

Earth Sciences 3340a - Fall 2024 Course Outline

1. Course Information

Earth Sciences 3340a/b Watershed Hydrology

Schedule: Thursday's – lectures (section 001) 10:30 a.m. to 12:20 p.m. ; 1ab (section 002) 1:30 to 3:20 p.m.

Prerequisites: Any 1.0 course equivalent at the 1000 level from Calculus, Mathematics, Applied Mathematics, Numerical and Mathematical Methods, Data Science, or Statistical Sciences.

- *Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.*

2. Instructor Information

Instructor: Rob Schincariol, Ph.D., P.Geo.

519-661-2111, ext. 83732, schincar@uwo.ca

Office Hours by appointment – email and a time will be arranged that meets both our schedules.

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. Course Syllabus, Schedule, Delivery Mode

Description: Occurrence, movement, and behavior of water in the hydrologic cycle. The development of quantitative representations of hydrologic processes (e.g. precipitation, evapotranspiration, runoff, infiltration and unsaturated flow, saturated flow, surface flow). Analysis of stream response hydrographs. Statistical models of predicting flood responses and water resource management.

Learning Outcomes

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

- Apply quantitative skills to assess and evaluate all components of the hydrologic cycle including precipitation, evapotranspiration, surface water flow, unsaturated zone flow, and ground water flow.
- Framework calculations of hydrologic quantities, and water balances, within their respective data limitations, including model error and measurement error, both spatially and temporally.
- Delineate watersheds topographically and evaluate how topographic and subsurface hydrogeology processes affect watershed divides and basins.
- Assess current and historical precipitation patterns from online radar, satellite, and ground-based measurements.
- Assess historical and 'realtime' streamflow hydrographs both online and in the field through application of current meter, float, and dilution gaging methods.
- Comparative calculation of evapotranspiration through evaporation pan, water balance, FAO Penman-Monteith, and Thornthwaite and Mather models.
- Measure field saturated hydraulic conductivity and matric flux potential using the Guelph permeameter.
- Measure unsaturated hydraulic conductivity using a tension infiltrometer.
- Construct potentiometric maps and quantify ground water flow vectors and velocities.
- Quantify event and stream base flows using runoff models.
- Improve students presentation skills ability.

Detailed Schedule

Sept. 5	lecture 1; lab 1 assigned
Sept. 12	lecture 2; lab 1 due 1:30 p.m.; lab 2 assigned
Sept. 19	lecture 3; lab 2 due 1:30 p.m.; lab 3 assigned
Sept. 26	lecture 4; lab 3 due 1:30 p.m.; lab 4 assigned
Oct. 3	test 1 (10:30 a.m. to 12:20 a.m.) – lectures 1, 2, 3, 4; labs 1, 2, 3; no lecture; no lab
Oct. 10	lecture 5; lab 4 due 1:30 p.m.; lab 5 assigned
Oct. 24	lecture 6; lab 5 due 1:30 p.m.; lab 6 assigned; Group Presentation watershed region deadline
Oct. 31	lecture 7; lab 6 due; lab 7 assigned
Nov. 7	lecture 8; lab 7 due; groundwater equipotential quiz during lecture
Nov. 14	test 2 – (10:30 a.m. to 12:20 a.m.) lectures 5, 6, 7, 8; labs 4, 5, 6, 7; no lecture; no lab
Nov. 21	Group Presentations 1 in lecture; Group Presentations 2 in lab.
Nov. 28	Group Presentations 1 & 2 (finalized version reflecting comments due by 12:20 p.m.)
Dec. 5	No lecture or lab

Contingency plan

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

4. Course Materials

Text: Physical Hydrology 3rd Edition, S. Lawrence Dingman, ISBN 978-1-4786-1118-9, 2015 Waveland Press.

Textbook in hard copy and electronic formats is available directly from the publisher at

<https://www.waveland.com/browse.php?t=382>

Electronic formats are also available from other web sites / vendors. In addition, being a 2015 publication, there are plenty of used textbooks available.

You will absolutely require the textbook as lectures and lab work directly with material / figures from the text that are not reproduced in the lecture slides. The lectures will guide you into what sections (and what ‘depth’) you are required to understand. This text is routinely used in practice. As such it is quite extensive and goes into much greater depth on many topics than is required for this course.

Students should check OWL Brightspace <https://westernu.brightspace.com/d2l/login>

on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a regular basis.

The main purpose of the lectures is to help you understand key hydrological processes and techniques used to quantify these processes. The labs apply the techniques. Case studies / consulting reports give you the real-world application of these techniques.

All course material will be posted to OWL Brightspace <https://westernu.brightspace.com/d2l/login>

If students need assistance, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Technical Requirements – A stable internet connection, computer with working microphone and webcam, Microsoft Excel software, ability to print in colour (at home or store front), scanner or camera (cell phone is fine).

5. Methods of Evaluation

<u>Marking Scheme:</u>	<i>Option 1*</i>	<i>Option 2*</i>	
Lab Assignments	21%	21%	Each lab is worth 3%.
Test 1 (110 minutes)	30%	34%	
Test 2 (110 minutes)	30%	34%	
Group Presentations	14%	6%	10% for initial presentation; 4% for final PowerPoint
Quiz (in lecture)	5%	5%	

*Final grades will be calculated using Option 1 and Option 2, with the higher of the two grades being assigned.

NO FINAL EXAM

* Tests will be short answer and calculations. All tests are scheduled during your normal lecture timeslot (see above). **No computers or cell phones may be used during the tests.** All work must be done independently. Not adhering to these conditions will be considered a scholastic offence. *Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:* http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Any assignments handed in past the due date will be subject to a penalty of 20% per late day (if you have exceptional circumstances contact the instructor schincar@uwo.ca prior to due date). The majority of marks for questions are given for problem setup, assumptions, solution approach, and proper use of significant figures and units. Simply writing down a formula (or providing an Excel output) and giving the answer, even if correct, will not result in full marks. NOTE: 20% of each assignment grade is for proper layout and organization, neatness, and significant figures / statement of uncertainty.

6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Any absence will be handled with reweighting for Test 1 and Test 2, and an extension for the Major Report. Absence from a Group Presentation will be handled either with a re-assignment or reweighting depending on the situation.

7. Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at <https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf.

8. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

No electronic devices are permitted on tests.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

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

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters:

<https://www.uwo.ca/sci/counselling/>

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

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 sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services> .