

Western University - Faculty of Engineering
Department of Civil and Environmental Engineering

CEE 3355b – Municipal Engineering Design – Course Outline 2024

This course applies the principles of hydraulics and hydrology in the design of municipal water systems and introduces the student to design and analysis tools that are used in practice. The general objectives are for the student to become able to:

- apply knowledge of hydrology and statistics to describe rainfall events;
- use appropriate models to quantify the volume and rate of runoff resulting from rainfall events;
- use current methods to design stormwater drainage structures;
- recognize the effect of urbanization on stormwater runoff and design effective measures to mitigate this impact;
- use stormwater computer models effectively as part of the design process;
- understand municipal sanitary sewer and water distribution systems;
- improve communication skills by documenting design decisions in coherent and legible design calculations, preparing professional engineering reports and delivering effective oral presentations;
- recognize the need for life-long learning to keep abreast of new design and construction methods, enhance one's abilities as a designer, and maintain one's professional competence.

Calendar Copy:

Application of hydraulics and hydrology in design of water-related municipal systems. Topics include municipal water requirements and waste volumes; surface and ground water supplies; water treatment, transportation and distribution; sewerage, drainage and flood control. 0.5 Course.

Contact Hours:

Lectures:

Lecture content will be delivered asynchronously through videos and notes posted to the course OWL site. The lecture sessions will be held in person. These sessions will follow a flipped classroom approach, with the instructor presenting worked examples and answering questions related to the previous week's posted lecture material. Attendance at these sessions is mandatory. Review of lecture material and self-study should take approximately 4 hours per week.

Tutorials:

Tutorial sessions will be held in person on a weekly basis. In this session, students will work in teams to complete the first part (Part A) of the weekly assignment, which will be due at the end of the session. The second part of the weekly assignment (Part B) will be completed individually by each student and submitted at the start of the following week. The course teaching assistant and the course instructor will be available to answer questions related to both parts of the assignment during the tutorial sessions and may also make arrangements for additional office hours later in the week.

Prerequisites: CEE 2224

Corequisites: None

Antirequisite: None

Note: It is the **student's responsibility** to ensure that all Prerequisite and Corequisite conditions are met or that special permission to waive these requirements has been granted by the Faculty. It is also the **student's responsibility** to ensure that they have not taken a course listed as an Antirequisite. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite, Corequisite or Antirequisite conditions.

Instructor:

Jon Southen, P.Eng. ; SEB 3116 ; jsouthen@uwo.ca

Office hours: By appointment – contact via email to make arrangements.

Textbook:

Class notes and other pertinent material will be made available via the course website (<http://owl.uwo.ca>).

Other References:

Urban Hydrology, Hydraulics and Stormwater Quality: Engineering Applications and Computer Modeling, A. O. Akan & R. J. Houghtalen, John Wiley & Sons, 2003. [Recommended]

Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change

<https://www.ontario.ca/document/stormwater-management-planning-and-design-manual-0>

City of London Design Specifications and Requirements Manual.

[Standards \(roadauthority.com\)](http://standards.roadauthority.com)

Low Impact Development Stormwater Management Planning And Design Guide

https://cvc.ca/wp-content/uploads/2014/04/LID-SWM-Guide-v1.0_2010_1_no-appendices.pdf

Computing:

Students are required to use personal computers running a Windows environment. Assignments may require the use of stormwater modelling programs:

PCSWMM (<https://www.pcswmm.com/>)

EPA-SWMM (<http://www.epa.gov/water-research/storm-water-management-model-swmm>)

OTTHYMO (<https://civi.ca/visualotthymo-single-and-continuous-events/>)

Units:

Both SI and US units will be used in lectures and examinations

Specific Learning Objectives:

1. Hydrologic Modelling [ET1, ET2]

- Define watershed characteristics (Area, length, slope, soil characteristics, land use, channel geomorphology, travel time)
- Develop a unit-hyetograph for a watershed
- Apply the Intensity-Duration-Frequency curve of rain
- Develop a design storm of given frequency, duration and cumulative rain distribution
- Use infiltration models to calculate the component of rain that contributes to runoff

2. Rainfall Excess, Open-Channel Flow and Runoff Rates in Urban Watersheds [ET1, ET2]

- Investigate the hydraulics of open-channel and overland flow
- Determine the run-off coefficients and time of concentrations of drainage areas
- Apply the unit hydrograph method to calculate runoff hydrographs at the outlet of a watershed
- Apply the rational method to calculate peak flows in storm sewers

3. Design of Stormwater Drainage Structures [D1, D2, D3]

- Design drainage structures for street pavements
- Design storm sewers
- Design culverts
- Design open channels for surface drainage

4. Storm Water Management [D1, D2, D3]

- Recognize the detrimental effect of urban development on the quality and quantity of water released into streams and lakes.
- Compare pre-development and post-development discharge hydrographs
- Carry out flood routing calculations
- Design a detention facility to manage stormwater quantity

5. Stormwater Pollution and Stormwater Quality Control [ET2, D1, D2, D3]

- Use models to estimate stormwater quality
- Design detention facilities and other methods of stormwater quality control
- Recognize appropriate best management practices for stormwater quality

6. Stormwater Computer Modelling [ET1, ET2]

- Become familiar with current stormwater management models
- Use these models in the design of stormwater management systems

7. Sanitary Sewers and Water Distribution [D1, D2, D3]

- Estimate sewerage and water demands in a municipal context
- Determine required pipe sizing for a sanitary sewer system
- Calculate working storage, emergency storage and fire-fighting storage requirements
- Identify the components of a municipal water supply system and their design capacities
- Learn about the type of pumps used in the water industry and their hydraulic behaviour

The instructor may modify course material as appropriate.

General Learning Objectives

E=Evaluate, T=Teach, I=Introduce (*Advanced Level*)

Knowledge Base	T	Engineering Tools	E	Impact on Society	I
Problem Analysis	T	Team Work		Ethics and Equity	
Investigation		Communication	T	Economics and Project Management	
Design	E	Professionalism	I	Life-Long Learning	T

Evaluation:

The final course mark will be determined as follows:

Assignments:	30%
Tests:	20%
Group Project:	10%
Final examination:	<u>40%</u>
Total	100%

- Note:**
- (a) **Students must pass the final examination to pass this course.** Students who fail the final examination will be assigned the aggregate mark, as determined above, or 48%, whichever is less.
 - (b) **Students who have failed this course previously must repeat all components of the course.** No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted.
 - (c) Should any of the tests conflict with a religious holiday that a student wishes to observe, the student must inform the instructor of the conflict no later than two weeks before the scheduled test.
(For further information on Accommodations for Religious Holidays see http://www.uwo.ca/univsec/handbook/appeals/accommodation_religious.pdf)

1. Weekly Assignments

A two-part assignment based on the previous week's lecture material will be posted to OWL each week. The first part of the assignment will be completed in a team assigned by the course instructor and due at the end of each week's tutorial session. The second part of the assignment will be completed individually and submitted to OWL by 9:00 am on the Monday following the tutorial. Problems and assignments will be discussed during the tutorial hours. Weekly assignments must be submitted for marking by the deadline specified to the course OWL site. Late submissions will be assigned a mark of zero unless an extension has been negotiated in advance with the instructor.

2. Tests and Examinations:

Two 60 minute tests will be held during tutorial periods, tentatively scheduled on February 8 and March 14. Both tests and the final examination will be **OPEN BOOK**, and **programmable calculators are permitted**.

3. Group Project:

A group project will be assigned early in the term. Teams will work on completing the project throughout the course, with the content of weekly assignments frequently contributing to the final project. The deliverables for the project will consist of a group report with supporting drawings and calculations as well as a group presentation delivered during a scheduled lecture period. Further details will be provided.

4. Use of English

In accordance with Senate and Faculty Policy, students may be penalised up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Activities in which collaboration is permitted:

- Homework Assignments – Part A
- Group project

Activities in which students must work alone (collaboration is not permitted):

- Homework Assignments - Part B
- Tests
- Final Exam

Online Proctoring Notice:

Note that all assessments are planned to be in-person.

Depending on COVID-19 restrictions and University guidelines, tests and the final examination in this course may be in the form of a “**remote proctored/open book**” exam, conducted using Zoom. You will be required to keep your camera on for the entire quiz/exam session. The camera should show your workspace including: your tabletop, material allowed to use on the exam, and your sitting area. Hold up your student card for identification purposes and share your screen with the invigilator if asked to do so at any time during the exam. The exam session will not be recorded. Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please discuss this with your instructor in advance of the test or examination.

More information about the use of Zoom for exam invigilation is available in the Online Proctoring Guidelines at the following link:

<https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf>.

Completion of this course may require you to have a reliable internet connection and a device that meets the system requirements for Zoom. Information about the system requirements are available at the following link:

<https://support.zoom.us/hc/en-us>.

When deemed necessary, tests and examinations in this course may be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western’s Remote Proctoring website at: <https://remoteproctoring.uwo.ca>.

Course content

The lecture notes and online lecture videos are copyrighted to the instructor and legally protected. Do not post these videos and lecture notes on any other website or online forums. The recording of the live/synchronous sessions of the course without the permission from the instructor is prohibited. The illegal posting and sharing of the copyrighted course content could be subjected to legal actions.

Plagiarism:

University policy states that plagiarism, defined as the “act or an instance of copying or stealing another’s words or ideas and attributing them as one’s own.” (excerpted from Black’s Law Dictionary, West Group, 1999, 7th ed., p. 1170) is a scholastic offence. In submitting any written work as part of the coursework requirements for this course students must ensure that this work is written in their own words.

A student who is found guilty of plagiarism in respect of any written work submitted as part of the coursework requirements for this course will be given a grade of zero for the submitted work. Repeated acts of plagiarism, either in this course or any other course subsequent to a first offence, will result in the student being given a failing grade for the course in which the subsequent offence occurs, and may also incur further penalties such as requiring the student to withdraw from the program in which they are enrolled in.

Cheating:

University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning.

For more information on scholastic offenses, please see:

http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf

Attendance:

Any student who, in the opinion of the instructor, has not engaged sufficiently in class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Accommodation:

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: [Academic Accommodation for Students with Disabilities](#).

Academic Consideration for Absences:

Students should immediately consult with the instructor if they have any problems that could affect their performance in the course. The student should seek advice from the instructor regarding how best to deal with the problem. Failure to notify the instructor (or as soon as possible thereafter) will have a negative effect on any appeal. Please visit for information on how to submit a request for Academic Consideration: <https://www.eng.uwo.ca/undergraduate/academic-consideration-for-absences.html>

Notice:

Students are responsible for regularly checking their @uwo.ca email and the course website (<https://owl.uwo.ca>).

Consultation:

Students are encouraged to discuss problems with their teaching assistant and/or instructor in tutorial sessions. Office hours will be arranged for the students to see the instructor and teaching assistants. Other individual consultation can be arranged by appointment with the appropriate instructor.

Course breakdown:

Engineering Science = 25% ; Engineering design = 75%

STATEMENT ON GENDER-BASED AND SEXUAL VIOLENCE

Western [is committed to reducing incidents of gender-based and sexual violence](#) and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, [here](#). To connect with a case manager or set up an appointment, please contact support@uwo.ca.

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work by the due date, you should follow the instructions listed below. You should understand that academic relief will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services Office) that there are compelling medical or compassionate grounds that can be documented before academic relief will be considered. Different regulations apply to term tests, final examinations and late assignments. Please read the instructions carefully.

A. GENERAL REGULATIONS & PROCEDURES

1. All first-year students will report to the Undergraduate Services Office by submitting the [Academic Consideration Request Form](#), for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or examination you will report the absence by submitting [Academic Consideration Request Form](#). Absences worth LESS THAN 10% of your mark, will be processed by your department office. If your course work is worth 10% OR MORE of your final grade, your request will be processed by the Undergraduate Services Office.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.
5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. TERM/MIDTERM TESTS

1. If you are in first year and you are unable to write a midterm/term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a midterm/term test, inform your instructor PRIOR to the scheduled date of the test and request relief through the [Academic Consideration Request Form](#). If the instructor is not available, leave a message for him/her at the department office. If the test is worth LESS THAN 10% of your mark, your request for relief will be processed by your department office. If the test is worth MORE THAN 10% of your final grade your request for relief will be processed by the Undergraduate Services Office.
3. Be prepared to attach supporting documentation to the Department Chair and/or the Undergraduate Services Office through the online form (see next page for information on documentation).
4. Discuss with the instructor if and when the test can be rescheduled. The approval of the Chair or the Undergraduate Services Office is required when rescheduling midterm/term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office **PRIOR TO THE SCHEDULED EXAMINATION TIME** to report your absence using the [Academic Consideration Request Form](#) and request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, headache, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you must submit an "[Application for a Special Exam](#)" form. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to submit the [Academic Consideration Request Form](#) and provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Assistant Dean, First Year Studies, if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
 - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean, Undergraduate Studies. Documentation is mandatory.
 - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean, Undergraduate Studies.

E. SHORT ABSENCES

If you miss a class due to a minor illness or other problem, check your course outlines for information regarding attendance requirements and make sure you are not missing a test, laboratory or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You are strongly encouraged to seek advice from your Academic Counsellor in the Undergraduate Services Office.

G. DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. ACADEMIC CONCERNS

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).
2. **You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.**
3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your Academic Counsellor.

Calendar References: Check these regulations in your 2023 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Absences Due to Illness:

https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_13_5

Academic Accommodations for Students with Disabilities:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_10

Academic Accommodations for Religious or Holy Days:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_16

Course Withdrawals:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=6&SelectedCalendar=Live&ArchiveID=#Page_75

Examinations:

<http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=5&command=showCategory&SelectedCalendar=Live&ArchiveID=#>

Scheduling of Term Assignments:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_78

Scholastic Offences:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20

Student Medical Certificate:

<https://www.eng.uwo.ca/files/undergraduate/student-medical-certificate.pdf>

Engineering Academic Regulations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=4&SelectedCalendar=Live&ArchiveID=#Page_86

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

Add Deadlines:

First term half course (i.e. “A” or “F”)	September 15, 2023
Full courses and full-year half course (i.e. “E”, “Y” or no suffix)	September 15, 2023
Second term half course (i.e. “B” or “G”)	January 16, 2023

Drop Deadlines:

First term half course without penalty (i.e. “A” or “F”)	November 13, 2023
Full courses and full-year half courses without penalty (i.e. “E”, “Y” or no suffix)	November 30, 2023
Second term half or second term full course without penalty (i.e. “B” or “G”)	March 7, 2023

Contact Information:

Undergraduate Services Office:	SEB 2097 Phone: 519-661-2130	E-mail: engugrad@uwo.ca
Chemical & Green Process Engineering:	TEB 477 Phone: 519-661-2131	E-mail: cbeugrad@uwo.ca
Civil Engineering:	SEB 3005 Phone: 519-661-2139	E-mail: civil@uwo.ca
Computer, Electrical, Mechatronics Systems & Software Engineering	TEB 279 Phone: 519-661-3758	E-mail: eceugrad@uwo.ca
Integrated Engineering	ACEB 2410 Phone: 519-661-6725	E-mail: engceli@uwo.ca
Mechanical Engineering:	SEB 3002 Phone: 519-661-4122	E-mail: mmeundergraduate@uwo.ca