ENV E 421 Municipal Systems

Fall 2024 - September 03 to December 09

Class time: Tuesday, Thursday 12:30-13:50 Location: NRE 2-003

Instructor:

Bipro Dhar, PhD, P.Eng, He/him
(780)248-1923
bipro@ualberta.ca
DICE 6-277
Office Hours: Office hours are by request or appointment only. There will be separate office hours for exams

Course Description:

*3.8 (fi) (either term, 3-0-3/2) Detailed and advanced design of water supply systems, sewerage, and storm drains. Rates of flow and hydraulics of networks and sewers, rainfall-runoff analysis, storm water storage, and loads on conduits. Extensive computer simulation of systems.

Prerequisites: CIV E 331

Course synchronous and asynchronous content delivery schedule:

All lectures will be delivered in-person. In the event of instructor's illness, recorded lecture materials will be provided on eClass for asynchronous learning.

Land Acknowledgment:

The University of Alberta respectfully acknowledges that we are located on Treaty 6 territory, a traditional gathering place for diverse Indigenous peoples including the Cree, Blackfoot, Métis, Nakota Sioux, Iroquois, Dene, Ojibway/ Saulteaux/Anishinaabe, Inuit, and many others whose histories, languages, and cultures continue to influence our vibrant community.

TA Information:

Dr. Sherif Ismail
• For lab and software related matters
• E-mail: saismai1@ualberta.ca

Romana Saila
• For lab and software related matters
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Monisha Alam
• For assignments and others
• E-mail: monisha@ualberta.ca

Lab Sections:

Section	Day	Time	Location
LAB D51	Friday	14:00 - 16:50	NRE 2-090
LAB D52	Friday	14:00 - 16:50	NRE 2-090

Course Objectives & General Content:

Course Description
Detailed and advanced design of water supply systems, sewerage, and storm drains. Rates of flow and hydraulics of networks and sewers, rainfall-runoff analysis, storm water storage, and loads on conduits. Extensive computer simulation of systems.
Prerequisites: CIV E 331.

Course Outline
Chapter 1: Municipal Water Systems, Water Demands and Forecasting
Chapter 2: Water Distribution Systems
Chapter 3: Sanitary Sewer Systems
Chapter 4: Strom Sewer Systems
Chapter 5: Pipe Materials and System Maintenance

Learning Objectives
• Learning how to forecast water demands using historical population data.
• Obtain flow data for and design pipes in a water distribution network using hydraulic modelling software to satisfy applicable design criteria.
• Analyze chlorine residual decay over time in a water distribution network using hydraulic modelling software.
• Calculate the load on a rigid conduit buried in a trench and select appropriate combinations of pipe strength class and bedding type.
• Design storm and sanitary sewer systems by the spreadsheet method and by using hydraulic modelling software to satisfy prevailing design criteria.
• Analyze storm water detention pond performance using hydraulic modelling software.

Learning Outcomes:

By the end of this course, students should be able to:

1. Obtain flow data for and design pipes in a water distribution network using hydraulic modelling software to satisfy applicable design criteria;
2. Analyze chlorine residual decay over time in a water distribution network using hydraulic modelling software;
3. Prepare system head-capacity curves and determine the required system operating point(s);
4. Prepare modified pump curves for parallel pump operation;

5. Calculate the load on a rigid conduit buried in a trench and select appropriate combinations of pipe strength class and bedding type;
6. Design a storm sewer by the spreadsheet method and by using hydraulic modelling software to satisfy prevailing design criteria; and
7. Analyse storm water detention pond performance using hydraulic modelling software.

Marking Scheme:

Activity	(A)Synchronous	Due/Scheduled	Weight
Assignments			20%
Lab reports			20%
Mid-term		October 22, 2024 (12:30-1:30 PM)	20%
Final Exam		December 18, 2024 (8:30-10:00 AM)	40%

The Faculty recommended grade point average for a 400 level course is 3.1. Instructors have the leeway to deviate from this average and can assign grades based on their own scheme. All grades are approved by the department chair (or delegate). The office of the Dean has final oversight on all grades.

Term Work

All term work solutions will be posted no later than the last day of classes. All term work will be returned to students by the final day of classes, with the exception of major term work due in the last week of classes. The latter will be returned by the day of the final examination or the last day of the examination period if there is no final examination in the course as per university policy; instructors will make accommodations to return these term work. It is the responsibility of the student to pick up all their term work at the specified time and place. Any unreturned term work, shall be retained and then shredded six months after the deadline for reappraisal and grade appeals. Final examinations will be kept for one year as required by university guidelines and the Government of Alberta's Freedom of Information and Protection of Privacy Act.

Calculator Policy

Only approved non-programmable calculators are permitted in examinations. Any calculator taken into an examination must have a sticker identifying it as an acceptable non-programmable calculator (gold sticker). Students can purchase calculators at the University Bookstore with the stickers already affixed. Calculators purchased elsewhere can be brought to the Student Services where the appropriate sticker will be affixed to the calculator.

Expectations for AI use

In this course, our primary focus is to cultivate an equitable, inclusive, and accessible learning community that emphasizes individual critical, creative, and affective thinking as well as disciplinary problem-solving skills. While it is reasonable to assume AI-use might accelerate some aspects of coursework, the determination has been made to not use such tools. In order to achieve the identified course learning outcomes, students must be given learning opportunities and tasks which enable students to develop and demonstrate their skills and knowledge across course and discipline specific projects, assignments, and

assessments.

To ensure a just and consistent learning experience for all students, the use of advanced AI-tools such as ChatGPT or Dall-E 2 is strictly prohibited for all academic (written/coding/creative/etc.) work, assignments, and assessments in this course. Each student is expected to complete all tasks without substantive assistance from others, including AI-tools.

IMPORTANT: Please note that AI use is strictly prohibited in course work, assignments, and assessments. Failure to abide by this guideline may be considered an act of cheating and a violation as outlined in the relevant sections of University of Alberta (November 2022) Code of Student Behaviour .

Text and References (Mandatory):

Lecture covering each part of the course content will be available to download from the eCanvas. This course will be mainly based on the course lectures.

Text and References (Recommended):

For references, the following textbooks are recommended:

- Akan, A. Osman; Houghtalen, Robert J. 2003. Urban Hydrology, Hydraulics, and Stormwater Quality - Engineering Applications and Computer Modeling. John Wiley & Sons.
- Alberta Environment. Multiple Years. Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems. Edmonton, Alberta: Standards and Approvals Division, Municipal Engineering Branch. Available online as an Adobe pdf at: https://open.alberta.ca/publications/5668185
- ASCE/EWRI/WEF, 2007. Gravity Sanitary Sewer Design and Construction. 2nd Ed. ASCE. Reston VA.
- Jones, G.M., 2008. Pumping Station Design. Revised 3rd Ed. Elsevier. Burlington MA, USA.
- Mays, L. 2000. Water Distribution Systems Handbook. McGraw-Hill Book Co.

Website:

eCanvas

Did you know that the University of Alberta has various low-to-no-cost services to help students succeed? Visit http://www.deanofstudents.ualberta.ca/ for information about the academic, wellness, and various other support services available to U of A students. It's never too early or too late to seek help!

University and faculty policies

Respect and professionalism

The Faculty of Engineering is committed to fostering and protecting an equitable, inclusive, and respectful work and study environment in line with University of Alberta policies and professional engineering industry standards.

The faculty prepares students to uphold industry standards to become a Professional Engineer (P.Eng). Therefore, respect, professionalism, and accountability must be upheld within the Faculty of Engineering and the University of Alberta.

Academic integrity

All students are expected to follow the University of Alberta's Student Code of Behaviour and Student Conduct Policy. The faculty expects an environment free of harassment, discrimination, and bullying. We encourage you to talk to the Office of Safe Disclosure and Human Rights about experiences, questions, or concerns. Additional resources and support for students are attached below.

Engineering students studying in the province of Alberta must also follow the Code of Ethics set by the Association of Professional Engineers and Geoscientists of Alberta (APEGA).

Course outline policies, course requirements, evaluation and grading information can be found in the University Calendar.

Safety during learning activities

In all Faculty of Engineering courses, labs, seminars or other learning activities, safety is of paramount importance. In some cases, laboratory work in a program requires high standards for risk management to keep potential hazards safely under control.

Anyone found to be unable to function safely in the class, lab, seminar or other learning activity may be asked to leave or be removed for their and the safety of other participants and instructors in alignment with the Student Code of Behaviour and Student Conduct Policy. As members, or prospective members, of the engineering profession, it is your responsibility to identify and inform the proper authorities of unsafe work.

Audio and video recording

Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan.

Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

Only those items specifically authorized by the instructor may be brought into the exam facility. Students must not bring any unauthorized electronic device into an examination room, including cell phones or other devices.

Student services and support

Health & Wellness Support

Counselling and Clinical Services

Free, short-term, appointment-based counselling and psychiatric services. Also offers drop-in workshops. Book an initial consultation. Visit uab.ca/CCS to learn more.

Wellness Supports Social Workers

Free one-on-one support for students in the areas of housing, finances, academics, personal wellness, life skill development, family dynamics, system navigation, and any area of life where there is a desire to invite change. Visit uab.ca/wellness to learn more.

Sexual Assault Centre

Free, anonymous, and confidential drop-in counselling. Visit uab.ca/UASAC to learn more.

The Office of Safe Disclosure & Human Rights (OSDHR)

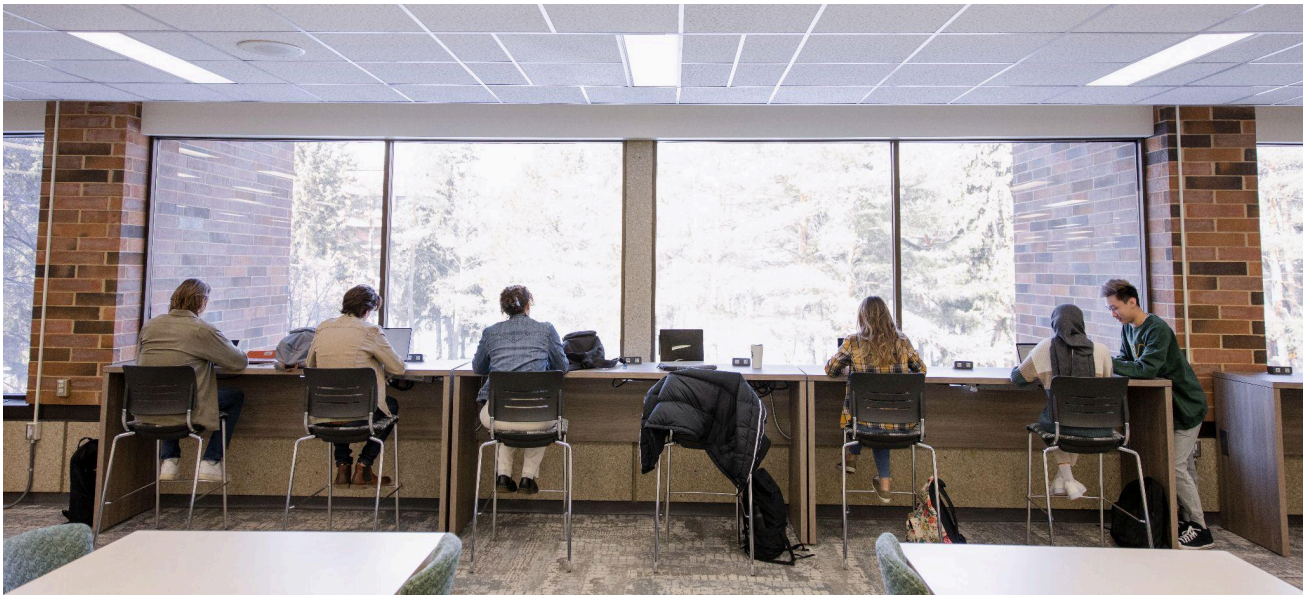
The OSDHR advises confidentially on sensitive issues you may not feel comfortable solving on your own. Contact the OSDHR if you want to get help or to make a report while keeping your privacy. Visit uab.ca/OSDHR to learn more.

HIAR (Helping Individuals at Risk)

If you're worried about someone, contact HIAR, who can help assess risk and connect individuals to support. Learn more at uab.ca/HIAR.

Immediate External Supports

Health Link Alberta: 811
Suicide Crisis Helpline: 988



Academic support

Academic Success Centre
Access to a variety of services to maximize your academic success. Learn more at uab.ca/ASC.

Accessibility Resources
Connects students with disabilities to accommodations. Learn more at uab.ca/Access under accommodations + accessibility.

Decima Robinson Support Centre
Academic support for 100- or 200-level introductory calculus, linear algebra and statistics courses. Visit uab.ca/DSC to learn more.

Engineering Student Success Centre
The Faculty of Engineering provides drop-in tutoring for first-year courses. Visit uab.ca/ESSC to learn more.

Office of the Student Ombuds
Call for complex problems and conflict mediation. Learn more at uab.ca/ombuds.

Financial support

Student Service Centre

For awards and other funding support. Learn more at uab.ca/ask.

Campus Food Bank

The Campus Food Bank Society is an independent charity supporting University of Alberta students, faculty, staff, and alumni for up to five years. For additional information visit their website at campusfoodbank.com.