



**Faculty of Engineering**  
**Department of Civil Engineering**  
**COURSE OUTLINE**

**CIVE 295 – Building Science Fundamentals**

**Term – Summer 2020 (202005)**

<b>Instructor</b>	<b>Office Hours</b>
Dr. Ralph Evins	Zoom during lecture times
E-mail: revins@uvic.ca	

**List all prerequisites and co-requisites:** MATH 101. CHEM 150 and PHYS 111 are highly recommended.

**LECTURE DATE(S)**

Section: A01	Days: M Th	Time: 11:30-12:50
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**TUTORIAL SECTIONS**

Section: T01	Days: W	Time: 1:30-2:20
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<b>TA Name</b>
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## COURSE OBJECTIVES:

This course teaches the principles that govern energy flows in buildings and their application to the behavior and design of low-energy buildings. The course consists of five modules:

1. Key concepts of energy use in buildings and associated transfer concepts (conduction, radiation, convection)
2. Air flow, ventilation and buoyancy in the context of buildings, and associated fluid dynamics.
3. The boundary conditions of building design: climate and thermal comfort.
4. Solar radiation, solar angles and shading, daylight and artificial lighting.
5. Final project, putting the above engineering knowledge to use on a case study project of a low-energy home in Victoria.

The course places the fundamental concepts from physics and chemistry in the context of buildings. The tutorials and assignments relate the equations learnt to real-world example problems. Guest lectures will cover advanced topics in greater depth.

**LEARNING OUTCOMES:** At the end of this course, students will be able to:

1. Describe and explain the main energy flows in buildings, including the influence of climate, behavior of building components, and thermal comfort of users.
2. Identify key measures for reducing the energy demand of buildings.
3. Calculate the main components of the energy balance of a building zone.
4. Apply the equations and methods of analysis related to building energy flows to new problems.
5. Explain the assumptions underlying the simplified treatment of energy flows in buildings, and identify scenarios in which these are not appropriate.
6. Analyze the interactions between the different energy flows in a building.
7. Assess and evaluate design decisions relating to building energy use, including both the technical performance and the broader context.
8. Analyze the influence of climate on energy flows in a building, and devise appropriate engineering solutions to address these.
9. Develop an engineering solution appropriate to a specific context, and critically evaluate performance against soft criteria.
10. Execute a project to develop an engineering solution from first principles to concept design, including presentation and technical reporting.

	Weight	Date
Quick questions, 1% each	20%	2 per week
8 quizzes, 5% each	40%	See schedule
2 assignments, 10% each	20%	See schedule
Final project	20%	Due end of term

- Quick questions are to be completed on CourseSpaces.
- Assignments will be distributed via CourseSpaces. Submissions will be made electronically via CourseSpaces.
- Quizzes will be conducted on CourseSpaces. A formula sheet of useful equations will be provided.
- The final project will be completed in groups, and will consist of a report and a presentation.

## Course Schedule

Week beginning		
1	04-May	Intro & Course outline; Energy and power flows; Conduction (Theo)
2	11-May	Radiation; Energy balances Quiz 1
3	18-May	Thermal mass Quiz 2
4	25-May	Housing for Indigenous communities (Pierre) Assignment 1
5	01-Jun	Convection; Non-dimensional numbers Quiz 3
6	08-Jun	Airflow; Buoyancy; Wind; Infiltration Quiz 4
7	15-Jun	Psychrometrics Quiz 5
8	22-Jun	Thermal comfort; Climate Quiz 6
9	29-Jun	Climate data; Python (Theo) Assignment 2
10	06-Jul	Solar radiation (Gaelle) Quiz 7
11	13-Jul	Daylight Quiz 8
12	20-Jul	Project work
13	27-Jul	Project work Project due end of term

## GENERAL INFORMATION

### Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

### Course lecture notes

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

### There will be no supplemental examination for this course.

#### "Attendance

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time....

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course." UVic Calendar, (2017-2018)  
<http://web.uvic.ca/calendar/undergrad/info/regulations/attendance.html>

### Accommodation of Religious Observance

The University recognizes its obligation to make reasonable accommodation for students whose observance of holy days might conflict with the academic requirements of a course or program. Students are permitted to absent themselves from classes, seminars or workshops for the purposes of religious or spiritual observance.

In the case of compulsory classes or course events, students will normally be required to provide reasonable notice to their instructors of their intended absence from the class or event for reasons of religious or spiritual observance. In consultation with the student, the instructor will determine an appropriate means of accommodation. The instructor may choose to reschedule classes or provide individual assistance.

Where a student's participation in a class event is subject to grading, every reasonable effort will be made to allow the

student to make up for the missed class through alternative assignments or in subsequent classes. Students who require a rescheduled examination must give reasonable notice to their instructors. If a final exam cannot be rescheduled within the regular exam period, students may request an academic concession.

To avoid scheduling conflicts, instructors are encouraged to consider the timing of holy days when scheduling class events. For further information, including a list of days of religious observances, please contact the Equity and Human Rights Office or visit their website: [web.uvic.ca/eqhr](http://web.uvic.ca/eqhr)

### Discrimination and Harassment Policy (GV0205)

<http://web.uvic.ca/calendar/general/policies.html>

### Standards for Professional Behaviour

*"It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals...."*

You are advised to read the Faculty of Engineering Document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<https://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

### Policy on Academic Integrity

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the Undergraduate Calendar

<http://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html> for the UVic policy on academic integrity.

### Equality

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements.

Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Resource Centre for Students with a Disability located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members."