

**University of Western Ontario  
Department of Geography  
Geography 3341b Hydrology  
2015 Winter Term**

1. *Course Description and Prerequisites*

The study of water in the environment. Selected aspects of the terrestrial hydrological cycle, including: runoff generation, flooding and drought, snow and ice. Applied aspects will be considered in each topic covered. Prerequisites: Geog 2330a/b Geomorphology and Hydrology or Geog 2310a/b Weather and Climate or permission of instructor. (Geog 2210b Spatial Analysis (or equivalent) highly recommended.)

2. *Objectives*

- a) To provide an overview of hydrological processes and the terrestrial water cycle from the water resource perspective, sufficient to the commissioning, oversight and interpretation of a hydrological consulting report.
- b) To provide exposure to a range of general analytical techniques which are part of the tools of the trade of the environmental professional.

3. *Personnel*

Instructor: Dr.C.C. Smart, Room 1402 SSC Tel. 85007  
E-mail: [CSMART@UWO.CA](mailto:CSMART@UWO.CA)  
Office hours Tues. 10:00-12:00 (or by appt.)

Teaching Assistant: Jason Igras  
[IGRAS.UWO@GMAIL.COM](mailto:IGRAS.UWO@GMAIL.COM)  
TBA

4. *Course Format*

A two hour lecture period: Wednesday. 1:30-3:30 SSC 1302 (PGLL)

A two hour lab period: Wednesday. 3:30-5:30 SSC 1316a (GIS Lab)

Two ~one hour *lecture sessions* will run each week with a short break between. Lab exercises will be posted on-line, introduced and explained during lab sessions that immediately follow the lecture.

5. *Marking Scheme*

Exercises (five @8%) .....	40%
Mid-term test, 1h (Provisionally 1:30pm. 24/02/16)	20%
Final Exam (2h in April).....	40%

The lectures provide most “raw material” for the course. Lectures and Exercise guidance are not available on line. Attendance at class and lab sessions is therefore critical in passing the course. Exercise marks are awarded to encourage completion of the exercise, NOT as a rigorous form of evaluation. Therefore, in most exercises it should be possible to gain rather high marks. Tests and examinations are the primary means of *evaluation*, and may therefore appear to be much more demanding. The end result might be an overall average mark for the course in the mid B range, while the average lab mark may be in the mid A range.

*Exercises* will consist of laboratory problems devised to demonstrate fundamental aspects of measurement, data processing and analysis for hydrological problems. You will normally be allowed just under two weeks to tackle the assignment and raise questions in scheduled classes and labs. Use assigned laboratory hours to work on exercises. You are encouraged to work in small groups, but unless stated otherwise your assignment should be explicitly written up independently.

Exercises are generally designed with generate a single deliverable electronic file in Word or Excel. These reports are to be delivered to the teaching assistant (or instructor as directed) by Noon on the designated Monday. Name submissions using the following convention: “Geo3341 15 ex# *your name*”. Unattributed files will not be marked. Deadlines will be enforced.

Tests are usually short answer and calculation format.

The final examinations will also incorporate a "pre-announced" essay topic of strictly limited length, typically 200 words. Brief in-class tests ("pop" tests) worth 2% each may be introduced as an incentive to be adequately prepared for each lecture. Key concepts from previous lectures will be assessed. The mid-term and exercise weighting will be reduced to accommodate such tests. In tests, basic calculators are permitted, no electronic communication devices are permitted.

### 6. Texts

Background information can be found in texts used in earlier Geography courses. The "texts" for the course are expensive, so I have not ordered them. They are available in the Taylor Library

George M. Hornberger, Jeffrey P. Raffensperger, Patricia L. Wiberg 1998. *Elements of Physical Hydrology* Taylor [GB661.2.E44 1998](#)

Dingman, S.L., 1993. *Physical Hydrology*. Prentice Hall Taylor [GB661.2.D56 2008](#)

Ward, R.C., and Robinson, M. 2004. *Principles of hydrology* McGraw Hill. Weldon [GB661.2.W35 2000](#)

Some copies of Dingman may be available second hand (possibly listed under Earth Sciences). This and Hornberger are excellent books, but rather expensive books that cover material to a far more advanced level than required for the course. As a purchase, it would be best suited to those wishing to have a superior reference source at their disposal for future studies or work. Ward and Robinson is less technical, but rather long winded. Web retailers list books at very variable prices. More basic texts can be found in the library by perusing the stacks and selecting something appropriate to particular needs. Online resources are widely available and should be used in reviewing lecture notes. Critical sources and class images will be posted on line.

7. *Course Outline* (Note that the full curriculum may not be covered in this course. Examinations adjusted accordingly.)

1. Water: an anomalous compound. Measurement of hydrological fluxes [Snow hydrology]
2. The hydrological cycle: reservoirs and fluxes
  - Lab 1. Water balance and the hydrological cycle.
  - Lab 2. Current metering and the discharge rating curve
3. Hydro-climatology: Precipitation, interception and evapotranspiration. (Lab 3. Thiessen polygons)
4. Soil water (see Geog 3342a/b for more advanced groundwater course)
5. Surface water hydrology: Hillslopes, Catchments, modelling, statistical analysis
  - (Lab 4. Hydrological modelling, Lab 5. Time series analysis
- {6. Limnology}

The course material is cumulative, i.e. you are expected to keep up with the material week by week. Discuss problems with your peers, read the text and make use of the open question forum at the beginning of each lecture. If you do not keep up with the material, you may find subsequent lectures difficult. Revision should be weekly, not exclusively the night before an examination.

*Field work* is not practical during much of the winter term. The first lab session will (if feasible) look at snow hydrology. Brief field work on Medway Creek may be possible in late March when snowmelt flooding may occur.

Geography 2210 (or equivalent) level of *statistical analysis* and rudimentary *Windows* and *Excel* skills are assumed. Quick tutorials may be arranged. *Spreadsheets* provide exceptionally useful general management and analysis tools, relevant not only in hydrology, but in many areas of employment. Accordingly, the exercises are generally framed in an Excel format, and the labs are held in SSC1316a. You must have a Social Science student account.

### *Lab and Assessment Schedule*

Date	Exercise	Lab due (noon)	
06/01/2016	Lab session: snow hydrology	Weather dependent	
13/01/2016	Exercise 1 Hydrological Cycle		
20/01/2016			
27/01/2016	Exercise 2. Stream gauging	Exercise 1	25/01/2016
03/02/2016			
10/02/2016	Exercise 3 Rainfall GIS	Exercise 2	08/02/2016
17/02/2016	Mid term break		
24/02/2016	Mid term test 1:30 1 hour		
02/03/2016	Exercise 4 Hydrologic modelling	Exercise 3	29/02/2016
09/03/2016			
16/03/2016			
23/03/2016	Exercise 5 Time series analysis	Exercise 4	14/03/2016
30/03/2016			
06/04/2016	Last Class	Exercise 5	28/03/2016
09/04/2016	Examinations (through 30th April)	2 hours	

### *Expectations from the course*

You are expected to develop knowledge of the component processes of the land surface hydrological cycle, their measurement, implementation in a water balance and analysis using graphical and statistical tools. In addition, you are expected to understand how humans interact with and influence the hydrological cycle. Capacity to implement, operate and report on spreadsheet based data analysis is also expected.

### **Special Accommodations and late assignments**

Late assignments may be accepted at the discretion of the marker up to the date of return of the marked assignments. A penalty will apply. Generally, exercises are submitted (electronically) *by noon on Monday* with the intent to return marked exercises the following Wednesday. This may not be possible with all exercises.

For UWO Policy on Accommodation for Medical Illness and a downloadable SMC see:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_medical.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf)

Students seeking academic accommodation on medical grounds for any missed tests, exams, participation components and/or assignments worth 10% or more of their final grade must apply to the Academic Counselling office of their home Faculty and provide documentation. Academic accommodation cannot be granted by the instructor or department. Note that the final examination period extends to the end of April.

### **Use of computers and electronic devices**

Personal computers are permitted to assist note taking during lectures. They are not to be used for other purposes that may distract the user and others in the classroom. Computer users are requested to occupy rear seats in the classroom to avoid screen distraction for others. Personal communication devices are not to be used during classes.

### **Statement on Academic Offences**

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

**Note:** working with others in the class to tackle assignments is considered wise. However, the submitted exercise should clearly be an individual effort.

### **Mental Health**

If you or someone you know is experiencing distress, there are several resources here at Western to assist you. Please visit the site below for more information on mental health resources:

<http://www.uwo.ca/uwocom/mentalhealth/>.

### **Western's commitment to accessibility**

The University of Western Ontario is committed to achieving barrier free accessibility for persons studying, visiting and working at Western.

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

### **Support Services**

Registrarial Services: <http://www.registrar.uwo.ca/>

Student Development Services: <http://www.sdc.uwo.ca/>