McMaster University | Civil Engineering

COURSE OUTLINE

COURSE INFORMATION

Course Name: Design of Water Resources Systems Course Code: CIVENG 4L04
Session Offered: Winter 2026

Calendar Description: Investigation, planning, analysis and design of water resources systems, climate change. Introduction to GIS tools. Frequency analysis, design storms, urban drainage and analysis, floodplain analysis and flood control. Two lectures, one tutorial, one lab; one term. Prerequisite(s): CIVENG 3M03

Instructor: Sonia Hassini Email: hassins@mcmaster.ca

Teaching Assistants: Ahmed Abdelaal Email: abdela96@mcmaster.ca

Class Schedule Day(s):

Lectures:	Mo. 10:30AM – 12:20PM
Tutorials:	Th. 2:30PM – 4:20PM
Labs:	Tu. 2:30PM – 5:20PM

Textbook (Optional): Water Resources Engineering, Larry W. Mays, John Wiley and Sons, Inc., 2nd or 3rd Edition.

1. COURSE OBJECTIVES

Upon successful completion of this course, students will be able to:

1) Perform hydrologic and hydraulic analyses using HEC-HMS and HEC-RAS, applying the design storm approach.
2) Conduct frequency analysis for precipitation and flow data.
3) Apply basic GIS tools for water resources planning and analysis.
4) Assess flood risk through floodplain analysis and evaluate flood control measures.
5) Recognize climate change impacts on the design of water resources systems.

2. COURSE SPECIFIC POLICIES

1) Course Materials and Attendance: Lecture notes will be posted on Avenue to Learn as a supplement to in-class instruction. Students are expected to attend and actively participate in lectures, tutorials, and labs. Tutorials will reinforce key concepts, and labs will provide hands-on experience with GIS, HEC-HMS, and HEC-RAS. Announcements made in class or posted on Avenue to Learn apply to all students.
2) Missed Work: For approved relief requests (MSAF; see Section 7)
   - Midterm Test: Weight will be transferred to the final exam.
   - Individual Assignments: Deadline will be extended by three days.
3) Lab Assignments: Four assignments will provide hands-on experience with GIS, HEC-HMS, and HEC-RAS. Work individually or in pairs, with equal contribution expected. Submit all required files via Avenue to Learn by the stated deadline, late submissions will not be accepted.
4) Tutorial Quizzes: There will be 5 quizzes, based on the assigned tutorials and completed during the tutorial session. Full marks will be awarded for completion.

5) Grade Review: Please review your marked work within one week of posting and confirm that grades on Avenue to Learn are accurate. After this period, changes will only be considered under exceptional circumstances.

3. SCHEDULE

	Tentative Lecture Topic	Assessment Due Date
WEEK 1 (Jan 5)	Introduction	
WEEK 2 (Jan 12)	Hydrologic Analysis	
WEEK 3 (Jan 19)	Hydrologic Analysis	Lab Assignment 1 – Watershed Delineation (Monday Jan 19)
WEEK 4 (Jan 26)	Hydrologic Analysis Lab Assignment 1 - Presentations	
WEEK 5 (Feb 2)	Frequency Analysis & Climate Change	Lab Assignment 2 – Hydrologic Analysis (Monday Feb 2)
WEEK 6 (Feb 9)	Frequency Analysis & Climate Change Lab Assignment 2 - Presentations	
Reading Week (Feb 16 – 20) – No Classes		
WEEK 7 (Feb 23)	Hydraulic Analysis	**Midterm Test – Feb 26 at 2:30 pm**
WEEK 8 (Mar 2)	Hydraulic Analysis	
WEEK 9 (Mar 9)	Urban Drainage and Analysis	Lab Assignment 3 – Hydraulic Analysis (Monday Mar 9)
WEEK 10 (Mar 16)	Urban Drainage and Analysis Lab Assignment 3 - Presentations	
WEEK 11 (Mar 23)	Floodplain Analysis and Flood Control	
WEEK 12 (Mar 30)	Floodplain Analysis and Flood Control	Lab Assignment 4 (Monday Mar 30)
WEEK 13 (Apr 6)	Review Lab Assignment 4 - Presentations	
FINAL EXAMINATION	Scheduled during the regular University Final Examination period established by the Registrar's Office	

This schedule is tentative—the Instructor and the University reserve the right to modify elements of the course during the term. Any changes will be announced in class or posted on A2L.

4. ASSESSMENT OF LEARNING	WEIGHT %
Tutorial Quizzes	2%
Lab Assignments	35%
Midterm	25%
Final Exam	38%
Total	100%

5. LEARNING OUTCOMES

1) Perform hydrologic and hydraulic analyses using HEC-HMS and HEC-RAS (**1.4, 3.2, 5.2**)
2) Apply basic GIS tools for water resources planning and analysis (**1.4, 5.2, 12.1**)
3) Conduct frequency analysis and apply the design storm approach for urban drainage (**2.1, 2.2, 2.3**)
4) Assess flood risk through floodplain mapping and evaluate control measures (**3.2, 4.1, 4.2, 5.2**)
5) Recognize climate change impacts on water resources system design (**2.1, 2.3, 12.1**)

6. COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their "@mcmaster.ca" alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

7. POLICIES

ACADEMIC INTEGRITY

You are required to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the *Academic Integrity Policy*, located at www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism. e.g. the submission of work that is not own or for which other credit has been obtained
2. Improper collaboration in group work
3. Copying or using unauthorized aids in tests and examinations.

PROTECTION OF PRIVACY ACT (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and the posting of grades must be done in a manner that ensures confidentiality - see http://www.mcmaster.ca/univsec/fippa/fippa.cfm

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES POLICY

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) https://sas.mcmaster.ca/ to make arrangements with a Program Coordinator. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's https://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDEGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK – MSAF (ASSIGNMENTS, MID-TERMS, ETC)

The McMaster Student Absence Form is a self reporting tool for **Undergraduate Students** to report absences that last up to 3 days and provides the ability to request accommodation for any missed academic work worth less than 25%. Please note, this tool cannot be used during any final examination period.

You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.

If you are absent more than 3 days or exceed 1 request per term you MUST visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.

This form should be filled out immediately when you are about to return to class after your absence. http://www.mcmaster.ca/msaf/

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible. https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

8. MCMASTER GRADING SCALE

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49