crescent
Kilgour Rd
Fairland Rd
Broadway Ave
Thursfield Crescent
Divadale Dr
Donlea Dr
Eglinton Ave E
Hanna Rd
Tanager Ave
Rumsey Rd
Beaufield Ave
Sutherland Dr
Glenbrae Ave
Annesley Ave
Bessborough Dr
Laird Dr
Aerodrome Crescent
Vanderhoof Ave
Research Rd
Wicksteed Ave
Copeland St
Commercial Rd
Industrial St
Parklea Dr
Parkhurst Blvd
Howard Talbot Park
Bayview Ave
Fleming Crescent
Cameron Crescent
Sharron Dr
Crofton Rd
McRae Dr
Randolph Rd
Airdrie Rd
Field Ave
Trace Manes Park
Lea Ave
Esandar Dr
Donegall Dr
Belsize Dr
Millwood Rd

4.3 Sample Final Exams

_____

Family Name, Given Name (please print)

RYERSON UNIVERSITY
Building Science Graduate Program

BL8101 - Building Envelope Systems

Final Exam

Time: 2 Hours

Total Marks: 100

December 11, 2017

Examiner: R. C. Richman

Make and state any reasonable assumptions

Answer all questions on this examination package

Marks
25 Total
10 @ 2.5)

QUESTION 1:

a) Briefly explain how connectivity and porosity play a role in a hygroscopic material's ability to store moisture.

b) Briefly explain why saturated materials are poor insulators.

c) Briefly explain why winter condensation may not always be detrimental for a building envelope assembly.

d) What is the difference between a vapour retarder and a vapour barrier?

e) Why is it beneficial to keep your structure warm in a building enclosure?

QUESTION 1 (CONT'D)

f) With respect to the crack flow (or orifice flow equation) for estimating air leakage, briefly explain which variable does not change when testing the same sample at various different times.

g) Briefly explain the differences Uedge and Ucog.

h) What are the two most common water leak locations in curtain walls?

i) Briefly explain how you assess durability risk for enclosures when using WUFI.

j) Briefly explain the difference(s) between simulating for ‘energy loss’ versus ‘condensation analysis’ when using THERM or a similar program.

Marks 20 (total)

QUESTION 2

a) A wall assembly with a vented brick masonry veneer is as follows:

- Metal cladding
- Fully vented air cavity (25 mm)
- High density mineral wool insulation (100 mm)
- Plywood (15 mm)
- (Average) density mineral wool insulation (89 mm)
- 6 mil polyethylene sheeting
- Gypsum wall board (12.5 mm)

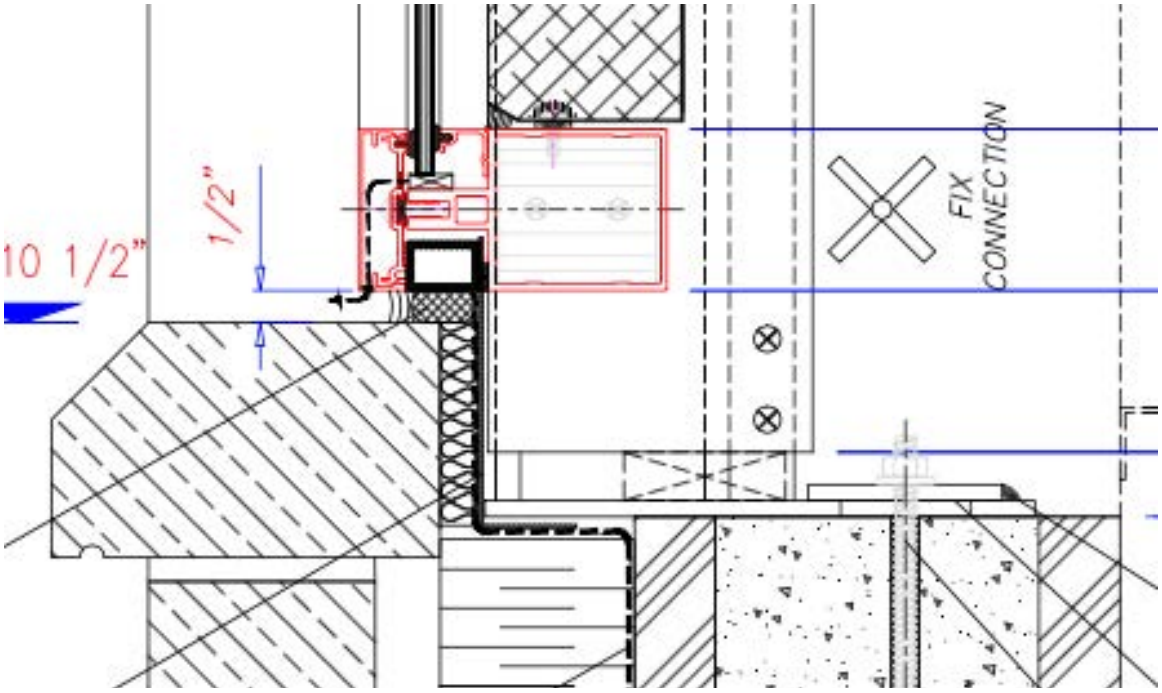
Condensation has formed on the outboard side of the polyethylene sheeting. Calculate the minimum ventilation rate required in the brick veneer cavity to optimally remove the condensation. The average exterior conditions during the dry out period are -2 C and 70% RH. How would you alter this assembly to prevent the condensation problem? Use illustrative calculations and sketches to prove your point(s).

QUESTION 2 (CONT'D)

Marks QUESTION 3
30 (Total)

a) An indoor swimming pool has been constructed as a separate building at a ski chalet complex near Ottawa, Ontario (45 degree N latitude). The pool building has a full height stick curtain wall system (3.0 m high) which include standard sealed double glazed units. The indoor air is at 26 C and 60% RH.
10 and the mean daily outdoor conditions in January are -10C and 85% RH. The windows have an over all thermal resistance of 0.30 m^2K/W. Comment on the choice of this window installation for this project and suggest a single alternative. Back-up your choice with sample calculations and illustrations

b) The spandrel detail below represents an average horizontal mullion for this project below the vision units.
5 Mark-up the detail highlighting key aspects needed for this system to succeed.



QUESTION 3 (CONT'D)

c) The owner complains to you that water and even ice often "fogs" the windows in the pool building. The water is also causing corrosion of the steel curtain wall framing at the bottom of the panels. In order to reduce the heat losses and the incidence of condensation, the owner has been advised to install operable insulated shutters (R = 2.5 m^2K/W) on the inside of the glass curtain walls. The owner asks you, "Shouldn't the shutters go on the outside of the glass curtain walls?" Using your technical building science knowledge and providing some numerical proof, you explain… 10

d) Now, assume that the owner does not want to block “the view” with insulated shutters. Suggest two ways in which condensation problems can be alleviated while still maintaining the “the view”. Explain the reasoning behind your choices and provide numerical justification.

Marks 25 (Total)

QUESTION 4

The following wall assembly is proposed for use in a walk-in cooler, located in Toronto. The walk-in cooler will be run continuously at 4C and 80% RH. The client particularly wants to know whether the 6-mil PE membrane is required. What is your recommendation for the wall assembly? What changes, if any, would you recommend and why (or why not?) Describe the process and tools required to support your answer with quantitative analysis. What problems do you foresee and how would you navigate them. Make and state any assumptions you need. Use sketches and illustrative calculations to support your answer.

Material	Thickness [inch]	Density [1b/ft³]	Heat Capacity [Btu/lb. °F]	Thermal Conductivity [Btu/hr. lb. °F]	Permeance [Perm]
Metal Cladding	0.04	8.1	0.55	1.33	0.002
JM PEBS Blanket Fibre Glass	6.0	1.9	0.20	0.026	99.077
Syseal Fabric	0.04	8.1	0.55	1.33	1.0
Air Layer	6.0	0.08	0.24	0.54	1840
PE-Membrane	0.04	8.1	0.55	1.33	0.07
Mineral Wool Batt Insulation	3.5	4.6	0.20	0.02	107.3
Plywood (USA)	0.6	29.3	0.50	0.049	1.5
FRP membrane	0.04	8.1	0.55	1.33	0.75

QUESTION 4 (CONT'D)

QUESTION 4 (CONT'D)

_____

Family Name, Given Name (please print)

RYERSON UNIVERSITY
Architectural Science Undergraduate Program

BSC822 – Advanced Envelopes/Components

FINAL EXAM

Time: 2 Hours

Total Marks: 100

THERE ARE 3 QUESTIONS ON THIS EXAM

April 25, 2017

Professor R. C. Richman

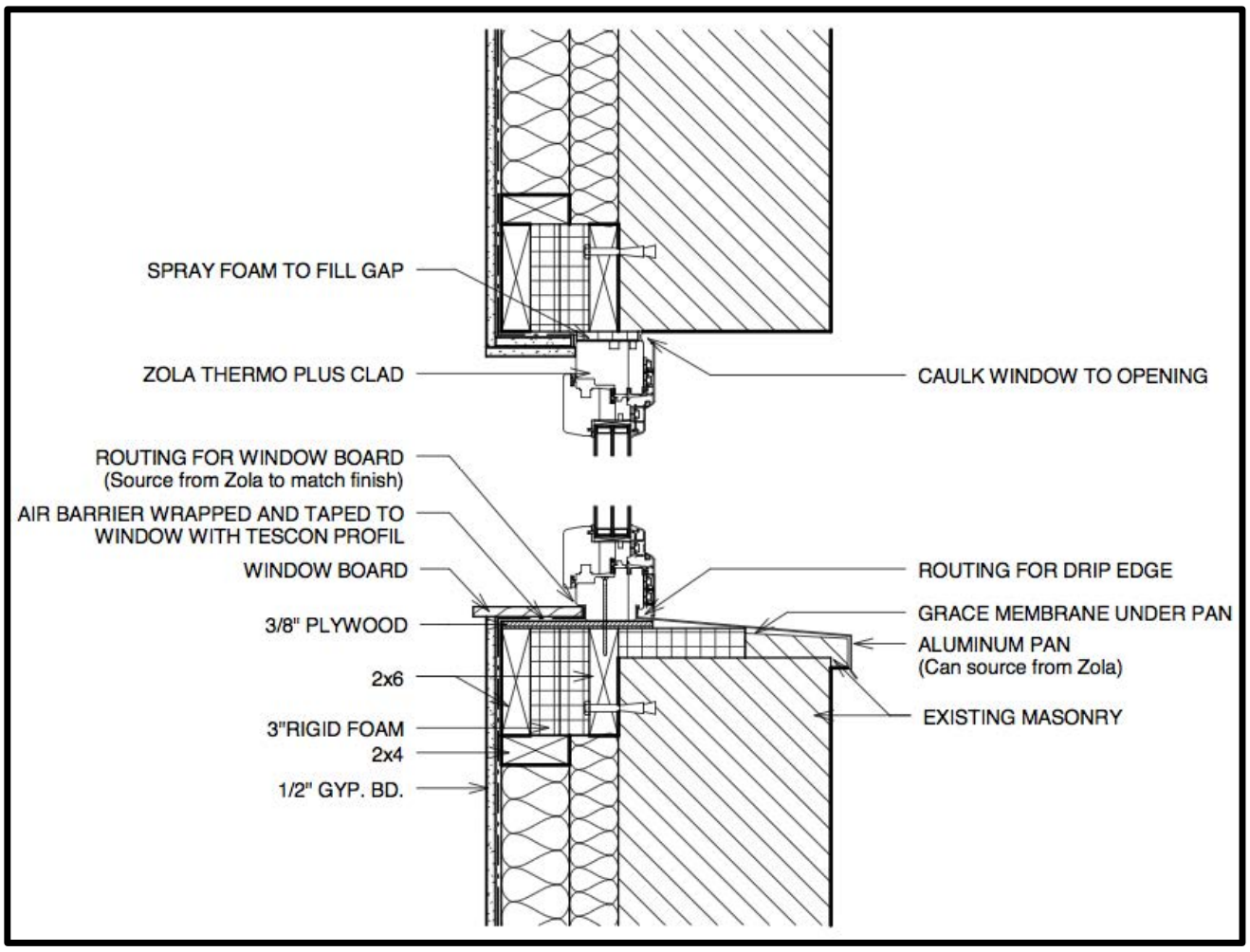
Make and state any reasonable assumptions

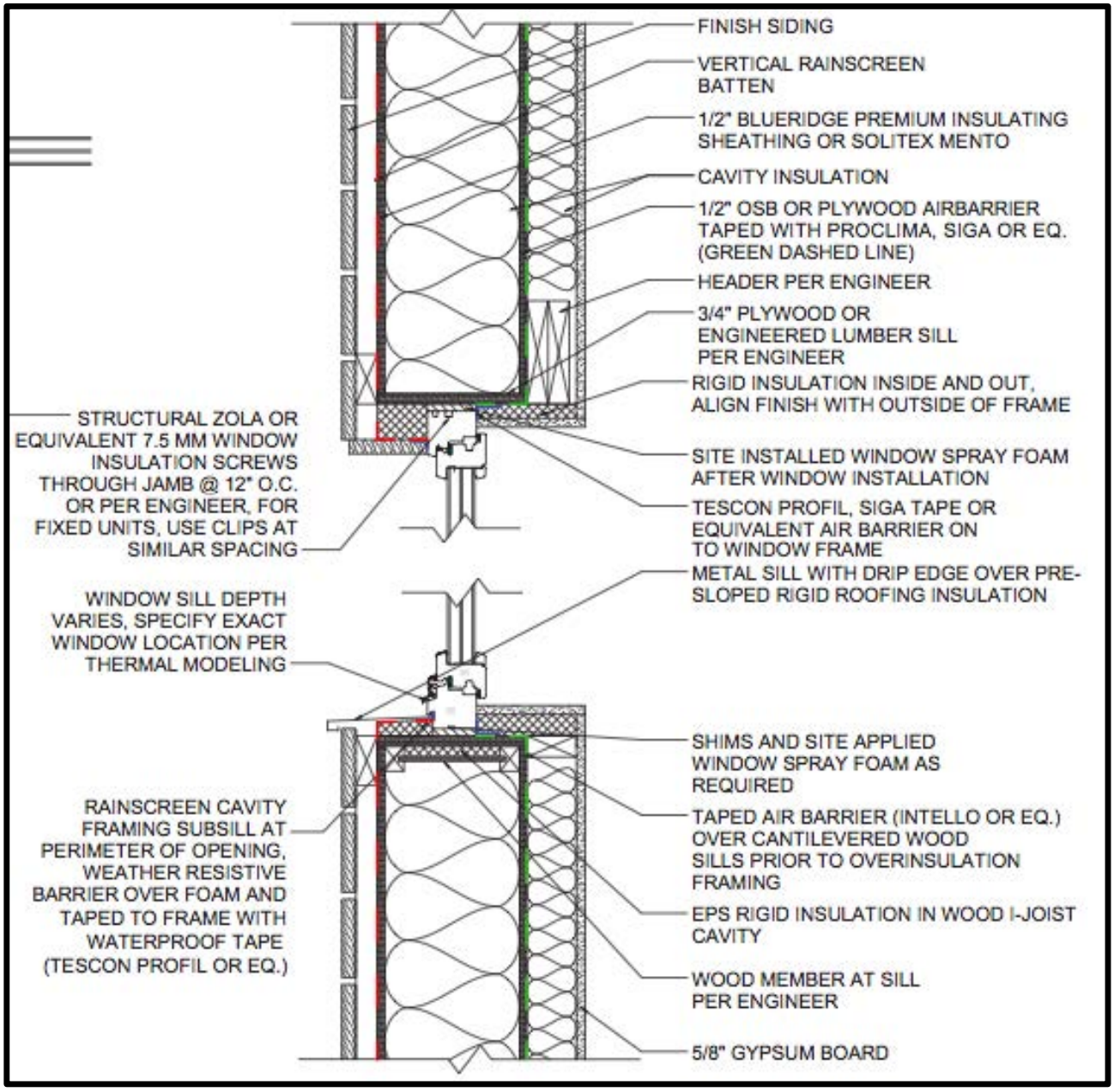
Answer all questions on these pages

(You are encouraged to use graphics and calculations to support all answers)

QUESTION 1

30 A client comes to you with two window installation details for you to evaluate for an upcoming project. Discuss the advantages and drawbacks of each detail. Which detail would you recommend and why? What steps would you have to complete to in order to fully evaluate these details (be specific)? The client wants a general understanding of you recommendation NOW! Using these drawings, what conclusions, both qualitative and quantitative can you come to about the proposed window and/or walls and/or installation? What would you keep? What would you change? You have the final say in this design. Use your building science and architectural knowledge to its highest capacity.

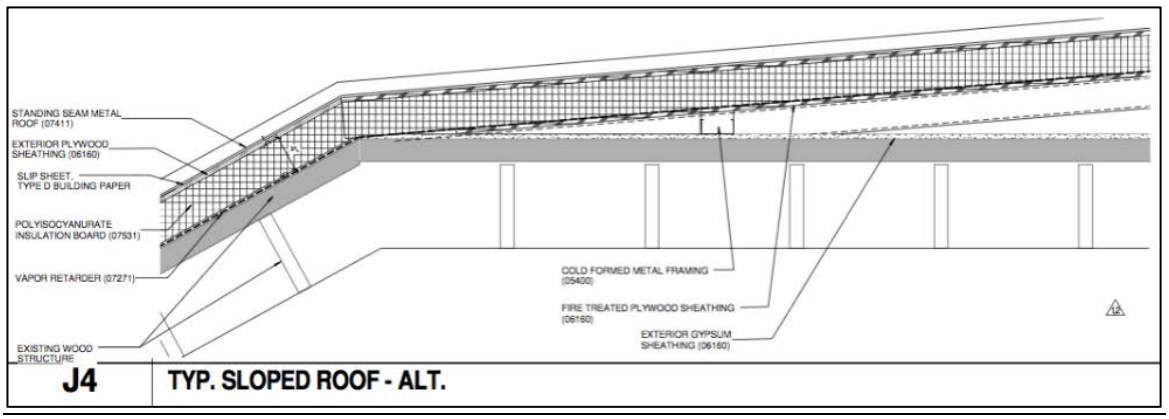



FINISH SIDING
VERTICAL RAINSCREEN BATTEN
1/2" BLUERIDGE PREMIUM INSULATING SHEATHING OR SOLITEX MENTO
CAVITY INSULATION
1/2" OSB OR PLYWOOD AIRBARRIER TAPED WITH PROCLIMA, SIGA OR EQ. (GREEN DASHED LINE)
HEADER PER ENGINEER
3/4" PLYWOOD OR ENGINEERED LUMBER SILL PER ENGINEER
RIGID INSULATION INSIDE AND OUT, ALIGN FINISH WITH OUTSIDE OF FRAME
STRUCTURAL ZOLA OR EQUIVALENT 7.5 MM WINDOW INSULATION SCREWS THROUGH JAMB @ 12" O.C. OR PER ENGINEER, FOR FIXED UNITS, USE CLIPS AT SIMILAR SPACING
SITE INSTALLED WINDOW SPRAY FOAM AFTER WINDOW INSTALLATION
TESCON PROFIL, SIGA TAPE OR EQUIVALENT AIR BARRIER ON TO WINDOW FRAME
METAL SILL WITH DRIP EDGE OVER PRE-SLOPED RIGID ROOFING INSULATION
WINDOW SILL DEPTH VARIES, SPECIFY EXACT WINDOW LOCATION PER THERMAL MODELING
SHIMS AND SITE APPLIED WINDOW SPRAY FOAM AS REQUIRED
TAPED AIR BARRIER (INTELLO OR EQ.) OVER CANTILEVERED WOOD SILLS PRIOR TO OVERINSULATION FRAMING
RAINSCREEN CAVITY FRAMING SUBSILL AT PERIMETER OF OPENING, WEATHER RESISTIVE BARRIER OVER FOAM AND TAPED TO FRAME WITH WATERPROOF TAPE (TESCON PROFIL OR EQ.)
EPS RIGID INSULATION IN WOOD I-JOIST CAVITY
WOOD MEMBER AT SILL PER ENGINEER
5/8" GYPSUM BOARD

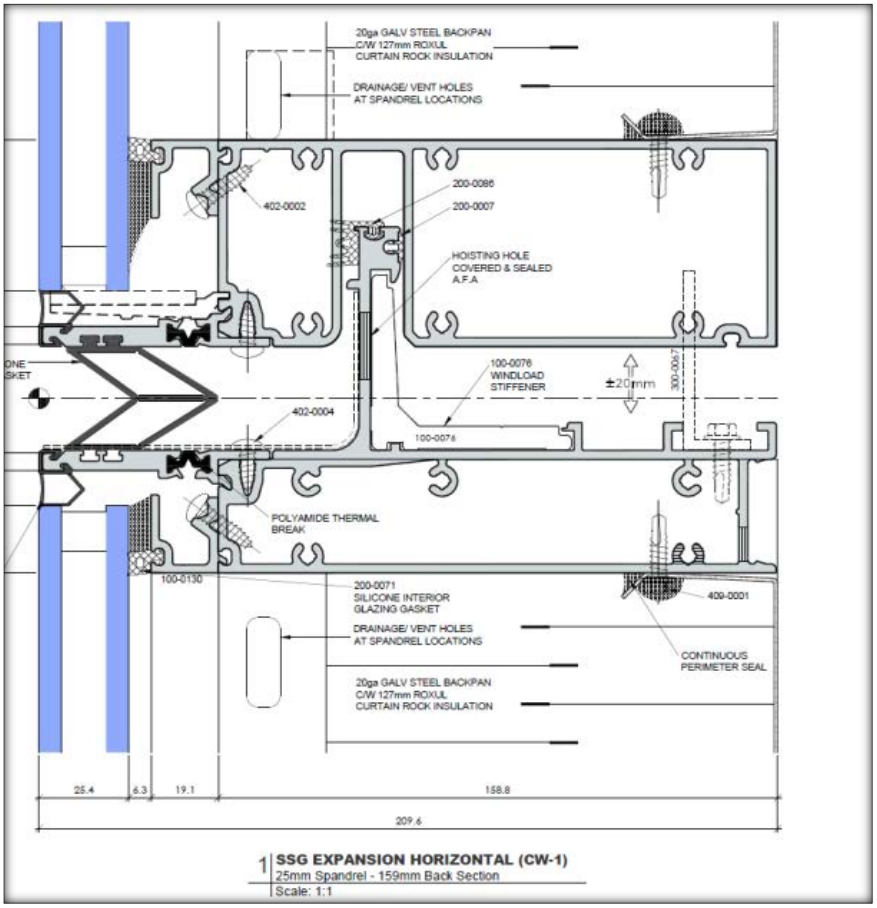
QUESTION 2

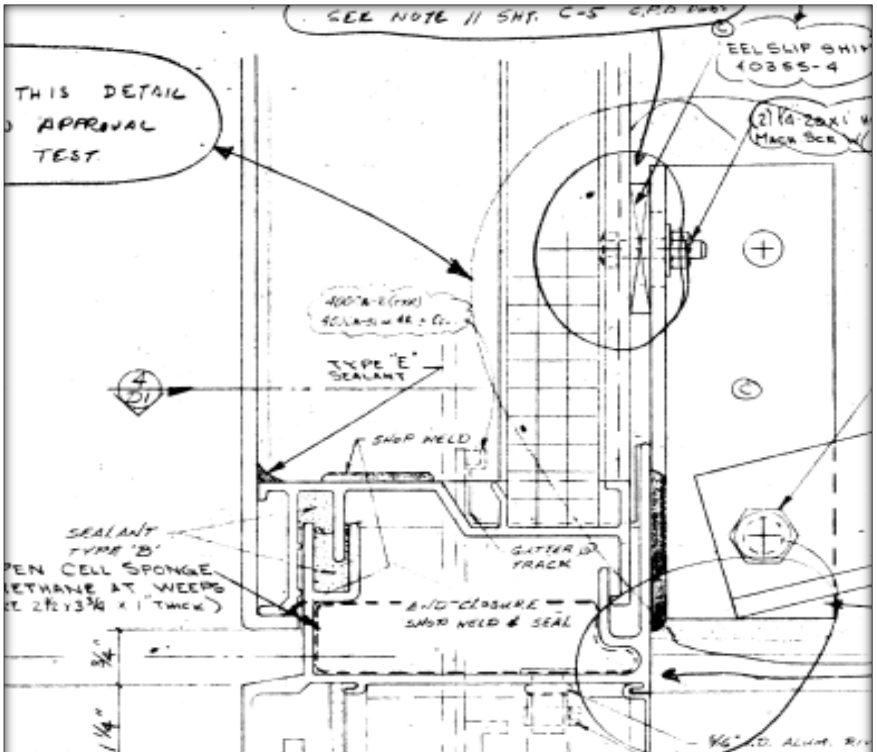
(A) Using sketches and text as a minimum, explain what happened to this Zinc standing seam metal roofing.

15



15 (B) On the next page is a first generation and modern unitized curtainwall system detail. Using your knowledge gained in this course, describe the differences, benefits and disadvantages between the two systems.





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Family Name, Given Name (please print)

RYERSON UNIVERSITY
Building Science Graduate Program

BL8100 - Building Science Theory

Final Exam

Time: 2 Hours

Total Marks: 100

December 9, 2011

Examiner: R. C. Richman

Marks
25 Total
(10 @ 2.5)

QUESTION 1:

f) Briefly explain why 0.15mm polyethylene sheeting can best be described as a vapour retarding membrane as opposed to a vapour barrier.

g) Briefly explain why minor flaws in air barriers can lead to serious problems in buildings in cold climates.

h) Briefly explain why the under-side of wood roof sheathing in Toronto may not necessarily decay if it is exposed to winter condensation.

i) Briefly state the conditions necessary for sun-driven moisture to appear on the outboard face of a polyethylene vapour retarder.

j) Briefly explain how my basement can be cold both in the winter and in the summer.

QUESTION 1 (CONT'D)

k) Briefly explain why electrically heated homes may experience more moisture problems than homes heated with a conventional, chimney-vented, gas furnace.

l) Briefly explain the role of adsorbed moisture in vapour transport within porous materials.

m) Briefly explain why most windows installed in a cold climate are net-energy losers.

n) Briefly explain why many old rural farm homes that were built in the 1800's in Ontario have very few north facing windows.

o) Briefly explain why it is more important to have a continuous air barrier than a continuous thermal insulating plane.

Marks QUESTION 2

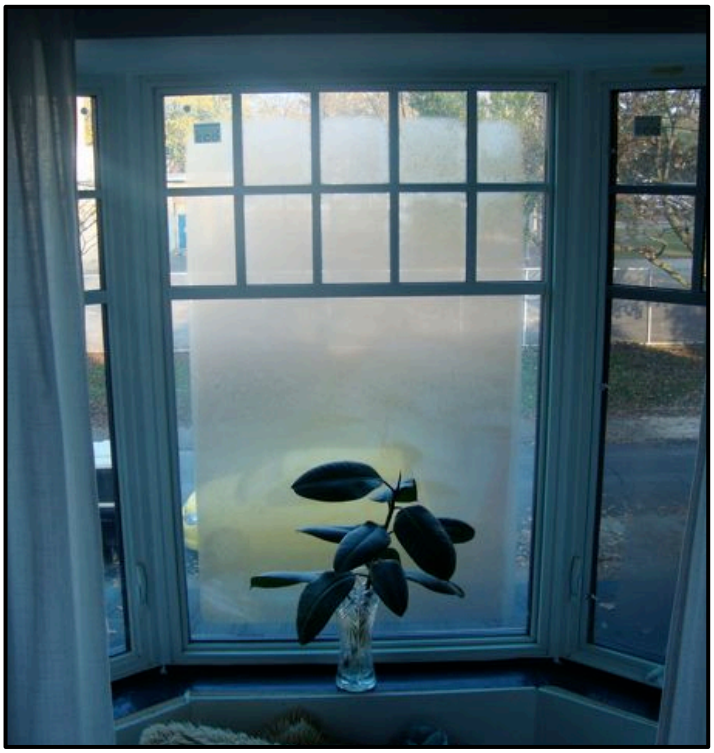
30 (total)

b) You wake up one morning and observe the fogging pattern below on the majority of your glazing around your low energy house. The dwelling is located in downtown Toronto. The windows are 'high performing' employing glazing with a centre of glass R-value of 14.3 and fibreglass framing components. The dividers are architectural only (i.e. fake!) an non-continuous through the glazing.. Upon closer inspection, you observe the fogging to be on the exterior side of the exterior pane of glass. Explain in detail why you are observing this fogging pattern. As a minimum you should:

15

- discuss the heat transfer mechanisms responsible for this phenomenon.
- explain what time of year this is.
- explain the interior and exterior climate conditions necessary overnight to cause this phenomenon.
- explain why this pattern is hardly ever witnessed with 'standard' windows.

Use quantitative (i.e. calculations) and qualitative approaches to justify your conclusions.



QUESTION 2 (CONT'D)

QUESTION 2 (CONT'D)

c) An indoor swimming pool has been constructed as a separate building at a ski chalet complex near Ottawa, Ontario (45 degree N latitude). The pool building has full height glass curtain walls (3.0 m high) which have been constructed using standard sealed double glazed units. The owner complains to you that water and even ice often "fogs" the windows in the pool building. The water is also causing corrosion of the steel curtain wall framing at the bottom of the panels. In order to reduce the heat losses and the incidence of condensation, the owner has been advised to install operable insulated shutters ($R = 2.5\ m^2K/W$) on the inside of the glass curtain walls. The owner asks you, "Shouldn't the shutters go on the outside of the glass curtain walls?" Using your technical building science knowledge and providing some numerical proof, you explain… 9

d) Now, assume that the owner does not want to block "the view" with insulated shutters. Suggest two ways in which condensation problems can be alleviated while still maintaining the "the view". Explain the reasoning behind your choices and provide numerical justification. 6

Marks QUESTION 3

15 (Total)

Your professor recently decided to install an energy recovery ventilator (ERV) in his 'low energy house.' The rated sensible and latent heat transfer efficiencies are 96% and 65% respectively.

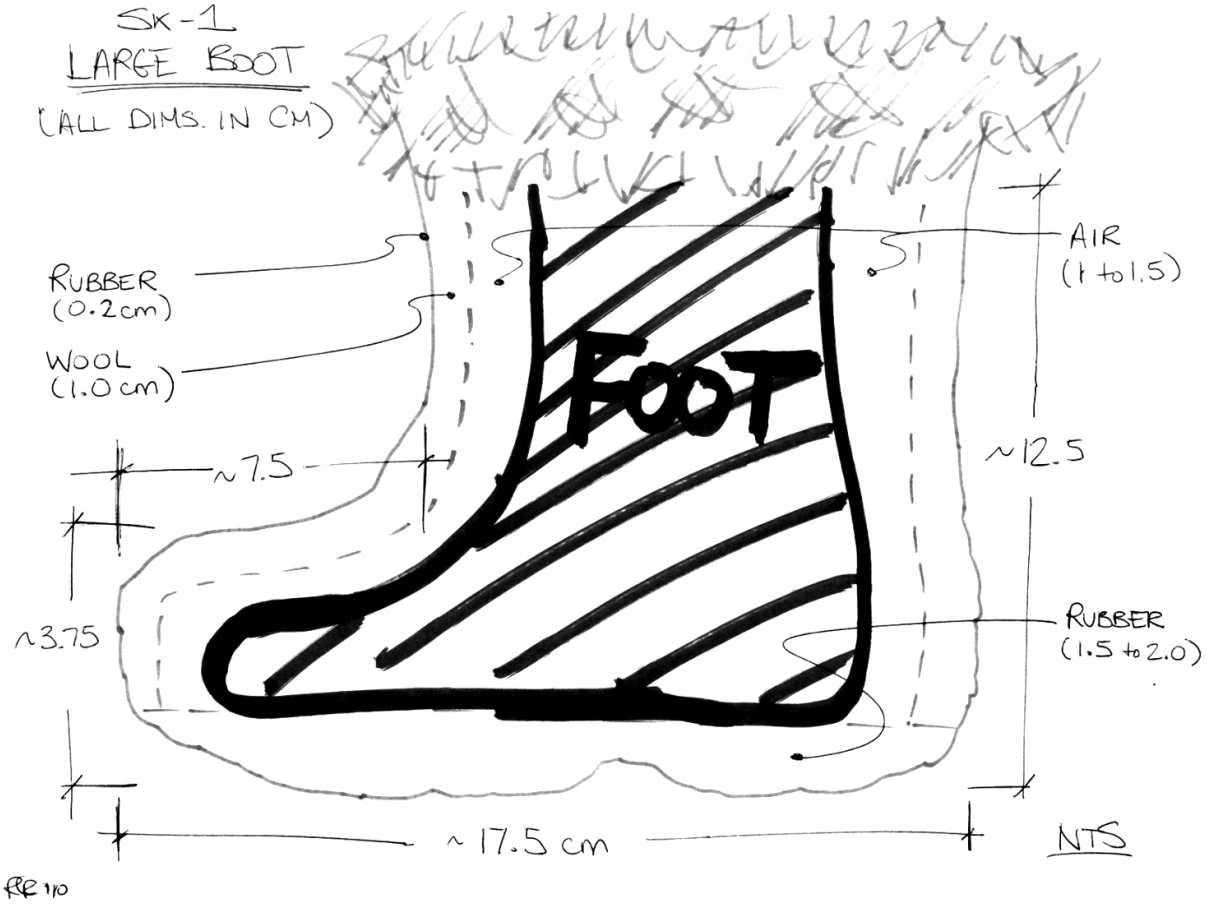
8 a) Calculate the overall energy transfer if your indoor conditions are 21C and 45% and the outdoor conditions are -5C and 90%. The flow rate of the unit at this time is assumed to be 120 CFM (cubic feet per minute).

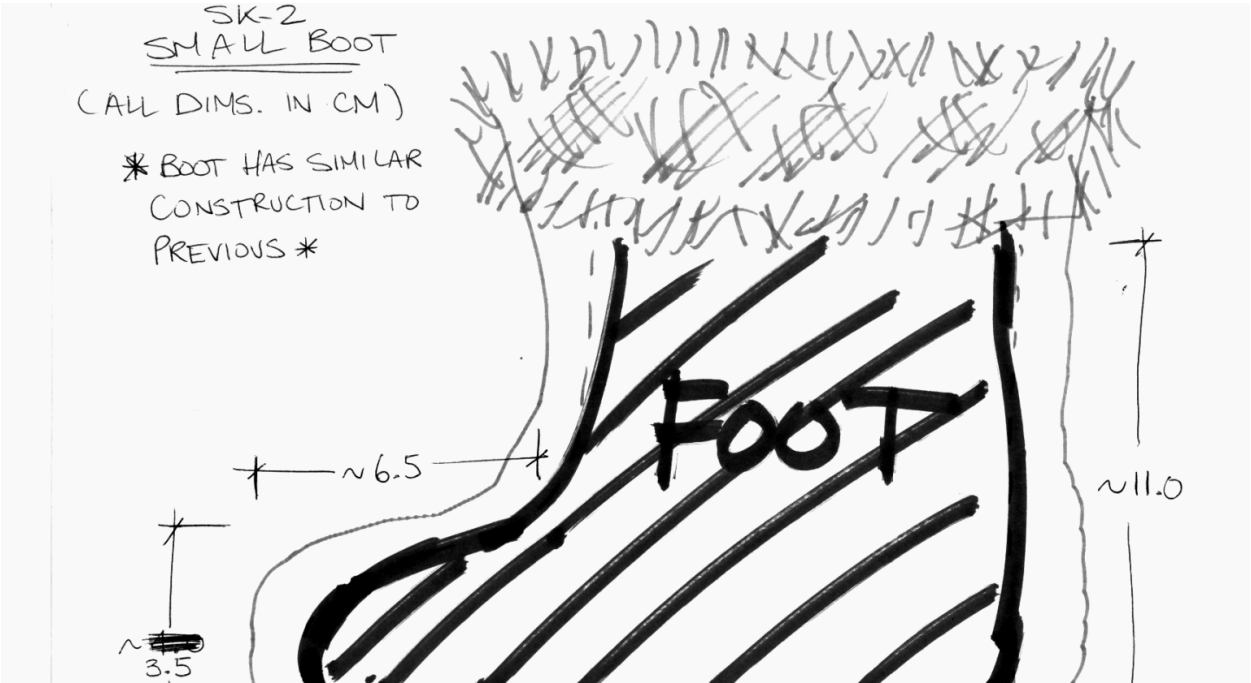
7 b) Assuming the above conditions remain constant, calculate how long it will take to remove 1 kg of moisture from the interior space.

Marks QUESTION 4

30 (Total)

a) Your professor has a problem. His youngest child's winter boots are a size too small or a size too big. He doesn't get paid enough to buy a new pair that fit. He's planning on taking the kids tobogganing and wants his youngest child's feet to stay warm. Should he use the smaller boots or the larger boots as depicted below?





Estimate the overall thermal resistance of each boot. Which boot should your professor use from a thermal perspective? Assume his youngest child's foot is at a constant surface temperature of 38 °C and the exterior temperature is -5 °C.

b) A sealed double-glazed window unit that measures 1.0m by 1.0m is tested in a climate simulator. The window is installed in between the warm and cold rooms and is subdivided into 16 quadrants each measuring 250mm by 250mm. Thermocouples are placed on the warm side face of the window at the geometric centre of each quadrant (represented by the dots). The warm room and cold room temperatures in the climate simulator are held constant at 23°C and -5°C. Shown in the figure below are the thermocouple readings.

7.5 i. Using the temperature observations above, estimate the "R" value (over-all thermal resistance including air films) of the window.

• 12.1	• 12.5	• 12.5	• 12.1
• 11.6	• 12.2	• 12.2	• 11.6
• 10.5	• 11.5	• 11.5	• 10.5
• 9.1	• 9.6	• 9.6	• 9.1

ii. A guarded hot box, a device for measuring heat flow, measures 1.0m by 1.0m by 0.5m deep. It is placed over and completely covers the warm-side of the test window. The cold room is set to -20°C. Using an electric heater, the guarded hot box is maintained at 23°C and the warm room is maintained at this same temperature as well. These conditions are sustained for 10 hours. After these 10 hours of testing, a metre wired to the electric heater inside the guarded hot box reveals that 1.344 kWh of electricity were used during the 10 hour test. Using this metre reading, estimate the "R" value of the window.

7.5

_____

Family Name, Given Name (please print)

RYERSON UNIVERSITY
Architectural Science Undergraduate Program

ASC200 – Sustainable Practices

Final Exam

Time: 2 Hours

Total Marks: 100

April 26, 2010

Examiner: Professor R. C. Richman

Marks QUESTION 1: SHORT ANSWER QUESTIONS
20 Total
(10 @ 2)

k) Discuss the difference between an air barrier and a vapour retarder.

l) In an LCA, what is the functional unit?

m) How can density be worked into sustainable practices?

n) Why is “reduction of consumption” such a cardinal rule in sustainable practices?

o) Describe the function of an HRV.

p) What is a daylighting factor? Generally, how is it applied?

q) How do provincial electricity generation mixes play a roll in sustainable practice?

r) Why should you ALWAYS take your shoes off before entering a home?

s) What are the common sources for grey water recovery in a house?

t) Describe the difference between 'low energy' and 'green buildings'.

Marks QUESTION 2: MEDIUM ANSWER QUESTIONS
40 Total
(8 @ 5)

a) List the five Axioms of Sustainability in your own words.

b) What is an RSI value? Describe how does it support sustainable design of buildings? Use an example to back up your argument.

c) Who is Matthew Simmons and what was his message?

d) List three separate passive design strategies and show how all three interrelate to each other.

e) List three different heating system options that one could specify for a house in downtown Toronto undergoing a full renovation. Describe the differences between each system. Which system would you recommend as the best option? Explain your choice.

f) In Toronto's climate, would you rather focus your design on maximizing daylighting or minimizing heat loss? Explain your choice.

g) Mr. Christopher Phillips mentioned humans as being a vessel. Explain what was meant by this analogy. Use specific examples from his lecture to support your explanation.

h) List three standards commonly used to design low energy and/or green buildings. Briefly explain the main differences between each standard.

QUESTION 3: LONG ANSWER QUESTIONS
40 Total
(2 @ 20)
Answer the following questions in written, essay format.

e) In your own words, outline and discuss Efficient Resource Design. List specific examples to support your explanation of strategies, concepts and terms comprising efficient resource design.

f) You have landed a summer job at The Ryersonian. Your first assignment is to write a written piece on ASC200 that is geared to a technical audience. The main question you answer is "What is ASC200 about and how could this course assist me as an architect". Please complete this task below…

5 The Role in Curriculum and Instructional Developments

5.1 Development of the Graduate Program in Building Science

DEVELOPMENT…From the first year of the program in 2008, I have played a role in the development of this graduate program through regular meetings, strategy sessions and long-term visioning.

CURRICULAR REVIEW…I was a member of our first Periodic Program Review committee. As part of this, I was instrumental at initiating the foundation for curriculum review in our program.

STRUCTURAL CURRICULAR CHANGES…I am a member of a committee to analyze major structural changes to the graduate program in building science. We are reviewing whether to add and additional term to the program completion requirements and whether a current P/F Major Research Project milestone should be removed from the curriculum.

5.2 Guest Lectures

I have organized several guest lectures as part of my undergraduate and graduate courses, including:

Matthew Bowick, LCA expert (ASC200 – 2009, 2010)
Marianne Touchie, Green Rating Systems (ASC200 – 2009, 2010, 2011)
Steven Gray, Sustainable Construction (ASC200 – 2011)
Chris Philips, Healthy Construction (ASC200 – 2009, 2010, 2011)
Christian Cianfrone, Low-impact Mechanical Design (ASC200 – 2009)
Adam Cohen, Passive House Builder (BL8100 – 2011, 2012)
Mike Wilson, Building Science Specialist/Consultant (BL8100 – 2012)
Alex Lukachko, RDH Building Science Consultants (BSC822 – 2014, 2016, 2017)
Duncan Rowe, RJC Building Envelope Consultants (BSC822 – 2014, 2016, 2017
Paul Pasqualini, Engineering Link (BSC822 – 2014, 2016, 2017)

5.3 Public Presentations

I have organized several guest presenters at the departmental level, including:

Peter Love, Ontario's First Chief Energy Efficiency Officer, 2016
Mark Carver, NRC Scientist, 2017
David Ricketts, President of RDH Building Consultants, 2015-2017

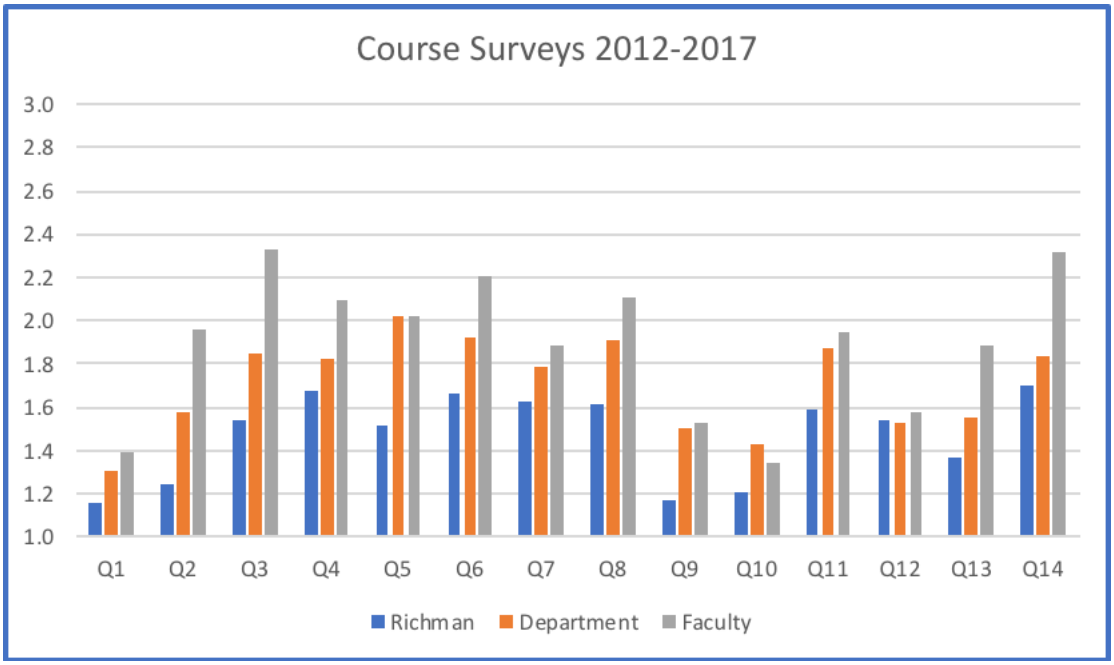
6 Faculty Course Survey Results

6.1 Summary of Last Five Teaching Years (2011/2012 to 2017/2018)

The following Figure shows my course survey results to be consistently better at both the departmental and faculty levels.

Legend

Q01. The instructor is knowledgeable about the course material. *(1=Agree, 5=Disagree)*
Q02. The course material is presented with enthusiasm. *(1=Agree, 5=Disagree)*
Q03. The instructor stimulates my interest in this subject. *(1=Agree, 5=Disagree)*
Q04. Concepts are clearly explained with appropriate use of examples. *(1=Agree, 5=Disagree)*
Q05. I get timely feedback on my assignments. *(1=Agree, 5=Disagree)*
Q06. I get constructive feedback on my assignments. *(1=Agree, 5=Disagree)*
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. *(1=Agree, 5=Disagree)*
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. *(1=Agree, 5=Disagree)*
Q09. Students are treated with fairness and respect. *(1=Agree, 5=Disagree)*
Q10. The class meets as scheduled and on time. *(1=Agree, 5=Disagree)*
Q11. The course is well organized and managed. *(1=Agree, 5=Disagree)*
Q12. The instructor is available for consultation as specified on the course handouts/ postings. *(1=Agree, 5=Disagree)*
Q13. This course provides a valuable learning experience. *(1=Agree, 5=Disagree)*
Q14. The way this course is taught helps me to learn. *(1=Agree, 5=Disagree)*



6.2Ryerson – Evaluations and Comments –Fall-2011

Faculty Course Evaluations for Ryerson University - Fall 2011 (Printed on 22 October 2012)
Instructor's Results by Course and Section
Paper-Based Evaluation

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates															
Instructor	Course	Sec.	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10	Q11	Q12	Q13	Q14	PRN	RCV	PAR%
Russell Richman			1.5	1.7	2.1	2.2	2.4	2.1	1.7	2.2	1.5	1.8	2.3	2.6	1.8	2.2	53	32	60
	BL8100		1.2	1.6	1.9	2.5	1.7	2.2	1.9	2.5	1.7	1.3	1.8	2.0	1.9	2.3	30	24	80
	BL8100	011	1.2	1.6	1.9	2.5	1.7	2.2	1.9	2.5	1.7	1.3	1.8	2.0	1.9	2.3	30	24	80
	ASC520		1.9	1.9	2.3	1.9	3.1	2.1	1.6	1.9	1.4	2.3	2.9	3.1	1.8	2.1	23	8	35
	ASC520	041	1.9	1.9	2.3	1.9	3.1	2.1	1.6	1.9	1.4	2.3	2.9	3.1	1.8	2.1	23	8	35

Faculty Course Evaluations for Ryerson University - Fall 2011 - 22 October 2012
Instructor's Results by Course and Section (Written Comments)

	Course Code-Section	Comment
1	ASC520-041	Russell Richman seemed like a responsible, though carefree guy. Unfortunately, this year he has become irresponsible and a little too carefree. Half the time he doesn't show up during studio times and when he does, he comes in late, and leaves early whereas other profs are staying overtime to help students out. This whole year I have talked to him only twice for crits and frankly, it's not enough.
2	ASC520-041	To put it bluntly, studio this year has been hell. It has been so incredibly unorganized to such a point where the 8 prof were never on the same page. Guidelines were constantly changed and material expected to be handed in and understood was never actually taught. I hated this year studio and it's really unfortunate because I love design. Also it is now Nov 18 and we still only have one mark. It is pathetic and extremely dissappointing.
3	BL8100-011	I enjoy the dynamic teaching style of this course. It has remained interesting, and the professor has the ability to make theoretical ideas practically applicable. Overall I think this is one of the best courses of the semester.
4	BL8100-011	Mr. Richman provides a very good learning experience for what some may consider a bland subject. I have not seen such a good quality instructor in many years of my education. I only wish he could have taught me some of my other subjects in the past. Keep him as long as possible, for decades if you can! -regards
5	BL8100-011	Too many projects to enjoy the learning process
6	BL8100-011	Very good professor. Clearly cares about his students and his subject.
7	BL8100-011	When the course instructor comes to class and says that they would prefer not to be there, it makes the experience demotivating. If they don't want to be there, why should I? But all in all, I appreciated the energy brought to class. and the analogies.

*** Negative comments pertaining to course organization for ASC520 were beyond my control

*** Last comment for BL8100 was an unfortunate misunderstanding one day towards the end of term when I came in exhausted, saw the students exhausted, and remarked that "we probably don't want to be here". I have used this written comment as a lesson to carefully craft my 'off the cuff' statements in class. This comment has been a valuable learning experience.

6.3Ryerson – Evaluations and Comments –Winter-2012

Faculty Course Evaluations for Ryerson University - Winter 2012 (Printed on 22 October 2012)
Instructor's Results by Course and Section
Paper-Based Evaluation

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates															
Instructor	Course	Sec.	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10	Q11	Q12	Q13	Q14	PRN	RCV	PAR%
Russell Richman			1.3	1.3	1.6	1.4	2.1	1.9	1.6	1.7	1.1	1.1	1.4	1.5	1.3	1.6	112	87	78
	ASC620		1.6	1.3	1.4	1.1	1.2	1.2	1.4	1.4	1.0	1.1	1.3	1.1	1.3	1.2	11	9	82
	ASC620	041	1.6	1.3	1.4	1.1	1.2	1.2	1.4	1.4	1.0	1.1	1.3	1.1	1.3	1.2	11	9	82
	ASC200		1.1	1.2	1.7	1.7	3.0	2.6	1.7	2.0	1.3	1.1	1.4	2.0	1.4	2.0	101	78	77
	ASC200	011	1.1	1.2	1.7	1.7	3.0	2.6	1.7	2.0	1.3	1.1	1.4	2.0	1.4	2.0	101	78	77

Faculty Course Evaluations for Ryerson University - Winter 2012 - 22 October 2012
Instructor's Results by Course and Section (Written Comments)

	Course Code-Section	Comment
1	ASC620-041	in reference to Vis Ramasubramanian

*** Evaluations for ASC620 were for Professor V. Ramasubramanian as our actual course sections did not equate to the listed course sections on RAMSS.

6.4Ryerson – Evaluations and Comments –Fall-2012

Faculty Course Evaluations for Ryerson University - Fall 2012 (Printed on 15 May 2013)
Instructor's Results by Course and Section

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates															
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.2	1.0	1.2	1.4	1.4	1.5	1.3	1.6	1.1	1.3	1.3	1.4	1.1	1.4	38	31	82
	BL8100		1.1	1.0	1.2	1.7	1.2	1.8	1.2	2.1	1.3	1.3	1.3	1.6	1.1	1.6	22	18	82
	BL8100	011	1.1	1.0	1.2	1.7	1.2	1.8	1.2	2.1	1.3	1.3	1.3	1.6	1.1	1.6	22	18	82
	ASC520		1.2	1.1	1.2	1.2	1.5	1.2	1.3	1.2	1.0	1.3	1.3	1.2	1.0	1.2	16	13	81
	ASC520	051	1.2	1.1	1.2	1.2	1.5	1.2	1.3	1.2	1.0	1.3	1.3	1.2	1.0	1.2	16	13	81

Faculty Course Evaluations for Ryerson University - Fall 2012 - 13 September 2018
Instructor's Results by Course and Section (Written Comments)

	Course Code-Section	Comment
1	ASC520-051	For the Feasability Study it was hard to find information on the gantt chart and the monetary portion. It was unclear what we were supposed to do for these portions and where we were supposed to get the information from.
2	ASC520-051	He is the most understanding and positive professor. He really inspires us to push our boundaries and design to the best of our ability. A+
3	BL8100-011	Excessive formality and scientific rigour would be a bad thing. A little bit might be an improvement. Class time could be used better. Presentation, debates, etc. are fun, but if it means scheduling instruction outside of class time, or covering less material then they are a detraction from the course.
4	BL8100-011	Far too many small assignments and groupwork for a grad level course.
5	BL8100-011	I am very happy with this course. It is interesting information taught in the most interesting manner. My only complaint is that there is a lot of workload that does not necessarily facilitate the grasp of knowledge in this course. My recommendation would be to reduce the theme problems, or make a couple of them straight calculation based and not group problems. I understand why it's important to meet in groups and collaborate on problems, but it is a huge time commitment, especially when we have so much other stuff going on.
6	BL8100-011	Russell did a great job teaching this course. The assignments were a lot of work, but got me to think deeply about the topics.
7	BL8100-011	The lectures are delivered with gusto, and lots of breaks means staying refreshed. (For the department, could we please have more morning classes?) There are tons and tons of assignments, which I thought was a bad thing, but is turning out to mean that we have 'less' work in the crazy final month... so good call. Expectations are very clearly outlined, so essentially if the readings are done and the classes are followed, then there is no problem doing the work.
8	BL8100-011	very enthusiastic about material, full of energy. There are however one too many small assignments that are time consuming. Some concepts are hard to understand.

6.5Ryerson – Evaluations and Comments –Winter-2013

Faculty Course Evaluations for Ryerson University - Winter 2013 (Printed on 15 May 2013)
Instructor's Results by Course and Section

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates															
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.1	1.1	1.1	1.1	1.1	1.2	1.5	1.5	1.1	1.2	1.6	1.2	1.1	1.4	45	41	91
	BSC822		1.0	1.0	1.0	1.1	1.0	1.1	1.3	1.1	1.1	1.2	1.6	1.2	1.0	1.2	30	26	87
	BSC822	011	1.0	1.0	1.0	1.1	1.0	1.1	1.3	1.1	1.1	1.2	1.6	1.2	1.0	1.2	30	26	87
	ASC620		1.1	1.3	1.2	1.1	1.2	1.3	1.6	1.8	1.1	1.3	1.6	1.3	1.1	1.6	15	15	100
	ASC620	041	1.1	1.3	1.2	1.1	1.2	1.3	1.6	1.8	1.1	1.3	1.6	1.3	1.1	1.6	15	15	100

Faculty Course Evaluations for Ryerson University - Winter 2013 - 13 September 2018
Instructor's Results by Course and Section (Written Comments)

	Course Code-Section	Comment
1	ASC620-041	Good job Russell. Studio was insane this year with all the disorganization, at least we had a professor with a brain and good technical advice.
2	ASC620-041	This class is a contuinuation of last semester. Russell is overall seemingly uninterested in our work and seems to have problems with favoritism. Doesnt really care about the students in a class where understanding our work is very important.
3	BSC822-011	A very passioned Professor who carries us students along with this enthusiasm and animates us to learn and understand the topic. I really enjoy this class.
4	BSC822-011	Although the class was mostly review, it offered a valuable learning experience, especially in fourth year. It was important to re-iterate the materials taught throughout the program in order to grasp a common understanding. Russell is very knowledgeable about the course material and taught with enthusiasm.
5	BSC822-011	Therm/wufi workshops appreciated. Youre a great prof, learned probably the most in this class than any other in past 4 years (except milijanas)
6	BSC822-011	Very professional professor who allows for our input when determining course material. Labs and course material are clearly explained such that we can apply it to our term projects. Intresting and worthwhile class.
7	BSC822-011	While challenging yet well presented, this course was a major success for the intent presented and as an overall learning experience! An amazing professor who understands the position, needs and interests of the students. A very nice conclusion to the building science stream.

6.6Ryerson – Evaluations and Comments –Fall-2013

Faculty Course Evaluations for Ryerson University - Fall 2013 (Printed on 13 September 2018)
Instructor's Results by Course and Section
Online Evaluation

Legend

Q01. The instructor is knowledgeable about the course material. *(1=Agree, 5=Disagree)*
Q02. The course material is presented with enthusiasm. *(1=Agree, 5=Disagree)*
Q03. The instructor stimulates my interest in this subject. *(1=Agree, 5=Disagree)*
Q04. Concepts are clearly explained with appropriate use of examples. *(1=Agree, 5=Disagree)*
Q05. I get timely feedback on my assignments. *(1=Agree, 5=Disagree)*
Q06. I get constructive feedback on my assignments. *(1=Agree, 5=Disagree)*
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. *(1=Agree, 5=Disagree)*
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. *(1=Agree, 5=Disagree)*
Q09. Students are treated with fairness and respect. *(1=Agree, 5=Disagree)*
Q10. The class meets as scheduled and on time. *(1=Agree, 5=Disagree)*
Q11. The course is well organized and managed. *(1=Agree, 5=Disagree)*
Q12. The instructor is available for consultation as specified on the course handouts/ postings. *(1=Agree, 5=Disagree)*
Q13. This course provides a valuable learning experience. *(1=Agree, 5=Disagree)*
Q14. The way this course is taught helps me to learn. *(1=Agree, 5=Disagree)*

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates																
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.0	1.0	1.0	1.7	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.7	1.3	1.3	21	3	14
	BL8100		1.0	1.0	1.0	1.7	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.7	1.3	1.3	21	3	14
	BL8100	011	1.0	1.0	1.0	1.7	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.7	1.3	1.3	21	3	14

Faculty Course Evaluations for Ryerson University - Fall 2013 - 13 September 2018
Instructor's Results by Course and Section (Written Comments)

	Course Code-Section	Comment
1	BL8100-011	I found that theme problem two and the lab experiment were kind of frustratingly off topic and didn't really advance my understanding of building science. Although I recognize that they are supposed to bring a kind of diversity to the coursework.
2	BL8100-011	The unstructur assumes we are highly profiecient in maths and calculations and even though at the end the important part is understanding the concepts, there are many moments where you are completely lost on what is important and what is not as important. And there is no moment on the class to clarify that.

***The two comments in BL8100 are unfortunate and do not reflect the positive evaluations received for the course.

6.7Ryerson – Evaluations and Comments –Winter-2014

Faculty Course Evaluations for Ryerson University - Winter 2014 (Printed on 13 September 2018)
Instructor's Results by Course and Section
Online Evaluation

Legend

Q01. The instructor is knowledgeable about the course material. *(1=Agree, 5=Disagree)*
Q02. The course material is presented with enthusiasm. *(1=Agree, 5=Disagree)*
Q03. The instructor stimulates my interest in this subject. *(1=Agree, 5=Disagree)*
Q04. Concepts are clearly explained with appropriate use of examples. *(1=Agree, 5=Disagree)*
Q05. I get timely feedback on my assignments. *(1=Agree, 5=Disagree)*
Q06. I get constructive feedback on my assignments. *(1=Agree, 5=Disagree)*
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. *(1=Agree, 5=Disagree)*
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. *(1=Agree, 5=Disagree)*
Q09. Students are treated with fairness and respect. *(1=Agree, 5=Disagree)*
Q10. The class meets as scheduled and on time. *(1=Agree, 5=Disagree)*
Q11. The course is well organized and managed. *(1=Agree, 5=Disagree)*
Q12. The instructor is available for consultation as specified on the course handouts/ postings. *(1=Agree, 5=Disagree)*
Q13. This course provides a valuable learning experience. *(1=Agree, 5=Disagree)*
Q14. The way this course is taught helps me to learn. *(1=Agree, 5=Disagree)*

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates																
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.1	1.2	1.5	1.5	1.8	1.7	1.6	1.5	1.2	1.1	1.5	1.6	1.4	1.5	32	11	34
	BSC822		1.1	1.2	1.5	1.5	1.8	1.7	1.6	1.5	1.2	1.1	1.5	1.6	1.4	1.5	32	11	34
	BSC822	011	1.1	1.2	1.5	1.5	1.8	1.7	1.6	1.5	1.2	1.1	1.5	1.6	1.4	1.5	32	11	34

Faculty Course Evaluations for Ryerson University - Winter 2014 - 13 September 2018
Instructor's Results by Course and Section (Written Comments)

	Course Code-Section	Comment
1	BSC822-011	One of the reasons I know anything about building science
2	BSC822-011	The method of teaching of using the quiz is effective as a review and to teach concepts in more detail, even for building science students. Enjoyed seeing examples of problems in buildings the professor has encountered. WUFI was presented in a slightly confusing manner, and could be incorporated more effectively for students to understand the application of the program.

6.8Ryerson – Evaluations and Comments –Fall-2014
Sabbatical year.

6.9Ryerson – Evaluations and Comments –Winter-2015
Sabbatical year.

6.10 Ryerson – Evaluations and Comments –Fall-2015

Faculty Course Evaluations for Ryerson University - Fall 2015 (Printed on 16 May 2016)
Instructor's Results by Course and Section

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates																
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.3	1.3	1.9	1.8	1.5	1.8	1.8	1.5	1.0	1.3	1.6	1.4	1.3	1.8	39	10	26
	BL8101		1.0	1.0	2.1	2.3	1.4	1.6	2.0	1.6	1.0	1.2	1.9	1.9	1.6	1.9	26	7	27
	BL8101	011	1.0	1.0	2.1	2.3	1.4	1.6	2.0	1.6	1.0	1.2	1.9	1.9	1.6	1.9	26	7	27
	ASC520		1.7	1.7	1.7	1.3	1.5	2.0	1.5	1.5	1.0	1.3	1.3	1.0	1.0	1.7	13	3	23
	ASC520	051	1.7	1.7	1.7	1.3	1.5	2.0	1.5	1.5	1.0	1.3	1.3	1.0	1.0	1.7	13	3	23

Faculty Course Evaluations for Ryerson University - Fall 2015 - 13 September 2018
Instructor's Results by Course and Section (Written Comments)

	Course Code-Section	Comment
1	BL8101-011	Dr. Russell is extremely knowledgeable and brings great enthusiasm and expertise to every lecture. Overall, the difficulty and scope of the assignments is fine, but it might be beneficial to dedicate some time (around 30min?) to show students how to analyze exported Wufi data in excel for assignment 1b (if/and function, graphs, etc…).
2	BL8101-011	Experienced Lecturer
3	BL8101-011	Russell is very enthusiastic about teaching the course, which is great, but I feel as though I haven't gotten a strong understanding of Building Envelope systems. I don't quite understand the full building envelope system as a whole. I would prefer that we are taught this, THEN learn how to use the software, then case studies to match real life with conceptual. Great prof, just need the course material to be reorganized a bit
4	BL8101-011	The course is very disorganized and confusing. Most of us registered the course to learn about building envelope and the details. However the class began with software stimulation before any knowledge was taught. Due to lack of basic knowledge of the envelope, one assignment cost so much time to understand and complete. Each 10% assignment cost us more than one week to finish. And the case study examples are again very confusing. The knowledge points jump from one to another. There is no clear structure to follow. The percentages of assignments and final exam are also badly distributed, two 10% assignments, one 30% assignments and final 50%? It just does not make sense. The amount of time we spent on 10% assignment was way more than what it worth. The term is about to end, the majority of us are still confused about what we learnt so far. Very disappointing class indeed.
5	BL8101-011	Would have liked to spend a bit of time learning about building envelope materials and typical assemblies before getting into the modelling software. The instructor also moved very quickly when introducing the software: it was hard to follow along, and most of the learning was done through assignments.

***An unusual number of students failed BL8101 this year. I made changes (course organization, deliverables, etc.) based on this experience and some of the comments.

6.11 Ryerson – Evaluations and Comments –Winter-2016

Faculty Course Evaluations for Ryerson University - Winter 2016 (Printed on 16 May 2016)
Instructor's Results by Course and Section

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

Instructor	Course	Sec.	Rates														PRN	RCV	PAR%
			Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10	Q11	Q12	Q13	Q14			
Russell Richman			1.3	1.7	1.8	1.9	1.6	2.4	1.7	1.9	1.5	1.4	1.9	1.7	1.8	1.9	65	19	29
	BSC822		1.0	1.4	1.4	1.4	1.1	2.1	1.3	1.6	1.4	1.0	1.5	1.3	1.3	1.5	34	8	24
	BSC822	011	1.0	1.4	1.4	1.4	1.1	2.1	1.3	1.6	1.4	1.0	1.5	1.3	1.3	1.5	34	8	24
	AR8103		1.5	2.0	2.2	2.4	2.1	2.6	2.1	2.3	1.5	1.8	2.4	2.1	2.4	2.4	31	11	35
	AR8103	011	1.5	2.0	2.2	2.4	2.1	2.6	2.1	2.3	1.5	1.8	2.4	2.1	2.4	2.4	31	11	35

Faculty Course Evaluations for Ryerson University - Winter 2016 - 13 September 2018
Instructor's Results by Course and Section (Written Comments)

Course Code-Section	Comment
1 AR8103-011	Russell is an interesting professor. He can be taken as an arrogant and obnoxious person, however, he really means well for the students. At the beginning I had my doubts about him, but as the semester progresses, it is clear that if you put in the effort he will give you the respect you deserve. I can understand why he may come off a certain way but his intentions are all for the best. He is funny and interesting at times (especially not on his moody days). The course itself I find to be more of a third year undergraduate studio with the type of work we are given. I would really hope this changes and shifts towards helping students focus and work towards their thesis, similar to last semester. Overall, Russell is a great professor that just wants you to succeed as long as you put in the effort.
2 AR8103-011	The course is engaging as it involves the construction of buildings and looking at architectural topics in a tangible and concrete way. However, the choice to make the whole semester as group work was not constructive. It prohibited discussions that would help individual students with their thesis, or the opportunity to expand on topics of personal interest. The mismatch of incorprating course materials with already established thesis projects was unproductive. The discussion remained at undergraduate level and did not make use of the progress students had made in the previous semester. Overall, the format of this course is more suited for first semester of MArch.
3 AR8103-011	Very knowledgeable about preservation, conservation and refurbishing buildings. However, both faculty members didn't seem to be 100% engaged in the studio. Time spent in studio seemed to be a bit of an issue. The students and projects could have been pushed and encouraged more to increase the quality and innovation of the projects.
4 BSC822-011	One of the best faculty members at Ryerson.
5 BSC822-011	Russel is the best!
6 BSC822-011	The course title of advanced envelopes is very misleading. Little time was spend on discussing anything advanced about envelopes. Most of the class was spent on rehashing information learnt in previous years in order to regurgitate it on a quiz. This is largely a waste of time and didn't do anything to further my knowledge of envelopes. Get rid of the quiz; teach something advanced instead.
7 BSC822-011	bringing in real physical models of envelope systems was really effective and helpful perhaps during wufi and therm tutorials, it should be in the classroom due to noise, clarity of instructions and visibility of screen -people with plug issues should just sit at the front of the classroom

6.12 Ryerson – Evaluations and Comments –Fall-2016

Faculty Course Evaluations for Ryerson University - Fall 2016 (Printed on 15 May 2017)
Instructor's Results by Course and Section

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates															
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.0	1.3	1.4	1.6	1.1	1.4	1.9	1.8	1.2	1.1	1.8	1.6	1.2	1.6	24	22	92
	BL8101		1.0	1.3	1.4	1.6	1.1	1.4	1.9	1.8	1.2	1.1	1.8	1.6	1.2	1.6	24	22	92
	BL8101	011	1.0	1.3	1.4	1.6	1.1	1.4	1.9	1.8	1.2	1.1	1.8	1.6	1.2	1.6	24	22	92

Faculty Course Evaluations for Ryerson University - Fall 2016 - 13 September 2018
Instructor's Results by Course and Section (Written Comments)

	Course Code-Section	Comment
1	BL8101-011	Russell Richman is an exemplary instructor. He's passionate, fair, engaging, and delivers on what he say's he will.
2	BL8101-011	Tutorial time for this course would be beneficial. Maybe not a regular tutorial schedule, but some tutorial time with a TA or the professor would be useful. Programs, like everything, require practice. Questions on the board are done well. Good use of technology, such as powerpoints, and prof. knows when to use the chalkboard. This course should be taught in the second semester or it should really start after BL100. Program introductions/brief seminars should be offered during bootcamp/orientation week.

6.13 Ryerson – Evaluations and Comments –Winter-2017

Faculty Course Evaluations for Ryerson University - Winter 2017 (Printed on 15 May 2017)
Instructor's Results by Course and Section

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates															
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.0	1.1	1.8	1.8	1.6	2.0	1.5	1.7	1.1	1.1	1.6	1.4	1.5	2.1	30	30	100
	BSC822		1.0	1.1	1.8	1.8	1.6	2.0	1.5	1.7	1.1	1.1	1.6	1.4	1.5	2.1	30	30	100
	BSC822	011	1.0	1.1	1.8	1.8	1.6	2.0	1.5	1.7	1.1	1.1	1.6	1.4	1.5	2.1	30	30	100

No comments.

6.14 Ryerson – Evaluations and Comments –Fall-2017

Faculty Course Evaluations for Ryerson University - Fall 2017 (Printed on 13 September 2018)
Instructor's Results by Course and Section

Legend

Q01. The instructor is knowledgeable about the course material. (1=Agree, 5=Disagree)
Q02. The course material is presented with enthusiasm. (1=Agree, 5=Disagree)
Q03. The instructor stimulates my interest in this subject. (1=Agree, 5=Disagree)
Q04. Concepts are clearly explained with appropriate use of examples. (1=Agree, 5=Disagree)
Q05. I get timely feedback on my assignments. (1=Agree, 5=Disagree)
Q06. I get constructive feedback on my assignments. (1=Agree, 5=Disagree)
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. (1=Agree, 5=Disagree)
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. (1=Agree, 5=Disagree)
Q09. Students are treated with fairness and respect. (1=Agree, 5=Disagree)
Q10. The class meets as scheduled and on time. (1=Agree, 5=Disagree)
Q11. The course is well organized and managed. (1=Agree, 5=Disagree)
Q12. The instructor is available for consultation as specified on the course handouts/ postings. (1=Agree, 5=Disagree)
Q13. This course provides a valuable learning experience. (1=Agree, 5=Disagree)
Q14. The way this course is taught helps me to learn. (1=Agree, 5=Disagree)

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates																
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.1	1.2	1.6	2.2	1.6	1.7	2.4	2.0	1.2	1.2	2.1	1.4	1.6	2.1	18	18	100
	BL8101		1.1	1.2	1.6	2.2	1.6	1.7	2.4	2.0	1.2	1.2	2.1	1.4	1.6	2.1	18	18	100
	BL8101	011	1.1	1.2	1.6	2.2	1.6	1.7	2.4	2.0	1.2	1.2	2.1	1.4	1.6	2.1	18	18	100

Faculty Course Evaluations for Ryerson University - Fall 2017 - 13 September 2018
Instructor's Results by Course and Section (Written Comments)

Course Code-Section	Comment
1 BL8101-011	The positives aspects of this instructor's approach to teaching: 1. Was personable 2. Has work experience in the field 3. Was enthusiastic about the subject. 4. Evaluation combines learning and how to apply learnings to case studies To improve the course delivery and student experience, my recommendations are: 1.Teach the subject matter in a step-by-step process starting with definitions, concepts, and building upon foundational material (e.g. wall, roof, foundation, air barrier etc.). Do not use acronyms/jargon without explaining them. 2. Develop power point slides for each lecture, with references to text books and articles to supplement the lecture. (Documents posted in lecture folder "X" in D2L often did not have anything to do with the materials covered in the lecture"X") Clearly identify what is required reading and what is supplementary reading. The current set up of documents is haphazard and does not reference the materials that we cover in the lecture. It seems that the course materials for each lecture is a compilation of what other professors have taught in the past and/or scans of documents. Post the materials weekly. 3.Clearly identify documents using appropriate nomenclature. 4. Before the beginning of class, locate and open all files that you will be using in the lecture. Time was frequently wasted trying to locate documents, materials and slides during the class. (The instructor was challenged to find his own documents, how do you think it was, for us, the students?). 5. Use a more balanced approach for evaluations (90% of the evaluation is based on tests/exams) and provide feedback earlier in the course. We received our first marks 10 days before the last day to drop the course. Consider using a 60/40 split with tests/exams & assignments. 6.We often heard about a "time crunch" – not enough time to cover this or that. – or I expect you to know this. If you have expectations on what we should know before coming to your course, then list the expectations and provide resources so that we are up to speed before entering the class. Evaluate us before we enter the program so assumptions are not made that are not valid (the student body knows something when we don't). Focus on the course material that you want us to learn. Avoid tangents on non-relevant non-building science topics.

***This is an interesting and informative written comment. I will use this to consider changes in the future. Unfortunately, some aspect cannot be changed (e.g. putting this course after the fundamentals course, BL8100)

6.15 Ryerson – Evaluations and Comments –S/S-2018

Faculty Course Evaluations for Ryerson University - Spring 2018 (Printed on 13 September 2018)
Instructor's Results by Course and Section
Online Evaluation

Legend

Q01. The instructor is knowledgeable about the course material. *(1=Agree, 5=Disagree)*
Q02. The course material is presented with enthusiasm. *(1=Agree, 5=Disagree)*
Q03. The instructor stimulates my interest in this subject. *(1=Agree, 5=Disagree)*
Q04. Concepts are clearly explained with appropriate use of examples. *(1=Agree, 5=Disagree)*
Q05. I get timely feedback on my assignments. *(1=Agree, 5=Disagree)*
Q06. I get constructive feedback on my assignments. *(1=Agree, 5=Disagree)*
Q07. The course handouts / postings contain all of the information I need about the organization and operation of this course. *(1=Agree, 5=Disagree)*
Q08. The assessment methods, including tests, provide a fair evaluation of my learning. *(1=Agree, 5=Disagree)*
Q09. Students are treated with fairness and respect. *(1=Agree, 5=Disagree)*
Q10. The class meets as scheduled and on time. *(1=Agree, 5=Disagree)*
Q11. The course is well organized and managed. *(1=Agree, 5=Disagree)*
Q12. The instructor is available for consultation as specified on the course handouts/ postings. *(1=Agree, 5=Disagree)*
Q13. This course provides a valuable learning experience. *(1=Agree, 5=Disagree)*
Q14. The way this course is taught helps me to learn. *(1=Agree, 5=Disagree)*

PRN: Number of prepared surveys
RCV: Received non-blank surveys
PAR%: Non-Blanks / Prepared

			Rates																
Instructor	**Course**	**Sec.**	**Q01**	**Q02**	**Q03**	**Q04**	**Q05**	**Q06**	**Q07**	**Q08**	**Q09**	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**PRN**	**RCV**	**PAR%**
Russell Richman			1.0	1.0	1.5	1.5	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.5	16	2	13
	BL8213		1.0	1.0	1.5	1.5	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.5	16	2	13
	BL8213	011	1.0	1.0	1.5	1.5	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.5	16	2	13

No comments.

6.16 Testimonials

Ryerson – Letters – Unsolicited Email from a Student

From: Mercedes Barber <mabarber@ryerson.ca>
Date: April 27, 2011 10:56:43 PM GMT-04:00
To: Russell Richman <richman@ryerson.ca>
Subject: ASC 200

Ryerson – Letters – Unsolicited Email from a Student

From: nikita.yakushev@ryerson.ca

Date: January 6, 2015 at 9:43 PM

To: Russell Richman <richman@ryerson.ca>

Subject: Happy New Year, and Thank you

Hello Prof. Richman,

I would like to kindly wish you all that is good in this newly arrived year of 2015. May you and those around you live in abundance, both physical and otherwise.

Professor, I would like to sincerely thank you for the knowledge you've shared and guidance you've given during my years at Ryerson. I can say with confidence that your passion for the science of architecture has sparked a flame that burns within me ever so stronger by the day. I am thankful also for the opportunity to work at SPL that you have opened to me. The hands on feild experience I am getting enriches my understanding of the profession and will help me make more informed and complete decisions as an architect in the future. Thank you once more, for that which you have done for me, and on behalf of those you are yet to guide.

May only great things follow you on your path,

Nikita Yakushev

Ryerson – Letters – Unsolicited Email from a Student (Ryerson)

Deva S. Veylan
5933 Broadway Road, Nanaimo, BC V9V 1C9
780-902-5860 dveylan@ryerson.ca

September 14, 2018

Faculty Promotion Committee
The Faculty of Engineering and Architectural Science
Ryerson University
350 Victoria Street,
Toronto, Ontario M5B 2K3

Dear Faculty Promotion Committee,

Please accept this letter of support for Dr. Russell Richman's promotion to the position of full professor at Ryerson University. My name is Deva S. Veylan, and I am a current student in the Master of Building Science Program at Ryerson University with Dr. Richman acting as my research supervisor.

In my own experience I have found Dr. Richman to be a supportive and responsive supervisor who has made himself readily available to help and direct me whenever the need has arisen. I am grateful to have had him as an instructor, as well as had the opportunity to work with him on my research. He has played an important role in helping make my graduate education the great experience it has been.

Dr. Richman's support is not limited to just the students he supervises. He is invested in the success of all his students, as well as the building science program at Ryerson University as a whole. He consistently makes time for any student who needs help whether it be with academics or personal matters.

Ryerson University would be well-served with this promotion, as Dr. Richman possesses the qualities of the ideal professor. Not only does he have a mastery of building science stemming from both academics and field work, he also is a gifted lecturer and teacher.

Ryerson – Letters – Unsolicited Email from a Student (Ryerson)

On 14-Nov-10, at 3:07 PM, Aubrey Deluca wrote:
Hello!
Hope you had a nice weekend! I approached you on Friday about getting some help on choosing some alternative, unconventional building materials for a project. I really enjoyed your Sustainable Practices class last year and I want to include some of the wall materials we discussed in lecture, but as I said; my notebook is unavailable and I can't remember them all. Plus, I want to do something that goes beyond just what we learned in class.
The project is to simply design a building envelope that fits one of four criterias, and of course I chose superinsulated (min R of 6.5m2 k/W) that reflects a net-zero energy/zero carbon emissions house.
I tend to spend a lot of extra energy on the projects I like, so I don't mind doing all the extra work that comes with doing an unconventional building envelope.
What time/day would be most convenient to discuss with you?
Thanks a bunch!
Aubrey Deluca

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

Dear Faculty Promotion Committee,

I have known Dr. Richman since 2010 and have interacted with him on frequent basis in his capacity as an instructor and the Associate Chair for Graduate Studies. During my time as an undergraduate and graduate student I have come to know Dr. Richman fairly well, and therefore can offer some insight on his teaching.

Dr. Richman is a charismatic and an extremely knowledgeable instructor who has always gone above and beyond to groom his students to be real world ready. It has been an absolute pleasure interacting and learning from him. One of the most memorable interactions with Dr. Richman was back in 2010, in my third-year design studio. I was pleasantly surprised to learn that, despite being an engineer, he was assigned to a design studio. However, the inputs he offered with regards to the feasibility of various design ideas and their real-life manifestation was invaluable and served as a catalyst in expanding my thinking and understanding of building systems.

An important aspect of Dr. Richman's interaction with his students is his enthusiasm and ability to understand the issue at hand, whether it is lecture related or administrative in nature. During my graduate studies, Dr. Richman was always eager and full of energy in all his classes. When explaining concepts and ideas, his passion about the subject matter and about his students fully understanding the material was profound and undeniable. Dr. Richman's course structure, use of real-life examples and hands on teaching allowed the students to relate course material to practical applications, which elevated the entire learning experience.

In all my interactions with Dr. Richman, he has always come across as equitable and meticulous, bringing out the very best in every student. I personally have greatly benefited from partaking in Dr. Richman's classes and sincerely hope that his efforts as an instructor and an administrator will be rewarded.

Sincerely,

Vadim Novik, BArchSc, MBSc
Faculty of Building Science Alumnus

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

To Whom It May Concern:

It is my pleasure to write this recommendation letter for Dr. Russell Richman in support of his promotion to a full professor at the Department of Architectural Science, Ryerson University.

I have known of Dr. Richman when I first started at Ryerson as a Master's student in the Building Science program. Many upper-year students I came across would generously praise Dr. Richman's course Building Science Theory, and how much they had learnt from doing research with him. It soon became my biggest regret to be admitted in a year that Dr. Richman was on his sabbatical.

Fortunately, I decided to stay for one more year in the program to complete a research-based degree and Dr. Richman was back at teaching. I did not hesitate and signed up to audit his course Building Envelope Systems, although I had already received the course credit in my first year. I was very impressed by the fact that it was the first time he taught this course and he had a totally different take on it. He familiarized us with modeling tools well accepted in the industry, such as THERM and WUFI, and shared many tips and tricks while we were practicing using the software in class. He also gave us problems that he had seen in the industry to solve.

Dr. Richman was very passionate in class and had a very lively teaching style that kept students interested and engaged. He was also very responsive to questions He had so many great ideas that I wished I could capture all of them in my notes. His various real-life examples and stories put abstract building science principles into perspective to help student comprehend. The most memorable project was his own house renovation where he "donated" his house for students' research and applied building science knowledge in envelope restoration. This project sent out a couple of powerful messages that I would always carry with me - (1) if we did not have the power to impact others' living environment yet, we could always start from our own; (2) we should also claim certain responsibility to improve the building performance because we knew better.

Dr. Richman is well connected in the industry and he is very willing to share his connections by inviting building science practitioners (such as RDH experts) to give students first-hand insight from practising in the real world. This also allowed students to see what is possible in our future career. These lectures were not only for the students he was teaching. He would broadcast it so whoever in the department was interested would have the opportunity to attend.

In addition to what he offered in class, Dr. Richman also organized workshops, for example EnergyPlus 3-day training course and Passive House Certification course. These courses prepared the students for the competitive workplace. Many students have expressed gratitude towards these informative and practical training sessions with student-friendly pricing. Dr. Richman is also very supportive of student's initiatives. When my peer Mark Flynn and I went to him with the idea of organizing an introductory talk/case studies about Passive House for students, Dr. Richman was very encouraging and even contributed his connections for speaker choices. His support made it into an event that attendees spoke highly of.

Dr. Richman was on my thesis committee and had provided me with many insightful suggestions and feedback, and steered my research in a more realistic and scientific-stringent direction during our periodical reviews. Such moments when he announced me passing my thesis and congratulated me wholeheartedly at my convocation are very unforgettable and part of my fond graduate school memories.

In short, Dr. Richman has an exceptional amount of knowledge in Building Science and Sustainable Buildings. His passion for knowledge sharing and the positive energy had won him respect from students. I would highly recommend Dr. Richman to become a full professor and look forward to encountering many more students inspired by him.

Sincerely,
Stacy Sun

Building Energy Analyst,
Sustainability and Energy, WSP

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

Greer Stanier
60 St Clair Ave. West
Toronto, ON

September 12th, 2018

Faculty of Engineering and Architectural Science
Ryerson University
George Vari Engineering and Computing Centre
245 Church Street
Toronto, Ontario, Canada
M5B 1Z2

To the Faculty Promotions Committee,

I have been a student at Ryerson University for six years; I started my Bachelor of Architectural Science in 2012 and am now in my second year of my Master of Applied Science in Building Science. I have known Professor Richman for 2 years in his capacity as my instructor in both undergraduate and graduate courses. My experience with Professor Richman has been very positive and I feel confident commenting on his credentials with respect to his promotion to full Professor.

Professor Richman is a knowledgeable and enthusiastic teacher and it has been a pleasure to learn from him these past few years. As an instructor, Professor Richman is available to his students for questions and provides a structured and valuable learning experience. He seeks feedback without being defensive and looks for new ways to integrate practical knowledge and industry expertise into the curriculum. His courses are some of the most relevant and interesting ones I have taken in my years attending Ryerson.

On a more personal note, Professor Richman has also proven to be a great mentor. While I was in my final year of my undergraduate degree I took Professor Richman's fourth year building envelopes course. When I expressed an interest in learning beyond the curriculum, he took the time to explain the resources I would need and made himself available to answer any questions I had. Outside of his teaching responsibilities, he has been a significant help with extra-curricular endeavors like the Race to Zero competition.

I have personally benefitted from taking Professor Richman's classes and hope to see him as a full Professor.

Sincerely,

Greer Stanier

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

Faculty Promotion Committee
Faculty of Engineering & Architectural Science
Ryerson University
350 Victoria Street
Toronto, Ontario
M5B 2K3

Members of the FPC,

This letter is to support the promotion of Dr. Russell Richman to full time professor.

I attended Ryerson between 2009 - 2015 where I received a Bachelor of Architectural Science in 2013 and a Masters of Architecture in 2015. During this time I had the privilege and pleasure of having Dr. Richman as a professor, mentor, and supervisor.

As a professor, Dr. Richman brought a strong passion to the classroom which significantly shaped the career path I have chosen. His fast paced and precise teaching method helped me engage with the material and encouraged learning beyond the classroom. His extensive knowledge and broad experience within the field allowed his teaching material to be relevant and challenging. On many occasions he gave students opportunities to engage with the construction industry outside the classroom which became invaluable to my education.

During the course of my education Dr. Richman was my professor for;

ASC ??? - Second Year
BSC 822 - Advanced Envelope Systems
ASC 520 - Integration Studio
DAS House - Race to Zero Competition

In addition to the classroom based teaching and support, Dr. Richman was a consistent mentor throughout my education offering collaboration opportunities, employment connections, and career advice. In this way Dr. Richman takes teaching beyond the classroom and encourages students to learn through experience. Although he did not directly supervise my thesis, his expert opinion and advice was a guiding principle in my research.

For these reasons I support the promotion of Dr. Russell Richman to full time professor.

Sincerely,

Steven Andrew Biersteker
Intern Architect | AIBC

September 12, 2018

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

August 31, 2018

Faculty Promotion Committee
Faculty of Engineering and Architectural Science
Ryerson University
Toronto, Ontario

RE: Letter of Support - Dr. Russell Richman

Dear Faculty Promotion Committee,

I know Dr. Russell Richman in the capacity of Professor of BL8101: Building Envelope Systems and BL8213: Passive House Design and Construction and Associate Chair, Graduate, Building Science. Russell brings to his teaching a perspective that is unique in the department. Through his building science consulting experience, Russell keeps up-to-date on the building science industry. He is able to bring real-world examples into the classroom and link academic theory with practice. He teaches and tests through examples based on problems faced in the field which encourages students to apply theoretical knowledge creatively to real problems. In my opinion, this is the type of teaching that keeps Ryerson University unique and should be continually encouraged in both the undergraduate and graduate programs.

Russell is an enthusiastic professor who comes to class prepared, and ready to engage a classroom of students. He is an advocate for effective implementation of building science principals in building design and inspires us to be future leaders of the industry.

Sincerely,

Erica Barnes
Master of Applied Science (MASc) Candidate
Building Science, Department of Architectural Science, Ryerson University

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

June 6, 2011

Department of Building Science
Ryerson University
325 Church Street
Toronto, ON

Re: BL8204 - Building Performance Simulation

To whom it may concern,

Having completed the masters of building science course in Building Performance Simulation in the winter term of 2011, I am inclined to state that the experience and knowledge gained from my enrollment in the course have been both valuable and rewarding in the development of my academic and professional career. As in any form of teaching, the individual conveying the information to a student is of paramount significance in ensuring that the process is accomplished effectively. In describing my experience in the Building Performance Simulation course, I must necessarily emphasize the role of the instructor in creating an intellectually stimulating classroom environment.

The instructor I am referring to is Professor Russell Richman. One of the primary impressions of Russell is approachability, which is evident in his insistence on communication on first name basis. The informal dynamic established in his courses created an atmosphere that was highly conductive to learning and entertaining while, at the same time, demonstrating Russell's competence in the field and commanding an appropriate degree of respect for academia. In addition, I found that throughout the academic year, Russell was always available for individual consultation and, in fact, would make an effort to accommodate one's questions or concerns outside of typical office hours. As a result, communication was much easier and more sincere.

I have had the pleasure of attending more than one of Russell's courses while studying at Ryerson University and what I found highly characteristic of his teaching methodology was firstly, enthusiasm for the subject matter, and secondly, effective structuring of the course material. The ability to present material in a manner that stimulated interest in the subject was highly motivating and facilitated the dissemination of knowledge. Furthermore, the organization of the course was key in developing fundamental skills, which could then be synthesized and compounded to approach more complex tasks and assignment. I believe that the continuity in the use of the learned skills and tools throughout the duration of the course allowed one to gain a deeper understanding and appreciation for the material.

Although I found that Russell's courses tend to carry a heavier than normal workload, in most circumstances, the assigned material is reflective of real-world applications and becomes an excellent preparatory work for anyone seeking a career in the building science or engineering industry. Moreover, knowing a real-world example is considered, the assigned work appears to have a greater purpose and requires a higher degree of both professionalism and academic research, which I have personally found valuable.

I hope that anyone working with Russell in the future derives the same rewarding and illuminating experience as I have.

Sincerely,

Ivo Markiel
M.B.Sc. Candidate
Department of Building Science, Ryerson University

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

June 6, 2011

To Whom It May Concern:

This letter is in reference to Dr. Russell Richman and his instruction of BL8100 Building Science Theory, a core course in the Building Science graduate program at Ryerson University. I was a student in this course in the fall term of 2008.

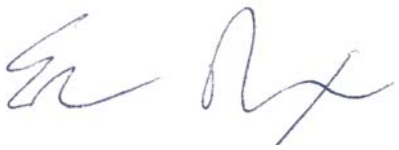
Dr. Richman is an enthusiastic instructor who is highly knowledgeable about the subject of Building Science. He uses a variety of teaching techniques to convey information to students and support differing learning styles. As a result, this course provided a solid foundation in Building Science principles.

Students were encouraged to be active participants in Dr. Richman's class by asking questions at all times as well as through activities designed to gain opinions and knowledge from students. In addition, Dr. Richman was readily available by email, phone or personal consultation outside class hours to answer questions and clarify theory.

In support of the course lectures, Dr. Richman provided a variety of interesting assignments involving both group and individual work. These assignments accomplished several important goals including: application of Building Science principles to real problems; writing a research paper to encourage graduate level theory development and writing techniques; presentation development and delivery to reinforce theory; and finally, creation of a portfolio to put the term learning experience and outcomes in a personal context.

My experience with the BL8100 course taught by Dr. Richman was very positive and I would not hesitate to recommend him as an instructor for any other course in his field.

Sincerely,



Erin Dixon
MASc
LEED AP
erin.dixon@ryerson.ca

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

Aaron Hendershott
168 Chisholm Ave.
Toronto, ON. M4C 4W1

June 2, 1011

To whom it may concern,

I am a recent graduate of the Bachelor of Architectural Science program at Ryerson University. I have known Russell since he supervised my architecture studio (ASC620) in the winter semester of 2010.

In the architecture studio, Russell brought not only a tremendous amount of technical expertise which he actively shared with students, but also an enthusiasm for teaching which reflected in an engaged studio group and ultimately strong work from his students. I feel that my skills, particularly as they apply to building performance and building envelope design benefitted greatly from Russell's ongoing support throughout the semester.

One of Russell's strengths is his approachability and his ability to relate to students on an interpersonal level. He always made time for students to discuss their work, and was always present during studio hours. He also clearly outlined expectations for his students, which made it a lot easier for me to focus my efforts.

While Russell initially absconded from discussions of architectural theory or design aesthetics, throughout the semester I saw Russell gain confidence in his ability to critique student work and offer suggestions to improve their designs on both a technical and artistic level. Since then, I believe Russell has become a well-rounded studio professor as well as an incredible resource for technical information, making him a valuable asset in the studio.

Since that time, I have spoken to Russell many times in the hallways of the school. He has been very approachable for discussing school work or otherwise. He has also taken an interest in my personal and family life as well.

I look forward to Russell's continued contribution to the Architecture department and his support as I continue studying at Ryerson in the upcoming years.

Sincerely,

Aaron Hendershott

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

June 7, 2011

To Whom It May Concern:

I am a Master's of Applied Science candidate at Ryerson University in the Building Science program. Russell was my instructor in the Fall 2010 term for Building Science Theory (BL8100), a core course requirement for the Building Science program.

I entered the program with no prior knowledge of Building Science - Russell's BL8100 course was my first introduction to Building Science principles. As one of only a few people in the program without an engineering or architecture background, the first few weeks of class were intimidating. However, Russell's easy going nature and assurance put me at ease. It is evident that Russell is passionate about both building science and teaching, which made the course interesting and enjoyable. His teaching style and methods are very effective and ensure that anyone, regardless of their background, is capable of learning if they are willing to put in the effort. Russell sincerely wants his students to succeed, and is willing to go out of his way to offer both advice and help when needed.

Overall, I have thoroughly enjoyed my learning experience with Russell, and strongly feel that his instruction has contributed to my success in the Building Science program thus far.

Should you have any questions, please do not hesitate to contact me at amanda.yip@ryerson.ca.

Sincerely,

Amanda Yip
Master of Applied Science Candidate, Building Science
Department of Architectural Science
Faculty of Engineering, Architecture, and Science
Ryerson University

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

June 7th, 2011

To Whom It May Concern:

I am a graduate student currently pursuing a Master of Building Science at Ryerson University. Russell Richman was my professor for my first class of this program, *BL8100 Building Science Theory*. I am writing this letter to acknowledge Russell as an excellent teacher and building science professional.

My undergraduate background is in business and economics but I pursued this program because I was interested in sustainable building design. Prior to my first semester in the program, I had very little knowledge about the engineering aspects of the built environment. On the first day of Russell's class, however, the students were presented with an intimidating list of building- and engineering-related concepts with which were expected to already be familiar with, and a pop quiz on the scientific occurrence of every day phenomena. Initially, I was extremely apprehensive of my ability to succeed in this course but Russell encouraged me to stick with the program for a few more weeks. Today, I have successfully completed all of my courses, and am preparing to finish my major research project in August and graduate this fall.

It is evident that Russell values the principles of good teaching, evaluates students through unique and varied approaches, is able to relate to the students while maintaining high expectations, and recognizes the effectiveness of applying theoretical knowledge to real-life situations. While the course is very challenging, Russell is easily approachable and provides support to the students, but requires them to make their own reasonable assumptions in order to draw conclusions.

Russell's teaching methods in BL8100 continuously require the student to evaluate their understanding of the learning content by applying the fundamentals of building science at the end of every class, after every theme module and at the end of the semester with an intensive exam. However, I found re-taking the pop quiz at the end of the course – to assess the development of our learning since the first day over the duration of the semester – and preparing a learning portfolio – which was non-technical but required students to reflect on their learning in the context of both their academic and personal lives – were the most significant demonstrations of my ability to understand a completely new subject. This too is a positive reflection of Russell's ability to turn out successful students from multi-disciplinary backgrounds.

Finally, I would like to acknowledge Professor Richman as a fair and effective teacher who is passionate about his subject.

Sincerely,

Lindsay Rowland
Graduate Student, Master of Building Science
Faculty of Engineering, Architecture & Science, Ryerson University

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

Re: Building Science, BL8100 Wednesday, June 08, 2011

To Whom it May Concern,

In September 2010, I was as student in the Graduate program of Building Science, at Ryerson University. While enrolled in Building Science (BL8100), it was my privilege to Professor Russell Richman as a professor.

From a teaching point of view, Professor Richman is a dynamic professor who uses best practice pedagogy to engage his students in critical thinking. Individual reflection, debating, case-study analysis, small group learning, and hands-on science are almost daily approaches Professor Richman uses fluidly throughout the course to deepen students understanding of concepts related to building science.
Differentiated instruction is built into the course, since students can self-select topics of personal interest for research. There is a deep respect for the prior knowledge that the diverse student body brings to class.

This is one place where we experience 21st century learning, since Professor Richman was as much concerned with what we learned as with how we learned, and how to become an independent learner.

Professor Richman was also very approachable, and provided students with many opportunities for interaction outside the classroom for direct support related to course work, as well as guidance related to the program and the building industry.

In my opinion, the educational experience of taking his course remains one of the most valuable experiences that the graduate program had to offer.

Sincerely,

Stephan Bibla, B.Ed, MBSc

Sustainability Office, Strategic Building and Renewal
Toronto District Schools Board
Instructional Leader
stephan.bibla@tdsb.on.ca

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

June 6, 2011

To Whom It May Concern:

I was first acquainted with Professor Russell Richman when he taught Sustainable Practices ASC 200 during my first year in the Architectural Science Bachelor Program. For the duration of this course, Professor Richman was a very insightful, helpful, and proficient professor. His enthusiasm, exceptional knowledge of the course material, and fair evaluations all contributed to provide students with an overall excellent learning experience.

When Professor Richman conducted lectures, he was always very enthusiastic about the material he presented. This enthusiasm would consequently extend to the students, making the course material much more enjoyable for many. He made classes engaging by inviting guest speakers who provided their expertise on different aspects of sustainable practices. By introducing students to such professionals, they were able to receive first hand knowledge and insight by people who were very well experienced in the field. Furthermore, through his own experience in the field and his valuable knowledge of the course material, he was able to provide insightful opinions on various matters that challenged students to be more aware of how they can change their lifestyles, including their careers, to maintain a healthy environment for future generations.

The projects that he assigned were a fair evaluation of everything that had been learned in class. They were engaging, and allowed students to demonstrate and build up an array of skills, from teamwork, to research, to critical skills. Furthermore, the projects allowed for student innovation and creativity, and he was able to expose them to the critical concepts of sustainability.

In addition, Professor Richman was also committed to his students and was available to assist them whenever they required help. He was willing to answer questions and provide students with the proper information that allowed them to feel comfortable with project aspects and course material.

Professor Richman overall made ASC 200 a very enjoyable experience. He allowed for everyone to conclude the course with a handful of new skills and information that would not only assist in understanding the complex characteristics of sustainable practices, but that would also help develop their skills as innovative people.

Setareh Shams

Ryerson – Letters – Solicited Letter from a Student (Ryerson

Letter of support for Professor Russell Richman

To whom ever this may concern,

I am writing this letter to reflect on my experience of being a student under the direction of Professor Russell Richman in the third year studio course, ASC520. The course required the professor to direct a number of students in both group and individual projects. Being the leader of the section, I had a lot of help and advice from Russell teaching and helping me achieve strong projects within a group of fifteen and time manage on my own work.

His teaching methodology has proven to be very effective as he uses very simple examples to explain complex ideas and gain attention and involvement from the whole class. He strongly encourages exchange of ideas and constantly pushes one to break conventions and his/her own boundaries. He displayed great dedication to his position as he was always available for office hours and was willing to change his own schedule to accommodate students' needs.

His relations with other professors have been very welcoming as he would refer students to other faculty in areas which they might have been able to provide more help. Areas in which he was unable to assist, he would take the time to research and return with sources or information. Russell constantly went out of his way to explain course material as he would bring in models and booklets for references and take the time to explain the matter to students both under and outside of his direction.

In summary, I consider myself very lucky to have been able to learn from Professor Russell Richman as I was challenged by his open mind to my ideas. It would have been an honour to have studied under his direction once again.

Ilona Korotkevich

4th year student in process towards the Bachelors Degree of Architectural Science

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

To whomever it may concern,

Dr. Russell Richman was my studio professor for the integration studio, ASC 620, during the second term of my third year in the Department of Architectural Science at Ryerson University.

Dr. Richman was consistently good natured, helpful and available for consultation. His efforts and dedication were invaluable in allowing me reach a high level of resolution to my own project and his advice often steered me in new directions of thinking about problems I encountered.

His insights and contributions, as a professional in the science of building and structural engineering were key to developing a project that was not only aesthetically pleasing but also feasible.

Dr. Richman provided constructive criticism, was forthcoming about his weaknesses as well as his strengths and knew where to direct me when I was facing an issue with which he was not intimately familiar. Regarding those issues with which he did have a high level of familiarity, he helped insure that I not only apply the knowledge he provided but also understand it.

The knowledge and know-how provided by Dr. Richman have helped me feel more confident and capable in my understanding and application of architecture as a whole.

Sincerely,

Dov Feinmesser

LEED AP©

Ryerson University, Department of Architectural Science, Class of 2011.

Ryerson – Letters – Solicited Letter from a Student (Ryerson)

Ivan Lízias Duarte
5 – 1989 Yonge Street, Toronto, ON, M4S 1Z8
(647) 968-1683 ivan_lizias@hotmail.com

June 07, 2011

Graduate Program in Building Science
Department of Architectural Science
Ryerson University
325 Church Street
Toronto, ON

Re: Dr. Russell Richman as a professor in BL8100 course

It is a pleasure to have the opportunity to write about Dr. Russell, a great professor that motivates students to go even further to excel. I met Dr. Russell during my first term (Fall 2009) in which he was my professor for the Building Science Theory course (BL8100). Honestly, when he initially presented himself and outlined the topics to be taught throughout the term, I was overwhelmed and became really concerned about failing the course. I am an architect and urban planner from Brazil, and 'building science' during my undergrad was related to passive design alternatives, exploring the natural light and ventilation. What I was about to learn in BL8100 was much more complex, intriguing and challenging, and I was still learning English.

The course BL8100 was one of the hardest courses in the program, and I am sure I could have failed if Dr. Russell was not the professor. The way he structured the course and his teaching methodology to convey the information really helps the students to learn and improve in the area. His passion in teaching is evident and his enthusiasm is contagious which ease the learning process. He definitely showed a thorough knowledge of the subject, and always ensured that his students were able to understand everything required. I felt that he was always prompt to help any student to fully understand each topic. Early in the course, I personally thought that his course objectives were too ambitious to be achieved in one term only. However, all the hard work that he proposed motivated me to go beyond and reach new limits. I feel confident to discuss and analyse building science related problems, even proposing solutions. His ability to teach helped me to achieve an 'A' in his course, even though the odds were against me.

Dr. Russell is one of the greatest assets in Ryerson University academia. All the knowledge he has and research interests towards sustainability in construction are crucial to solving contemporary problems towards better societies in the future. I am glad to have had him as a professor, an inspiration for my professional and academic life.

Please feel free to contact me at any time.

Best regards,

Ivan Lízias Duarte
MASc candidate in Building Science
Architect and Urban Planner (BR)

Ivan Lízias Duarte
1989 Yonge Street Suite 5 Toronto ON M4S 1Z8 (647) 968-1683 ivan_lizias@hotmail.com

Ryerson – Letters – Solicited Letter from a Student

To Whom It May Concern:

RE: Professor Russell Richman

I was a student of Professor Richman's ASC 200: Sustainable Practices course in the Winter of 2010 at Ryerson University. Before his course, my interest in all things "Green" was merely a hobby, but thanks to Professor Richman's enthusiasm it is a topic I hope to focus on in the future.

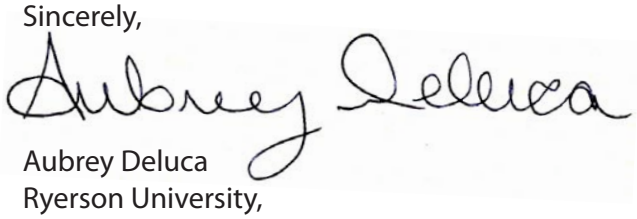
It was his charismatic and highly knowledgeable character that made the course a joy to participate in. His teaching style made the course load manageable and enjoyable. His eagerness to get us to explore controversial, new and unknown technologies and systems created opportunities for us to find something to be passionate about. Without him I don't think I would have looked into New Urbanism and now have an appreciation for intelligent urban planning.

His honest passion for the course subject was absolutely contagious and motivational. Professor Richman was respectful of our program's course load and did his best to plan our deadlines around our studio due dates, giving us as many opportunities for success in his class as possible.

He presented relevant material in an interesting and educational format. He brought in highly reputable guest speakers relevant to the weekly topic. He showed us video clips to explain how certain technologies worked, and documentaries to expose us to all points of views. He allowed us to make our own judgments and opinions on all the topics and share them with him in our weekly feedback. This feedback occurred in the form of a question or scenario he would present to us.

To rate Russell Richman on a scale of 1-10 is an impossible task. I cannot imagine a more inspiring and genuine professor.

Sincerely,



Aubrey Deluca
Ryerson University,
Architectural Science Student, Class of '13

7 Special Contribution to Teaching

None.

8 Teaching Assessments

There have been no teaching assessments since tenure was granted.

9 Other Material Relevant to Teaching

9.1Bringing Practice Into Teaching

Being a practicing engineering consultant allows me to bridge the world's of academia and the construction industry. In addition to augmenting my theoretical knowledge with practical, applied experience, I bring specific projects into various courses for assignments, projects, case studies, etc. The following section provides some examples of this value add from practising as a professional engineer.