

2026-27 & Fall

Building Services Engineering

Civil and Environmental Engineering/Faculty of Engineering and Design

ACSE 4107/BLDG 5302

Teaching Team

Instructor:

Pedram Nojedeheh, PhD, CEM

Email Address: PedramNojedeheh@cunet.carleton.ca

Office location: Canal Building, 7206

Office hours: by appointment only and at least 24 hours before assignments are due.

TA(s): To be announced later

Course Description and requirements

1) Course schedule*

Lectures: Mondays/7:05-9:55 pm/ [REDACTED]

Labs: Wednesdays/2:35 pm-3:55 pm/ [REDACTED]

*Please refer to the [Public Class Schedule](#) for the most recent information

2) Course description

This course provides students with working knowledge of how building mechanical, electrical, and plumbing (MEP) systems are designed and operated. Major building systems covered by the course include: heating, ventilating, and air-conditioning (HVAC) equipment, lighting and electrical systems, controls, and water/wastewater. Standard and advanced operational strategies and the systems that support them are also covered. By the end of the course, students should have good knowledge of building system components and integration, quantitative design methods, and operational strategies. Guest lectures and technical tours will be used to supplement the regular lectures. Lab/tutorial activities include field studies, software use, and example problem solving.

3) Precluded courses

For BLDG 5302: Precludes additional credit for: ENVE 4107

4) Prerequisites and recommended knowledge

For ACSE 4107: CIVE 3209 and (ACSE 3105 or ENVE 4105)

5) Learning Outcomes

After taking the course, students should be able to:

- Be able to identify and describe the functionality of all major building service systems, their components, and the role they serve in buildings

- Perform calculations and modelling to support preliminary design of building HVAC, electrical, and water systems
- Understand and quantify the broad impacts of building service systems on the building, occupants, and the environment

6) Graduate Attributes

The Canadian Engineering Accreditation Board (CEAB) requires graduates of undergraduate engineering programs to possess 12 attributes. Courses in all four years of our programs evaluate students' progress towards acquiring these attributes. Aggregate data (typically, the data collected in all sections of a course during an academic year) is used for accreditation purposes and to guide improvements to our programs. Some of the assessments used to measure GAs may also contribute to final grades; however, the GA measurements for individual students are not used to determine the student's year-to-year progression through the program or eligibility to graduate. The following list provides the GAs that will be measured in this course, along with the Learning Outcomes that are intended to develop abilities related to these attributes.

GA	Assessment Tool
1.15.C Discipline-specific concept	This GA will be assigned based on the students' letter grade performance in the course (0-100) through final exams, assignments and a final project.

For information on GAs and continual curriculum improvement, visit the [Accreditation section of Engineers Canada website](#).

7) Accreditation Units

Math	Natural Science	Complementary Studies	Engineering Science	Engineering Design
-	-	-	50%	50%

8) Text book(s)/Learning Materials and their costs

Course and exam materials are drawn from freely available sources, including textbook chapters, PowerPoint presentations, conference and journal papers, government reports, and building standards. Please refer to the course schedule for specific readings and materials. Concepts discussed by guest lecturers may also be included in course evaluations. Students are **not required to purchase any textbooks or other learning materials** for this course. The following resources are **optional** for further reading:

1. **Chadderton, D. V.** *Building Services Engineering*, 6th ed. (\$358.21; selected chapters are available online at no cost through the library)
2. **Wujek, J. B.** *Mechanical and Electrical Systems in Architecture, Engineering, and Construction*, 5th ed. (~\$265)
3. **McQuiston, F. C., et al.** *Heating, Ventilating, and Air Conditioning: Analysis and Design* (~\$164)
4. **2020 ASHRAE Handbook—HVAC Systems and Equipment** (Available online at no cost through the library)
5. **2025 ASHRAE Handbook—Fundamentals**. (Available online at no cost through the library)

9) Topics and tentative plan

Please refer to the course schedule on Brightspace for detailed, up-to-date information on lectures, lab/PA sessions, assignment deadlines, project milestones, and other important dates.

Topics may include:

- Fundamentals of building services engineering
- HVAC system anatomy and major components
- Indoor and outdoor design conditions
- Heating and cooling load estimation and HVAC sizing
- Terminal units and zone air distribution
- Duct and piping systems
- Fans and pumps
- Central HVAC plant equipment
- Building electrical systems
- Building controls and automation
- Lighting systems
- Solar photovoltaic systems
- Energy auditing and building energy analysis
- Gas and steam systems
- Building utilities
- Water supply systems
- Sanitary drainage and wastewater systems

Labs/PA sessions are expected to begin in Week 2 (week of September 14, 2026). Lab/tutorial sessions will include a combination of hands-on learning activities, including software installation and use, practical exercises with relevant tools, individual and group work periods, and guided discussion of example problems.

Assignments will be posted at least two weeks before their due dates. Students should refer to the course schedule on Brightspace, which will be updated regularly, for confirmed deadlines and activities.

10) Evaluation and marking scheme

Assignments (2 total, spaced at about 3-week intervals)	15%
Mid-term exam – covers material up to the exam date	20%
Final Group Project (Energy Modelling and Carbon Pathway Study)	25%
Final Exam - Covers entire term; exam will be scheduled during the exam period.	40%

All evaluation (assignments, exams) will be in SI units. However, it would be beneficial for students to be comfortable with basic conversions to IP units (e.g., CFM).

a) Final and Midterm Examination

- i) Exam Conditions: Exams will be closed-book and proctored on campus and will cover all course material taught from the beginning of the term up to the date of the exam. Students may bring one single-page cheat sheet to the exam. Calculators are permitted. Drawing instruments, such as a scale ruler, set square, and sharp pencil, may also be required. Students must achieve a minimum grade of 50% on the final exam to pass the course.

- ii) **Final exams are for evaluation purposes and will not be returned to students.**

Deferred Final Examinations: Students who are unable to write the final examination because of extenuating circumstances, as defined in the [Academic Consideration Policy](#), may apply for accommodation by contacting the Registrar's office. Consult the [Section 4.3 of the University Calendar](#).

- b) **Term work late submission policy:** 20% reduction per every day late.

- c) **Deferred term work and self-declaration**

Students who claim extenuating circumstances defined in the [Academic Consideration Policy](#), as a reason for missed term work, including a midterm exam, are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases. This must occur no later than three (3) days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Consult [Section 4.4 of the University Calendar](#). A missed midterm examination due to approved extenuating circumstances will be handled in accordance with the same Academic Consideration Policy, and alternate arrangements will be determined by the instructor.

11) Academic dates

Students should be aware of the academic dates (e.g. last day for academic withdrawal) posted on the Registrar's office website <https://carleton.ca/registrar/registration/dates/academic-dates/> or [Calendar website](#).

Academic Integrity and Plagiarism

- a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: <https://carleton.ca/engineering-design/current-students/fed-academic-integrity> Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or, expulsion.
- b) One of the main objectives of the Academic Integrity Policy is to ensure that **the work you submit is your own**. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source.

Examples of violations of the policy include, but are not limited to:

- any submission prepared in whole or in part, by someone else;
- using another's data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and

- failing to acknowledge sources of information through the use of proper citations when using another's work and/or failing to use quotations marks.

Unauthorized Dissemination

As per Carleton's [Academic Integrity Policy](#), Unauthorized Dissemination is a violation of the standards of academic integrity to publish, disseminate, or otherwise make available to a third-party instructional material where the instructor has explicitly prohibited their dissemination.

The materials (including the course outline, slides, posted notes, videos, labs, projects, assignments, quizzes, exams, and solutions) created for this course are intended for personal use only. They may not be reproduced, redistributed, or disseminated in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—without written permission from the author(s), both during and after the semester.

Generative Artificial Intelligence (GenAI)

As our understanding of the uses of GenAI and its relationship to student work and academic integrity continues to evolve, students are required to discuss their use of GenAI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

You are encouraged to use AI tools (e.g., ChatGPT, Gemini, Copilot, and other large language models) in this course. Effective use of AI is an emerging professional skill, and the course will guide on how these tools can be used appropriately.

When using AI, keep the following expectations in mind:

- **Prompt quality matters.** Minimal or vague prompts often produce low-quality results. Good outcomes typically require clear instructions, refinement, and iteration.
- **Do not assume AI-generated information is correct.** Treat numerical values, technical claims, references, and factual statements as potentially incorrect unless you can verify them independently. You are responsible for any errors or omissions in submitted work.
- **Verify technical content using reliable sources.** Wherever possible, check AI-generated information against primary sources such as textbooks, standards, peer-reviewed publications, manufacturer documentation, or official government sources.
- **Acknowledge your use of AI.** If AI is used in an assignment, include a short statement at the end describing how AI was used and, where appropriate, the main prompts or types of prompts used. Failure to disclose AI use when required may constitute a violation of academic integrity expectations.
- **Do not upload or share course materials with AI tools.** Course content, including lecture slides, textbook chapters, exam materials, or other instructor-provided resources, must not be uploaded, copied, or otherwise shared with external AI platforms unless the instructor has explicitly given permission. This helps protect course intellectual property, assessment integrity, and potentially confidential or copyrighted material.
- **AI may be used to support programming tasks.** This course includes Python, Python libraries, and EnergyPlus. AI tools can be particularly useful for generating, explaining, debugging, and modifying code. However, code should be tested in small, manageable sections to confirm that it produces the expected results before being incorporated into a larger workflow.

- **Use AI selectively.** AI is a tool, not a substitute for engineering judgment, subject knowledge, or critical thinking. Consider whether its use is appropriate for the specific task.
- **Review and substantially edit AI-generated text.** Ensure that the final submission is accurate, relevant, clear, and consistent with your own writing style and the requirements of the assignment.
- **You remain responsible for the final work.** This includes technical inaccuracies, unsupported statements, irrelevant content, fabricated references, incorrect calculations, and other errors introduced through AI use.

The most effective use of AI is typically when you already understand the underlying topic well enough to evaluate, verify, and improve its output.

Safer Learning and Working Environment

Carleton University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the [Department of Equity and Inclusive Communities](#) at equity@carleton.ca, [Ombuds Services - Carleton University](#) or submit an anonymous human rights concern through [this form](#).

Academic Accommodations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website (students.carleton.ca/course-outline)

Engineering Academic Advising

[The Engineering Academic Support Service](#) assists undergraduate engineering students with course selection, registration, and learning support from first-year through to graduation.

Academic Advisors Contact can be found here: <https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/>.

Student Mental Health and Wellness

As a university student you may experience a range of mental health challenges that can significantly impact your academic success and overall well-being. Carleton's [Wellness Services Navigator](#) is designed to help students connect with mental health and wellness resources.

If you need to talk to someone from the department for more information and support with connecting to resources, you can contact the following faculty members, depending on your program. Or contact the department.

Department: CEEUGChair@cunet.carleton.ca

Prof. Shoeleh Shams

Email: shoelehshams@cunet.carleton.ca, Office: 4242 Mackenzie

ACSE: Prof. Cara Lozinsky

Email: caralozinsky@cunet.carleton.ca, Office: 2374 Mackenzie

CIVE: Prof. Christian Viau

Email: Christian.Viau@carleton.ca, Office: 4535 Mackenzie

ENVE: Prof. Cole Van De Ven

Email: cole.vandeven@carleton.ca, Office: 6210 Canal Building

Here is a list of on-campus and off-campus recourses:

1. [Emergencies and Crisis](#)
2. **Carleton's Wellness Desk:** Located at 204A MacOdrum Library, is a space for students to learn about resources, connect with our Wellness Coordinator, and decompress during stressful times of the year. You can pop into the Wellness Desk any time during its hours of operation – no appointments necessary! <https://wellness.carleton.ca/mental-health/wellness-desk/>
3. **Carleton's Care and Support Team:** The role of a Care and Support Team is to support students with any questions or concerns they may have relating to their academics, well-being, finances or any other challenges they may be experiencing. <https://wellness.carleton.ca/mental-health/student-care-and-support-team/>
4. **Carleton's Health and Counselling Services:** To book an appointment visit the [CHR Connect App](#) or contact the main clinic by calling 613-520-6674 ext. 2. If urgent, let the Patient Care Coordinator know or go in person to the main clinic (2500 Carleton Technology and Training Centre Building) and indicate that they are in crisis and need to speak to someone right away. <https://wellness.carleton.ca/counselling/>
5. **Carleton's Single Session Counselling:** To book an appointment visit the CHR Connect App. <https://thconnect.telushealth.com/mobile-app-information/xz6lzGry>
6. **Residence Counselling and Wellness Service:** Counselling services specifically for students in residence. To book an appointment call 613-520-2600 ext. 8061. <https://carleton.ca/health/residence-counselling/>
7. **Carleton's Therapy Dogs:** Carleton's therapy dogs are around campus with their owners (who are Carleton University staff and faculty) to comfort and provide support to help you thrive as a university student. <https://wellness.carleton.ca/mental-health/therapy-dogs/>
8. **Good2Talk (1-866-925-5454):** Good2Talk is a free, confidential helpline providing professional counselling and information and referrals for mental health, addictions and well-being to post-secondary students in Ontario, 24/7/36 <https://good2talk.ca/>
9. **The Walk-In Counselling Clinic (off-campus community resource):** The Walk-in Counselling Clinic has offices in various locations across Ottawa and the greater Champlain region that are open 7 days a week. Individuals will be assisted, with no appointment, on a first-come, first-serve basis during the Walk-in Counselling Clinic hours. The Walk-in Counselling Clinic **offers services in many**

languages and is free and confidential. More information can be found at: <https://walkincounselling.com/>

10. **Distress Centre of Ottawa and Region:** Available 10am-11pm, 7 days/week, 365 days/year. **Distress Line:** 613-238-3311, **Crisis Line:** 613-722-6914 or 1-866-996-0991, **Text:** 343-306-5550. <https://www.dcottawa.on.ca/>
11. **Distress and Crisis Ontario,** Available for chat 2 pm – 2 am EST. <https://www.dcontario.org/>
12. **BounceBack Ontario (Toll-Free: 1-866-345-0224)** is a free skill-building program managed by the Canadian Mental Health Association (CMHA). It is designed to help adults and youth 15+ manage low mood, mild to moderate depression and anxiety, stress or worry. Delivered over the phone with a coach and through online videos, you will get access to tools that will support you on your path to mental wellness. <https://bouncebackontario.ca/>