COURSE OUTLINE

COURSE INFORMATION

Course Name: Building Science Course Code: CE4BP4

Session Offered: Winter 2024

Calendar Description: Building science theory; heat, air and moisture transfer; building envelope; building systems; energy consumption; sustainability considerations; LEED design

Instructor(s): Samir Chidiac Phone: 905 525 9140 Ext 27768

Email: chidiac@mcmaster.ca Office Hours/Location: Upon request by email

TA(s): George Efstathopoulos <efstathg@mcmaster.ca> Mouna Reda < redam1@mcmaster.ca>

Lecture Schedule Day(s): Mo, We, Th Time: 4:30 – 5:20

Tutorial Schedule Day(s): Tu Time: 2:30 – 4:20

1. COURSE OBJECTIVES

1) Introduce students to the principles of building Science
2) Analyse and design the building envelope components from a building science perspective

2. COURSE SPECIFIC POLICIES

"**The instructor and university reserve the right to modify elements of the course during the term. The university and instructor may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on the changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.**"

1. **Students are required to attend all the lectures and tutorials.**
2. **All email exchanges are to be via a McMaster University e-mail account**. **Emails from non-McMaster accounts will not receive a reply**.
3. We will not check nor reply to emails sent via Avenue.
4. Students are required to evaluate their peers for their contribution to the project. If there are any problems, communication/delivery or other problems, among group members, you are encouraged to first resolve it among yourselves. If the problem is not resolved within one week, the group is expected to contact the TA for assistance. If the problem is not resolved, the group members need to contact the instructor. Project Mark will be adjusted to reflect the contribution of the students.
5. **To pass the course, students must complete and receive a minimum average of 50% on the Term tests.**

Recommended Reference Material

It is not necessary to purchase a textbook to follow the course, as notes will be provided.
Students are encouraged to find their own self-study materials. Useful background reading includes:

1. Building Science for a Cold Climate, Hutcheon and Handegord, National Research Council of Canada, 1995.
2. Mechanical Electrical Systems in Architecture Engineering and construction, F.R. Dagostino and J.B. Wjuek, 5th edition, Pearson Prentice Hall, 2009.
3. Heating and Cooling of Buildings: Design for Efficiency, J.F. Krieder, P.S. Curtiss and A. Rabl, 2nd edition, New York: McGraw Hill, 2002.
4. Energy Audit of Building Systems: An Engineering Approach, M. Karti, CRC Press, 2000.
5. Building Science: Concepts and Application 1st Edition, Jens Pohl , John Wiley & Sons

Avenue

http://avenue.mcmaster.ca/

Lecture notes, Additional notes, and Problem Sets will be posted on Avenue. Students are expected to check and read all the material posted on avenue.

Problem Sets/Project/Tutorials

During this term, students are expected to work independently and in groups. Students are placed in a group of 4 to work together during tutorial time. Problem sets will be given during the term to assist in understanding the course material. Students are expected to work together on their project through the assigned problems during tutorial time.
Problem Set will be posted on avenue on Friday, 1 week ahead of the tutorial time. During the tutorial time, students are expected to work on their project/assigned problems. During the first part of the tutorial time, the TAs will solve similar problems on the board. The project timeline/progress will match the course material.

3. SCHEDULE		
WEEK 1-2	Introduction to building Science Building Envelope components & functions	Problem Set 1 Introduction to the group project
WEEK 3-4	Heat transfer through the building envelope	Problem Set / Project
WEEK 5-6	Principle of mass transfer, water transfer through the building envelope	Problem Set / Project
WEEK 7	Heat & Moisture modelling tools and techniques	Problem Set / Project
WEEK 8	Codes and regulations	Problem Set/ Project
WEEK 9	Building energy consumptions	Problem Set / Project
WEEK 10-11	Energy modelling tools and techniques Lighting fundamentals Building performance – durability, energy efficiency, sustainability, etc.	Project
WEEK 12	Problems of heat and moisture transport - freeze-thaw, condensation, corrosion, rot, mould, dissolution, etc.	Review / Project
WEEK 13	LEED - Leadership in Energy & Environmental Design	Project submission
Depending on the progress of the course either additional topics may be covered, or some topics may not be covered. The order of topic shown may change		

4. ASSESSMENT OF LEARNING	WEIGHT %
Term Tests: Feb 13 and March 26 – 2:30 to 4:30 pm	50
Group Project: Preliminary report (5%) and March 06, Final report April 10 – 12 noon.	40
Attendance	10
To pass the course, students must complete and receive a minimum of 50% on Term Tests	
Details of the group project will be discussed 1st week	

5. LEARNING OUTCOMES

1) understand the fundamental modes of heat transfer: conduction, diffusion, convection and radiation,
2) understand the fundamental modes of dry and moist air transfer: convection,
3) understand the fundamental modes liquid/moisture transfer: sorption and diffusion,
4) know the building envelope components and functions,
5) assess the performance, durability, and code requirements for building envelope components,
6) know the various building systems,
7) model the heat and moisture transfer in building envelope,
8) model the energy consumption of buildings, and
9) be familiar with LEED

6. COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their "@mcmaster.ca" alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.
- **Inform the instructor of a conflict with the scheduled term tests in the first week of class by email to chidiac@mcmaster.ca.**

7. POLICIES

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the *Academic Integrity Policy*, located at https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/.

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the *Code of Student Rights & Responsibilities* (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's *Academic Accommodation of Students with Disabilities* policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

In the event of an absence for medical or other reasons, students should review and follow the *Policy on Requests for Relief for Missed Academic Term Work*.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office ***normally within 10 working days*** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

8. MCMASTER GRADING SCALE		
Grade	**Equivalent Grade Point**	**Equivalent Percentages**
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49