

## **GGR 206 Introduction to Hydrology**

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### **Lectures**

Tuesday 12-2 pm, LM161

Four tutorials are given on Wednesday 11 am - 1 pm or 5-7 pm, in SS5620 (in the basement), on 25 September, 9 October, 23 October and 20 November. You can choose one of these two time slots. The pre-exam tutorial will be held at 5-7 pm on 4 December in SS561.

### **Consultations**

Jing Chen: 2:15-4 pm, Tuesdays, SS5058, 100 St. George Street,

Alvin Xiong: 12-2 pm, Mondays, SS596, 100 St. George Street.

### **Recommended Preparation**

GGR101Y or JGF150Y or JGG150Y; MAT135Y

(Preparation can be discussed with the instructor individually.)

### **Outline**

“Hydrology is the science dealing with the waters of the earth, their occurrence, distribution and circulation, their chemical and physical properties and their interaction with the environment”. This course encompasses major hydrological processes, including precipitation, evaporation, transpiration, rainfall interception, soil water, ground water, and runoff. The emphasis of this course will be on the basic principles of these physical processes forming the complete hydrological cycle at global, regional and watershed scales. A series of 4 assignments are given for students to gain practical skills in hydrological analysis.

### **Evaluation**

4 assignments \_\_\_\_\_ 40%

Mid-term exam \_\_\_\_\_ 20%

Final exam \_\_\_\_\_ 40%

Late assignment reports will be penalized at 10% of the portion of the lab for each day of delay, i.e., a multiplying factor of 0.9 will be used for 1-day delay, and 0.8 for 2-day delay, etc.

### **Text Book**

Ward, R. C. Ward and M. Robinson, 2011, *Principles of Hydrology*. 4<sup>th</sup> Edition. McGraw-Hill India. ISBN 1259002241.

### **Referenced Books**

Hendriks, M. R., 2010, *Introduction to Physical Hydrology*, Oxford, ISBN: 9780199296842.

Jones, J. A. A., 1997. *Global Hydrology: Processes, Resources and Environmental Management*. Longman.

## Lecture, Assignment and Tutorial Schedule

Date	Lecture Subject	Assignments	Readings
Sep 10	Administration and Introduction Global hydrological cycle (I)		WR 1.1-1.3
Sep 17	Global hydrological cycle (II) Precipitation processes (I)		WR 1.1-1.3 WR 2.1-2.1.1
Sep 24	Precipitation processes (II) Precipitation measurements		WR 2.1.2-2.2.3 H 2.4
Sep 25	Assignment #1 tutorial	#1 due Oct 08, 10%	
Oct 01	Precipitation analysis Evaporation processes		WR 2.6; H 2.5 WR 4.1-4.2
Oct 08	Transpiration processes Evaporation estimation Evaporation measurements		WR 4.4.3-4.4.4 WR 4.6.1-4.6.2, H 2.7 H 2.6
Oct 09	Assignment #2 tutorial	#2 due Oct 22, 10%	
Oct 15	Mid-term test Interception processes Interception estimation	Mid-term, 20%	WR 3.1-3.4 WR 3.6
Oct 22	Soil water (soil properties) Soil water movement (I)		WR 6.1-6.3.2 WR 6.3.3-6.3.5
Oct 23	Assignment #3 tutorial	#3 due Nov 12, 10%	
Oct 29	Soil water movement (II) Soil water measurement		WR 6.4 (up to Eq. 6.3) WR 6.3.6
Nov 05	Fall reading week		
Nov 12	Ground water (storage) Ground water movement (I)		WR 5.1-5.4.1 WR 5.5-5.5.2
Nov 19	Ground water movement (II) Runoff (sources and processes)		WR 5.5.3 WR 7.1-7.3.4
Nov 20	Assignment #4 tutorial	#4 due Dec 03, 10%	
Nov 26	Runoff (event-based) Runoff (temporal variations)		WR 7.4.1-7.4.2 WR 7.4.4-7.7
Dec 03	Runoff (spatial variations) Conclusion and review		Jones 4.2.1 and 6.1.1
Dec 04 (tentative)	Pre-exam tutorial		
		Final exam, 40%	

WR: Ward and Robinson (2011) – textbook

H: Hendriks (2010) – reference book

Jones: Jones (1997) – reference book

Note: Any additional readings are to be provided in class in advance.

### Assignments

The assignment reports are normally given to the instructor on the Tuesday class, but they can be put in an envelope on the instructor's office door (SS5058) before 5 pm of the due date.

### Preparation

Students also need to review materials in GGR101 or review Chapters 2, 7, and 9 in R. W. Christopherson (2000), *Geosystems: An Introduction to Physical Geography*, 4<sup>th</sup> Edition, Prentice Hall, New Jersey.

Hydrological analyses require some basic mathematical skills from simple summations to logarithmic functions. Students who are incapable of logarithmic operations are not encouraged to take this course. Logarithmic functions would be the most complex functions used in this course. Calculus is not required.

**Geography Math Help Centre**

Another resource for this course is the department's new Math Help Centre. Geography TAs will be available to help refresh and explain mathematical concepts and techniques that may come up in your GGR courses. This includes working with formulas, graphing data, completing calculations, and so forth. It does not matter how basic your questions are! No appointment is required, just drop by. There will also be table space available in the room, allowing students to get math help as they work through assignments. Details on location and TA times posted here: <http://geography.utoronto.ca/undergraduate/math-help/>