CE4A04 Engineering Hydrology, Fall 2018

COURSE OUTLINE

Instructor: Dr. Mohamed Mostafa
Email: mostam4@mcmaster.ca
Office Hours: By advance appointment only

Teaching Assistant: TBD
Office Hours: By advance appointment only

Lectures: Monday and Thursday: 09:30 AM – 10:20 AM, ABB-163
Tuesday: 10:30 AM – 11:20 AM, ABB-163

Tutorials: Friday: 09:30 AM – 11:20 AM, HH-104
Course attendance is expected for both lectures and tutorials.

Text: Introduction to Hydrology
W. Viessman, Jr. and G. L. Lewis

Main References: Hydrology and Floodplain Analysis,
P. B. Bedient, W. C. Huber, B. E. Vieux,
Water Resources Engineering
David A. Chin
Water Resources Engineering
Larry W. Mays

Prerequisite: CE3M03 Municipal Hydraulics

Course Website: Course website (Avenue to Learn, A2L) will be up and running after the first week of the term. Course notes and supplemental information may be found at A2L. Please do not use A2L to email me or the TA(s) as we only keep track of email exchanges using our McMaster email accounts.

Assessment of Learning: Assignments: 30%
Midterm Exam: 20%
Final Examination: 50%

Late assignments will not be accepted. Accommodation will only be given to missed assignments with proper MSAF, it will be the general policy that the lowest mark you obtained for the other assignments will be assigned to your missed assignment. If you miss the midterm, your final will weigh 20% more. The standard numeric to letter grade will be used to assign a final letter grade for the course. The McMaster Standard Calculator (CASIO FX991) must be used on tests and examinations. The midterm
exam will be held on Friday, October 26, from 09:30 AM to 11:20 AM in HH-104. Both the midterm and final exam will be closed-book but a formula and data sheet will be provided.

**LECTURE SCHEDULE**

<table>
<thead>
<tr>
<th>Week</th>
<th>Tentative Lecture Topic</th>
<th>Reading from Text</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Hydrologic Cycle, Hydrologic Processes, and Water Budget</td>
<td>Chapter 1</td>
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<tr>
<td>2</td>
<td>Precipitation and Precipitation Analysis</td>
<td>Chapter 4</td>
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<tr>
<td>3</td>
<td>Evaporation and Transpiration</td>
<td>Chapter 6</td>
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<td>4</td>
<td>Interception, Depression Storage, Infiltration, Horton Model</td>
<td>Chapter 5 &amp; 7</td>
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<td>5</td>
<td>Green-Ampt Model, Runoff Curve Number Method</td>
<td>Chapter 7</td>
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<tr>
<td>6</td>
<td>Streams, Watersheds, Hydrologic Measurements &amp; Streamflow analysis</td>
<td>Chapter 8 &amp; 2</td>
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<tr>
<td>7</td>
<td>Unit Hydrograph Theory and Applications</td>
<td>Chapter 9</td>
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<tr>
<td>8</td>
<td>S-hydrograph and IUH</td>
<td>Chapter 9</td>
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<td>9</td>
<td>Synthetic Unit Hydrographs</td>
<td>Chapter 9</td>
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<tr>
<td>10</td>
<td>Hydrograph Routing</td>
<td>Chapter 9</td>
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<tr>
<td>11</td>
<td>Statistical Methods in Hydrology</td>
<td>Chapter 3</td>
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<tr>
<td>12</td>
<td>Rainfall and Streamflow (Flood) Frequency Analysis</td>
<td>Chapter 3 &amp; 4</td>
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<tr>
<td>13</td>
<td>Design Hydrology (If time permits)</td>
<td>Chapter 13</td>
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</tbody>
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**TUTORIAL SCHEDULE**

<table>
<thead>
<tr>
<th>Week</th>
<th>Tutorial Assignment</th>
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<tbody>
<tr>
<td>1</td>
<td>No Tutorial</td>
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<tr>
<td>2</td>
<td>Water Balance: Problem Set 1</td>
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<tr>
<td>3</td>
<td>Precipitation Data Analysis: Problem Set 1</td>
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<tr>
<td>4</td>
<td>Evaporation &amp; Evapotranspiration Estimation: Problem Set 1</td>
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<tr>
<td>5</td>
<td>Infiltration Calculation: Problem Set 2</td>
</tr>
<tr>
<td>6</td>
<td>Infiltration Calculation: Problem Set 2</td>
</tr>
<tr>
<td>7</td>
<td>Streamflow/Hydrograph Analyses: Problem Set 2</td>
</tr>
<tr>
<td>8</td>
<td>Unit Hydrograph: Problem Set 3</td>
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<tr>
<td>9</td>
<td>Unit Hydrograph: Problem Set 3</td>
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<tr>
<td>10</td>
<td>Unit Hydrograph: Problem Set 3</td>
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<tr>
<td>11</td>
<td>Hydrograph Routing: Problem Set 4</td>
</tr>
<tr>
<td>12</td>
<td>Statistical Methods in Hydrology: Problem Set 4</td>
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<tr>
<td>13</td>
<td>Statistical Methods in Hydrology: Problem Set 4</td>
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</tbody>
</table>

**More Information about the Course**

**Course Description:** The purpose of this course is to equip students with the basic principles and concepts of hydrology and hydrologic modeling. Emphasis is placed on the types of hydrologic calculations that are required when planning and design civil infrastructures. Although computer simulation and modeling are eventually required in engineering practices, only hand and spreadsheet calculations are required for the completion of this course.

**Learning Outcomes** - when you have successfully completed this course, you will:

- Know the main processes involved in the local and global hydrologic cycles [CEAB Attribute 1.2]
- Be able to conduct basic precipitation analysis to determine areal average precipitation and water balance analysis to quantify one or more components of the hydrologic cycle [CEAB Attribute 2.1]
• Be able to perform infiltration calculations using some of the most widely used models [CEAB Attributes 2.2 and 4.2]
• Understand the physical processes generating surface runoff and stream flow [CEAB Attribute 1.2]
• Understand the concept of unit hydrograph and be able to use it in engineering design calculations [CEAB Attributes 1.1, 1.4 and 4.1]
• Be able to conduct hydrograph routing [CEAB Attribute and 2.1]
• Understand the basics of hydrologic statistics, be able to conduct basic rainfall and stream flow frequency analysis [CEAB Attributes 1.1, 2.3 and 3.2]

Policy Reminders - Students are reminded of the following policies, which could be relevant to activities in this course:

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 kinds of academic dishonesty please refer to the Academic Integrity Policy, located at: http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf

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.

Anti-Discrimination:

The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem that cannot be resolved by discussion among the persons involved, individuals are reminded that they should contact their Department Chair, the Sexual Harassment Office or the Human Rights Consultant, as soon as possible.


Requests for Relief for Missed Academic Term Work (Assignments, Mid-Terms, etc.)

The McMaster Student Absence Form is a self-reporting tool for Undergraduate Students to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. 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 5 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/
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 email and course websites on a regular basis during the term.

Freedom of Information and 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 posting of grades must be done in a manner that ensures confidentiality. [http://www.mcmaster.ca/univsec/fippa/fippa.cfm](http://www.mcmaster.ca/univsec/fippa/fippa.cfm)

Academic Accommodation of Students with Disabilities Policy

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or email sas@mcmaster.ca. For further information, please consult McMaster’s policy for Academic Accommodation of Students with Disabilities at [https://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf](https://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf)

Students must forward a copy of the SAS accommodation to the instructor of each course and to the Program Undergraduate Administrative Assistant immediately upon receipt. If a student with a disability chooses NOT to take advantage of a SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. [https://sas.mcmaster.ca/](https://sas.mcmaster.ca/)

Student Code of Conduct

The Student Code of Conduct (SCC) exists to promote the safety and security of all the students in the McMaster community and to encourage respect for others, their property and the laws of the land. McMaster University is a community which values mutual respect for the rights, responsibilities, dignity and well-being of others. The purpose of the Student Code of Conduct is to outline accepted standards of behavior that are harmonious with the goals and the well-being of the University community, and to define the procedures to be followed when students fail to meet the accepted standards of behavior. All students have the responsibility to familiarize themselves with the University regulations about the conduct expected of them while studying at McMaster University. [http://judicialaffairs.mcmaster.ca/pdf/SCC.pdf](http://judicialaffairs.mcmaster.ca/pdf/SCC.pdf)

Possible Changes to Delivery Format and Assessment Methods

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either
type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites at least weekly during the term and to note any changes.

Laboratory Safety

The Faculty of Engineering is committed to McMaster University’s Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs". It is your responsibility to understand McMaster University Workplace and Environmental Health and Safety programs and policies. For information on these programs and policies please refer to McMaster University Environmental and Health Support Services Occupational Safety Risk Management Manual at: http://www.workingatmcmaster.ca/med/document/Lab-Safety-Handbook-1-36.pdf

It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment.

The safety requirements for JHE 220 are listed below. Students not abiding by these safety requirements will be given one warning. Second offences will result in the student being asked to vacate the laboratory, and receiving a grade of zero for that particular lab. The safety requirements are:

- Glasses or safety glasses/goggles must be worn in the lab at all times.
- Contact lenses are not to be worn in the lab.
- No short (i.e., above the knee) pants or skirts are permitted in the lab. Lab coats must be worn over top of your clothing in these instances.
- Closed-toe shoes must be worn at all times.
- No loose clothing allowed.
- Long hair must be tied back.
- Gloves must be worn when working with hazardous chemicals (as indicated by the laboratory instructor).