Instructor: Burak Gunay, PhD
Office: CB 5206
Office Hours: Monday 9:00 to 10:00 am and Thursday 4:30 to 5:30 pm
Email: Burak.Gunay@carleton.ca

Course meets: Tuesday 6:05 pm to 8:55 pm

Learning Objectives:
1. Basic understanding on statistical analysis and modelling using sensor and metering data from building energy management systems
2. Basic understanding on building energy management systems
3. Fundamentals of exploratory data mining
4. Fundamentals of linear and generalized linear models
5. Familiarity about optimization methods
6. Basic understanding about model selection and validation procedures
7. Introductory knowledge about inverse modelling in building applications
8. Introductory knowledge about classification and clustering
9. Ability to apply basic data analysis and modelling concepts to tackle problems in building operation and maintenance
10. Ability to use Matlab for basic data wrangling and analysis

Software: Matlab

Course Plan:
Lecture 1: Introduction
Lecture 2: Building energy audits and retro-commissioning
Lecture 3: Inverse modelling and remote energy auditing
Lecture 4: Benchmarking the performance
Lecture 5: Fault detection and diagnostics
Lecture 6: Preventive and predictive maintenance
Lecture 7: Load forecasting
Lecture 8: Predictive control of the indoor climate
Lecture 9: Adaptive control of the indoor climate
Lecture 10: Advanced sensing technologies for built environment
Lecture 11: Demand response and smart grid
Grade Distribution:
Assignment 1 – Change point models 20%
Assignment 2 – Multiple linear regression and artificial neural networks 20%
Assignment 3 – Load forecasting 20%
Assignment 4 – Optimal sequencing for plant equipment 20%
Assignment 5 – Optimal start of AHUs 20%

Letter Grade Distribution:

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<th>Grade</th>
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Academic Regulations, Accommodations, Plagiarism

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university’s website [here](#).

Academic Accommodations for Students with Disabilities

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

For Religious Obligations

Students requesting academic accommodation on the basis of religious obligation should make a formal, written request to their instructors for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory event. Accommodation is to be worked out directly and on an individual basis between the student and the instructor(s) involved. Instructors will make accommodations in a way that avoids academic disadvantage to the student. Students or instructors who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton’s Academic Accommodation policies, or may contact an Equity Services Advisor in the Equity Services Department for assistance.

For Pregnancy

Pregnant students requiring academic accommodations are encouraged to contact
an Equity Advisor in Equity Services to complete a letter of accommodation. The student must then make an appointment to discuss her needs with the instructor at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required.

**Plagiarism** Plagiarism is the passing off of someone else’s work as your own and is a serious academic offence. For the details of what constitutes plagiarism, the potential penalties and the procedures refer to the section on Instructional Offences in the Undergraduate Calendar.

**What are the Penalties for Plagiarism?** A student found to have plagiarized an assignment may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; and/or a reprimand; a refusal of permission to continue or to register in a specific degree program; academic probation; award of an FNS, Fail, or an ABS.

**What are the Procedures?** All allegations of plagiarism are reported to the faculty of Dean of FASS and Management. Documentation is prepared by instructors and/or departmental chairs. The Dean writes to the student and the University Ombudsperson about the alleged plagiarism. The Dean reviews the allegation. If it is not resolved at this level then it is referred to a tribunal appointed by the Senate.

Plagiarism and cheating at the graduate level are viewed as being particularly serious and the sanctions imposed are accordingly severe. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy (See [here](https://example.com)). The Policy is strictly enforced and is binding on all students. Plagiarism and cheating – presenting another’s ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the graduate degree. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; a refusal of permission to continue or to register in a specific degree program; academic probation; or a grade of Failure in the course.

**Intellectual Property Statement** Student or professor materials created for this course (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).