***University of Toronto at Scarborough***

**“PRINCIPLES OF HYDROLOGY”**

*(EES B04H3F, Fall 2021)*

**Professor:** David McLagan (he/him/his)

**Office:** EV342 (*subject to change*)
**Email:** david.mclagan@mail.utoronto.ca

**Lecture Time:** Asynchronous (pre-recorded) lectures on Quercus, plus synchronous, online meetings on Wednesdays, 1-3 pm (given pre-recorded content, usually will not be full two hours)

**Office Hours:** Thursdays, 3-4 pm (no appointment necessary) via bbCollaborate on Quercus

**Course Web Site:** Everything on Quercus (<https://q.utoronto.ca>)

**Teaching Assistants:** Planck Huang (planck.huang@utoronto.ca)

Wai Lam (wy.lam@mail.utoronto.ca)

**Practical Times:** Tut01: Thursdays, 11am-1pm, Online synchronous

Tut02: Wednesdays, 3-5pm, Online synchronous

 Tut03: Thursdays, 10am-noon, Online synchronous

 Tut04: Wednesdays, 11am-1pm, Online synchronous

 Tut05: Wednesdays, 11am-1pm, Online synchronous

**Text:** "Fundamentals of Hydrology, Second Edition"

 [Author: Tim Davie; Publisher: Routledge, 200 pages]

 **INTENT OF THE COURSE**

 Hydrology is the study of the occurrence, circulation, and distribution of water on the earth and in its atmosphere. The course is intended to be a comprehensive introduction to how water moves through terrestrial systems, both “naturally” and as a result of human alteration of the environment. Simply put, water is the source of life. When NASA goes looking for life on other planets, what is the first thing they look for? Water! Water is also a powerful buffer for energy - that is it takes very large amounts of energy either to heat water up or to evaporate it. How much water is stored at the surface therefore strongly affects the temperature of the surface, the temperature of the air above it and its behaviour. After introducing some of the fundamental concepts in hydrology, considerable focus will be placed on the interaction between water on the surface and water in the atmosphere. Given concerns about global climate change, these surface-atmosphere interactions are of crucial importance. The hydrology of a system determines not only the temperature of the air above it, but also how much water vapour gets into the airmass by evaporation. This is another enormously important control on climate and rainfall.

 Water is also an important vector for the transport of mass and energy (nutrients, toxins, pollutants, etc.) from place to place in the environment. Pollutants may be transported about via rainfall, streamflow, and seepage through the ground. For example, if you want to know what nitrate (NO3-), a major fertilizer, is doing in an agricultural system, first you have to know how the water in which the nitrate is in solution is moving through the system. The knowledge of water motion is a prerequisite for knowing where a solute is, how much is there, where it is moving to, and at what rate.

 Hydrologic systems are complex and difficult to understand and model, and yet are critical in any sort of understanding of natural system processes at any scale. In order to understand, we have to make measurements. In order to make measurements we have to have some information about how the system works and how to make measurements and what those measurements mean. This course is about the fundamentals of how hydrologic systems work, how we can understand them better and how we can use that better understanding to make predictions of hydrologic system behaviour.

**ASSESSMENT IN THE COURSE**

Ten online quizzes (via Quercus) worth 5% each 50%

 Four assignments worth 10% each 40%

 Synchronous lecture attendance/participation 5%

 Synchronous tutorial attendance/participation 5%

 NO FINAL EXAM (this year)

**LECTURE FORMAT AND QUIZZES**

 This course will take on a synchronous/asynchronous hybrid format. This is basically the online version of a “flipped” classroom. Material for this course will be delivered via a number of pre-recorded “mini-lectures” each week (a number of shorter recordings that cumulatively make up the material for a particular week), available on Quercus. The intention is that you will watch these ahead of attending the online synchronous lecture every Wednesday at 1 pm. The weekly synchronous lecture will be a “looser” format in that the time will be less scripted and rather used to go deeper into some of the more complicated subject matter (as identified by you), to do some example problem sets, and to discuss answers to quizzes from weeks prior.

 To ensure that you are keeping up with course material, a large part of your grade will be related to 10 online quizzes (5% each; 50% total), due mostly every week, within 48 hours of the related synchronous lecture (example: a quiz that needs to be done before 3 pm on September 11 will be based on week 1 material – recorded and synchronous). The quizzes will have 10 multiple choice questions each, will be completed at your leisure online (but within 48 hours of the synchronous lecture) and involve just one timed (15 minute) attempt per student. Quizzes will be administered through Quercus. See schedule on last page of this syllabus and on Quercus. Outside of extraordinary circumstances, missed quizzes cannot be made up.

 5% of your overall grade will be given in relation to your attendance at and participation in the synchronous lecture. Though I do plan to record the synchronous part of the course and make it available to students, the weekly synchronous meetings will be driven by student needs, which therefore require student participation. If you have time conflicts that are both documented and cannot be resolved, let me know and I will try to see what can be done.

**ASSIGNMENTS/TUTORIALS**

 You will have 4 assignments during the term, worth 10% each (40% overall of the final grade). The idea of the assignments is to teach you some practical hydrological skills, and introduce you to some of the common instrumentation and techniques used by hydrologists. You will be given assignments via Quercus and you must submit your assignments or grading via Quercus. You are then required to attend tutorials (online synchronous – just 5 of them for the whole semester; see page 5 of this syllabus), where TAs will instruct you on how to complete the work and accompanying problem sets. Assignments are due on the dates shown in the schedule below. All assignments are due by 10 am (submitted via Quercus) the day of your next tutorial, except for assignment #4, which is due (submitted online) by midnight the day of the *second last* lecture of the year. **Attendance at tutorials (online synchronous) is mandatory and 5% of your overall grade (1% per mandatory tutorial) will be given based on your attendance**. This includes “tutorial #0”, which is an overview of basic (mostly elementary school) math skills needed for the course and is crucial for getting information: you must attend!

 In completing your assignments, you should use a word processor for your written responses in your assignments. Where it is otherwise difficult to do so (calculation, sketches), you may handwrite these, take a photo of it and add it into your document in the appropriate spot. If you have graphs or tables to present in an assignment, either paste them into your Word document where the question is being answered or refer to their place very specifically in an appendix. Your document should conform to the following: 25.4 mm margins, single-spaced, 12-point print size. The document must have your name, date and student number and **the submitted documents for all assignments should be in PDF format**. A PDF version of word documents can be created in all office suites. This can also be done using free online file conversion websites (google it if you need for information). Please don’t use title pages, these are an inconvenience and unnecessary.

**COURSE TEXT**

"Fundamentals of Hydrology, Second Edition" by Tim Davie, available through the UofT Bookstore and online. “Fundamentals of Hydrology” is a relatively basic/straightforward hydrology textbook that focuses on broad understanding, and I think is good for students’ introduction to hydrology. As far as textbooks go, it is relatively inexpensive. This book will provide a good background for course material but I don’t follow the textbook exceptionally closely for my lectures – the book is meant to supplement your understanding. This course is relatively well-known as a course that is not too difficult to succeed in as long as you participate fully and keep up with the material. **As far as your evaluation in this course goes (i.e., quizzes), assigned readings and all lecture material (even just what I say in addition to what is written on slides) are fair game. I *will* lean a bit more on lecture material than readings for quizzes, but I wouldn’t ignore the readings by any means.**

**MISSED TESTS/LATE PENALTIES FOR PRACTICALS**

 You have 48 hours to complete each quiz on your own time. Due to the nature of online delivery, quizzes cannot be repeated and quizzes you do not complete by the deadline will be given a grade of zero (outside of extraordinary circumstances). This is because we will discuss quiz answers in the subsequent lecture. The only exception is if there is a technical/Quercus error that is because of me or the university.

Fundamentally, I feel that late assignments are also entirely unacceptable. However, knowing that things do happen, my policy is that late assignments will be penalized at a rate of 20%/day and assignments more than one day late will simply not be accepted. In short, **if you are MORE than one day late, you will get a zero on the assignment**. If you fail to hand in your assignment on time (again, by 10 am), you will be assessed a late penalty.

**INTERACTION WITH THE PROFESSOR AND TEACHING ASSISTANTS**

 This semester will again be difficult with UTSC being primarily on-line again. This is difficult for me too as I like to deliver interactive lectures and have face-to-face contact with students. Though I want to be equitable to all students and thus I want to generally keep to the rules of this syllabus, if truly unforeseen things for which you need help/some leniency do arise, you simply need to let me know about it. I will usually stick around the synchronous lecture for a bit longer if students want to chat about hydrology or other things related to the course/school. You can refer to me as David or Prof. McLagan (he/him), I really do not mind.

Your TA(s) will also have office hours (look for this to be added to the Quercus page) and you should take advantage of these for questions pertaining to your laboratory assignments. Your TA is not responsible for knowing lecture material inside out, so if you have questions regarding lecture material, you are best to talk to Professor McLagan. Neither Professor McLagan nor the TA(s), however, will answer point-blank questions about specific questions on assignments ahead of them being due.

**Email policy:** Email should be restricted to only times when personal information is necessary to share (something happened to you, your grades, etc). All questions related to course content should otherwise be directed to Quercus as a Quercus Discussion so that the entire class may benefit from the answer. All emails should be sent via a “.utoronto.ca” email address. Emails from other domains will likely be lost to spam filters and not responded to. **I can only guarantee email responses within about 48 hours after receiving them.**

**QUERCUS INFORMATION**

**Logging in to your Quercus Course Website**

EESB04 uses Quercus for its course website, which can be accessed via <https://q.utoronto.ca>.

**Activating your UTORid and Password**

If you need information on how to activate your UTORid and set your password for the first time, please go to <http://www.utorid.utoronto.ca>. Under the “First Time Users” area, click on “activate your UTORid” (if you are new to the university) or “create your UTORid” (if you are a returning student), then follow the instructions. If you have any issues, please contact the Student Help Desk at 416-978-HELP.

**Communication *from* Professor McLagan and TAs**

If I need to contact you about an important change in the course, I will do so via the Quercus system. I suggest you consider downloading the “Canvas Student” app to your device(s) or at a minimum, ensure your utoronto email address is properly linked for forwarding to whatever email service you actually check.

**You are responsible for:**

 1. Ensuring you have a valid UofT email address that is properly entered in the ROSI/ACORN system

 2. Checking your UofT email account and/or Quercus communications on a regular basis as this is the primary means of professor-to-student communication outside of regular classroom hours.

**ACCESSIBILITY STATEMENT**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. (416) 287-7560 or ability@utsc.utoronto.ca.

**STUDENT CODE OF CONDUCT**

The University treats cases of cheating and plagiarism very seriously. The University of Toronto’s Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences in papers and assignments include using someone else’s ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment.
On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else’s answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor’s notes.

**RELIGIOUS ACCOMMODATIONS**

The University has a commitment concerning accommodation for religious observances. I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. According to University Policy, if you anticipate being absent from class or missing a major course activity (like a test, or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

**COURSE MATERIALS AND COPYRIGHT**

Course materials are provided for the exclusive use of enrolled students. Do not share them with others. I do not want to discover that a student has put any of my materials into the public domain, has sold my materials, or has given my materials to a person or company that is using them to earn money. The University will support me in asserting and pursuing my rights, and my copyrights, in such matters.

**SYNCHRONOUS LECTURE AND TUTORIAL OUTLINE / SCHEDULE**

|  |  |  |
| --- | --- | --- |
| **Date** | **Lecture Content** | **Tutorials/Assignments** |
| Sept. 8 | 1. Ground Rules, Introduction, the Historical Development of Hydrology, and Some Basic Concepts in HydrologyReading: Chapter 1 | **NO TUTORIAL THIS WEEK.** |
| Sept. 15 | 2. Hydrological Concepts and the Physical Properties of WaterReading: Chapter 1  | **TUTORIAL #0 THIS WEEK.** |
| Sept. 22 | 3. Energy in Hydrology Reading: Not much in book (bit at p. 37-38) | **TUTORIAL #1 THIS WEEK.** |
| Sept. 29 | 4. Precipitation and Interception Reading: Chapter 2 | **NO TUTORIAL THIS WEEK.** |
| Oct. 6 | 5. Averaging Precipitation; Snow and Snowmelt Reading: Chapter 2 ~ p. 26; Ch. 4 p. 71-76 | **ASSIGNMENT #1 DUE.** **TUTORIAL #2 THIS WEEK.** |
| Oct. 13 | NO CLASSES THIS WEEK – FALL READING WEEK |  |
| Oct. 20 | 6. Evapotranspiration Reading: Chapter 3 | **NO TUTORIAL THIS WEEK.** |
| Oct. 27 | 7. Soil Moisture and Infiltration Reading: Chapter 4 (p.56-61, 66-71) | **ASSIGNMENT #2 DUE.****TUTORIAL #3 THIS WEEK.** |
| Nov. 3 | 8. Percolation and Groundwater Chapter 4 (p. 61-66) | **NO TUTORIAL THIS WEEK.** |
| Nov. 10 | 9. Runoff GenerationReading: Chapter 5 | **ASSIGNMENT #3 DUE.****TUTORIAL #4 THIS WEEK.** |
| Nov. 17 | 10. Streamflow, Runoff Regimes and MeasurementReading: Chapter 5 | **NO TUTORIAL THIS WEEK.** |
| Nov. 24 | 11. Streamflow Analysis and Hydrological ModellingReading: Chapter 6 | **ASSIGNMENT #4 DUE (by** **midnight today).**  |
| Dec. 1 | 12. Water QualityReading: Chapter 7 | **NO TUTORIAL THIS WEEK.** |

|  |
| --- |
|  |
|  |

**ONLINE QUIZ SCHEDULE**

|  |  |
| --- | --- |
| **Quiz due by** | **Based on material completed by end of** |
| Sept 10, 3 pm | Sept 8 |
| Sept 17, 3 pm | Sept 15 |
| Sept 24, 3 pm | Sept 22 |
| Oct 1, 3 pm | Sept 29 |
| Oct 8, 3 pm | Oct 6 |
| Oct 22, 3 pm | Oct 20 |
| Oct 29, 3 pm | Oct 27 |
| Nov 5, 3 pm | Nov 3 |
| Nov 12, 3 pm | Nov 10 |
| Nov 26, 3 pm\* | Nov 24 (\*two weeks of material) |

Quizzes are completed online via Quercus. You will have one attempt for each quiz with a total duration of only 15 minutes (10 questions). ***Please find a quiet place with a good internet connection and double-check you are prepared to start the quiz, before you actually start a quiz. If you run into a technical problem outside of your control, take a screenshot (or photo with your phone) and send it to TA Planck Huang (******planck.huang@utoronto.ca******), along with a brief explanation of the problem - and we’ll figure something out.***