

## COURSE INFORMATION

**Course Name:** Design of Water Resources Systems  
Session Offered: Winter 2025

Course Code: CIVENG 4L04

**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

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### Teaching Assistants:

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**Class Schedule Day(s):**

Lectures:	Mo. 10:30AM – 12:20PM
Tutorials:	Tu. 2:30PM – 4:20PM
Labs:	Th. 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) Conduct hydrologic and hydraulic analyses and apply hydrologic and hydraulic models.
- 2) Gain basic skills in GIS and other tools suitable for water resources management.
- 3) Understand the design storm approach and perform event-based analysis.
- 4) Calibrate and validate a hydrologic model.
- 5) Analyze the effects of soil type, urbanization, and land use/land cover on watershed response.
- 6) Perform frequency analysis.
- 7) Understand the impacts of climate change on the design of water resources systems.
- 8) Perform flood mapping.
- 9) Learn about flood control measures, both structural and non-structural.
- 10) Collect data, make reasonable assumptions and reflect on the analysis results.

## 2. COURSE SPECIFIC POLICIES

1) Course notes will be posted on avenue-to-learn over the duration of the term. Posted notes are not intended to replace the lectures. Students are expected to attend and actively participate in the lectures, tutorials and labs. Tutorials will be used to practice key concepts presented in the lectures. Labs will be used to introduce software packages GIS, HEC-HMS, HEC-SSP, and HEC-RAS and work on relevant lab assignments and project parts.

Announcements made in class or posted on Avenue are considered communicated to all students, including those who did not attend.

2) Accommodations for missed academic work with a granted relief (MSAF; see section 7 for further details) are as follows:

- Midterm Test: A make-up test will be scheduled as soon as possible.

- Assignments will be extended by three days.

3) Assignments and project reports should be submitted online through Avenue to Learn. Late assignments and project reports will not be accepted. The deadline for a missed assignment with a granted relief will be extended by three days.

4) The project will be done in groups of three to four students. It is the responsibility of each group member to ensure that only the names of those who have equally contributed are included. If conflicts arise, first attempt to resolve them within the group. If unresolved, contact the TAs and cc the instructor promptly. Any group member who does not respond on time, does not contribute, or hinders the group's progress will be removed from the group and required to complete the project individually.

5) It is the responsibility of students to check their marked work within one week of posting and ensure that the marks entered on the course website are correct.

### 3. SCHEDULE

	Tentative Lecture Topic	Assessment Due Date
WEEK 1	Introduction	
WEEK 2	Water Cycle, Watershed Characteristics	GIS, Lab Assignment 1
WEEK 3	Hydrologic Processes	Project Part I – Watershed Delineation Tutorial Assignment 1
WEEK 4	Hydrologic Processes	HEC-HMS, Lab Assignment 2
WEEK 5	Hydrologic Processes	HEC-HMS, Lab Assignment 3 Tutorial Assignment 2
WEEK 6	Climate Change	Project Part II – Hydrologic Analysis
Reading Week – No Classes		
WEEK 7	Frequency Analysis	Lab Assignment 4 Tutorial Assignment 3
WEEK 8	Hydraulic Processes	Project Part III – Frequency Analysis
WEEK 9	Hydraulic Processes	Lab Assignment 5 Tutorial Assignment 4
WEEK 10	Hydraulic Processes	Lab Assignment 6, Tutorial Assignment 5
WEEK 11	Floodplain Mapping	Midterm Test – March 24 at 10:30 am

WEEK 12	Flood Control	Project Part IV – Hydraulic Analysis
WEEK 13	Project Presentations	Project Final Report
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.		
<b>4. ASSESSMENT OF LEARNING</b>		<b>WEIGHT %</b>
Tutorial Assignments		15%
Lab Assignments		15%
Midterm		30%
Design Project		40%
Total		100%
<b>5. LEARNING OUTCOMES</b>		
<p>The students are expected to gain the following learning outcomes after taking this course:</p> <ul style="list-style-type: none"> <li>• Competence in Specialized Engineering Knowledge (1.4)</li> <li>• Ability to identify reasonable assumptions (including identification of uncertainties and imprecise information) that could or should be made before a solution path is proposed (2.1).</li> <li>• Ability to identify a range of suitable engineering fundamentals (including mathematical techniques) that would be potentially useful for analyzing a technical problem (2.2).</li> <li>• Ability to obtain substantiated conclusions as a result of a problem solution including recognizing the limitations of the solutions (2.3).</li> <li>• Able to recognize and discuss applicable theory knowledge base (3.1).</li> <li>• Capable of selecting appropriate model and methods and identify assumptions and constraints (3.2).</li> <li>• Can estimate outcomes, uncertainties and determine appropriate data to collect (3.3)</li> <li>• Recognizes and follows an engineering design process and principles (4.1 &amp; 4.2)</li> <li>• The ability to use of modern/state of the art tools (5.2).</li> <li>• Be able to critically evaluate and apply knowledge, methods and skills procured through self directed and self identified sources, including those that lie outside the nominal course curriculum (12.1).</li> </ul>		
<b>6. COMMUNICATIONS</b>		
<p>It is the student's responsibility to:</p> <ul style="list-style-type: none"> <li>• Maintain current contact information with the University, including address, phone numbers, and emergency contact information.</li> <li>• Use the University provided e-mail address or maintain a valid forwarding e-mail address.</li> </ul>		

- 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](http://www.mcmaster.ca/academicintegrity), located at [www.mcmaster.ca/academicintegrity](http://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](mailto: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](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**

<b>Grade</b>	<b>Equivalent Grade Point</b>	<b>Equivalent Percentages</b>
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