

UNIVERSITY OF WESTERN ONTARIO
DEPARTMENT OF GEOGRAPHY

Geography 2330A - Geomorphology and Hydrology

Fall 2014

Class Times

Lectures:	Wed. 12:30 – 2:30 p.m.	SSC 3018
Labs:	Lab section 1 Thurs. 2:30-4:30 p.m.	SSC 1059
	Lab section 2 Thurs. 4:30-6:30 p.m.	SSC 1059

Instructor

Dr. Peter Ashmore
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Office hours: by appointment

Calendar Description

Water and sediment cycles at the Earth's surface and description and explanation of the resulting landforms. The interconnection of geomorphic and hydrologic systems to environmental change, with applications to environmental management. 2 Lecture hours, plus 2 laboratory hours.

Prerequisites

1.0 course from Geography 1100, 1300A/B, 1400F/G, 1500F/G, 2131A/B, 2153A/B (taken after September 2012), or the former Geography 020E; or 0.5 course from Earth Sciences 1022A/B or 1081A/B; or enrollment in the Major in Physical Geography or in an Honors Earth Science Program for Professional Registration.

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.

Course objectives

At the conclusion of the course you should be able to:

1. recognise, and describe the characteristics of, common landforms;
2. understand and explain the physical principles of common geomorphic and hydrologic processes, and the functioning of the water and sediment cascades;
3. explain landform development in relation to the relevant geomorphic and hydrologic processes

and anticipate the effects of environmental change on both the processes and landforms;

4. discuss, with the help of case examples, the application of geomorphology and hydrology to environmental management;
5. apply simple techniques such as map analysis, air photo reading, exploratory data analysis and use of physical theory to the solution of geomorphic and hydrologic problems.

Course content

Lectures will cover the following main topics:

1. Introduction - the scope of physical geography as the science of the physical environment of the Earth's surface, the place of hydrology and geomorphology in systematic physical geography, spatial and temporal scales of study.
2. Geomorphology and hydrology as physical systems - energy and mass transfer and budgets, endogenic and exogenic processes, the relief of continental surfaces and their denudation, global water cycle.
3. Physical properties of earth materials and application to hillslope erosion - soil moisture and shear strength, processes of mass movement and their role in hillslope evolution, slope stability as a geomorphic hazard and its mitigation.
4. Hillslope and drainage basin hydrology - the water balance and water movement at the local scale. Components of the water balance and the physical processes of water transfer: interception and evapotranspiration; soil moisture storage, movement and infiltration; groundwater; generation of surface and subsurface stormflow; streamflow analysis; flooding and flood hazards; fluvial erosion on hillslopes. The effects of land-use change on hillslope hydrology and erosion.
5. Drainage basin geomorphology - the drainage basin as a fundamental unit for geomorphology, surface hydrology and environmental management; quantitative analysis of stream network and drainage basin morphology and development; the drainage basin sediment cascade; processes of stream channel initiation; physics of flow and sediment transport in stream channels; stream channel form; effects of climate, land use and flow regulation on stream systems.
6. Glaciation - the significance of glaciation to geomorphology and hydrology in Canada; glacier mass balance; physics of glacier flow, erosion and deposition; landforms of continental and alpine glaciation.

Course Schedule

Topic	Lecture
Course introduction, earth systems	Sept. 10
Uplift and denudation, regional landforms	Sept. 17
Hillslopes:	
a) weathering	Sept. 24
b) hillslopes & mass movement	Oct. 1
c) hillslope stability & water erosion	Oct. 8
Drainage basins:	
a) hillslope and streamflow hydrology	Oct 15
b) drainage basins and rivers	Oct 22, Nov. 5, 12
Glaciers:	
a) glacial processes	Nov. 19
b) glacial landforms	Nov 26
Summary and Prospect	Dec.3

Midterm test on October 29th, in class

All students are expected to attend all lecture and lab sessions.

Reading:

There is no required textbook for this course but there will be required readings from various sources and I will place weekly reading assignments on OWL as we cover each topic. These will be excerpts from books, articles and various websites. The readings will be chosen to support, extend and provide cases related to each course topic and also the lab assignments.

For introductory background I recommend referring to the relevant parts of an introductory Physical Geography textbook such as: R. Christopherson and M.L. Byrne, 2012. Canadian Geosystems; An Introduction To Physical Geography, 3rd Canadian Edition, Toronto, Pearson Education Canada (this is the textbook for Geography 1300 Physical Geography). See **especially parts or all of Chapters 9, 12, 13, 14 and 17.**

There are two physical geography textbooks from which I will select readings:

- 1. Fundamentals of the Physical Environment by Smithson et al, 4th edition (Weldon library reserve readings).** This is an introduction to physical geography and chapters **1, 10, 13, 14, 15, 17 and 24** are especially useful for this course. There is also an *e-book* of the 3rd edition of this book accessible from the Western Libraries catalogue.
- 2. An Introduction to Physical Geography and the Environment, Joseph Holden (editor). Chapters 11, 13,14 and 18.**

Both of these books have useful glossaries if you are looking for definitions and terms.

In addition there are several textbooks on geomorphology (and aspects of hydrology) that I will use as sources. You may also want to do some independent reading in one or more of these books (you will find that content is similar between them).

3. **Key Concepts in Geomorphology**, P.R. Bierman and D.R. Montgomery. (2014) W.H. Freeman, New York. Chapters **1, 4, 5, 6, 7, 9**. **The book with nicest pictures and diagrams!** The “vignettes” and images on the website for this book are also useful:
<http://serc.carleton.edu/vignettes/index.html> <http://www.uvm.edu/~geomorph/gallery/>
4. **“Global Geomorphology”** by M.A. Summerfield. Chapters, **1, 6-9, 12 and 15** are most relevant for this course. **Weldon library reserve readings**
5. **Process Geomorphology** by Ritter D.F., Kochel. R.C, Miller, J.R. Most recent edition is 5th (2011), but 3rd and 4th editions are very similar. Chapters **1, 2, parts of 3, 4, 5, 6, 7, 9 and 10**. Some is at a more advanced level than covered in this course. **3rd edition is in Weldon Library reserve readings**

Laboratory Sessions

First lab session is September 18th

There is no lab session Oct 30 (Fall Study Break).

A full lab schedule is given below and also posted separately on the OWL site for the course.

Labs will be used for completion of a variety of exercises designed to consolidate and elaborate on the lecture material and lab material will be incorporated into examinations. The labs are also used to teach and apply some simple practical skills in geomorphology and hydrology and may involve short field excursions in the vicinity of the campus. The laboratory sessions will be supervised by teaching assistants who will also be responsible for assessment of lab work. During the lab sessions you will often work and report in small groups. Some lab exercises will require a calculator and in some cases labs will make use of computer-based exercises.

There is no laboratory manual for the course.

Assessment

There are three main components in the course assessment:

1. **Lab /field reports (see p. 6 for details):**
Six short reports based on hands-on field work and practical lab work distributed through the term. There will be at least two lab periods spent in the field in Medway Creek valley adjacent to campus. Four of the reports relate to aspects of the geomorphology and hydrology of the valley as an example of some of the principles discussed during lectures and applied to this local case study.
2. **Mid-term test. A 1 hour test** with short written answer format, in class on **Wednesday, October 29th.**
3. **Final exam. A 2 hour exam** with both short answers and essay type questions. The final examination will cover all aspects of the course, including the labs and readings. Scheduled in university examination period.

Final course grades are based on:

Lab and field work reports (6 assignments) 40%

Midterm: 20%

Final exam: 40%

Non-medical absences

If you miss, or anticipate missing, an assignment deadline or a test for non-medical reasons please:

- *either* contact the instructor to discuss the circumstances for possible accommodation ahead of time if you anticipate difficulties completing an assignment on time or attending a test *or* as soon as possible afterwards if the absence was un-anticipated.
- There is no automatic mark deduction for late assignments but a penalty may be applied if there are not valid reasons for the delay or absence. Delay beyond the date on which graded assignments are returned to the class will result in a grade of zero.
- Absence from a test will result in a grade of zero without a valid reason for absence or notification ahead of time. Accommodation and alternative test time can be granted if there are valid reasons for the absence.

Illness

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

http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf

Downloadable Student Medical Certificate (SMC): <https://studentservices.uwo.ca> under the Medical Documentation heading

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.

For assignments **worth less than 10%** no medical documentation is required but you must contact the instructor before the assignment due date, or as soon as possible afterwards, to notify them of the medical absence and for arranging academic accommodation.

Lab schedule and assignments

Lab date	Exercise
Sept 18	Medway Creek slope survey (field work)
Sept. 25	Medway Creek channel survey (field work)
Oct 2	Field data analysis and discussion, report due Oct 9
Oct 9	Medway air photo and map, report Oct 16
Oct 16 & 23	Slope stability analysis. Submitted Nov 6
Oct 30	No lab
Nov 6	Medway Cr. stream-flow analysis, report due Nov 13
Nov 13	Medway Cr. Summary discussion final synthesis report due Nov 20
Nov 20	Experimental geomorphology 1
Nov 27	Experimental geomorphology 2, Report due Dec 4
Dec 4	No lab

Activity assignment	Due date	Course grade
1. Medway fieldwork report	Oct 9	10%
2. Medway air photo and map report	Oct 16	5%
3. Slope stability analysis	Nov 6	10%
4. Medway Cr stream-flow report	Nov 13	5%
5. Medway summary/synthesis	Nov 20	5%
6. Experimental geomorphology	Dec 4	5%

Scholastic Offenses

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/handbook/appeals/scholastic_discipline_undergrad.pdf

Academic Conduct

Students should also be familiar with the University Academic Policies and Regulations and Academic Rights and Responsibilities in the Academic Calendar on the Registrar's website and p 33-41 of the printed calendar.
[http://www.westerncalendar.uwo.ca/western/web/2007\(new\)/ACADEMIC_INFORMATION_301621.html](http://www.westerncalendar.uwo.ca/western/web/2007(new)/ACADEMIC_INFORMATION_301621.html)

Electronic Devices

No electronic devices will be allowed during tests and examinations.

Plagiarism

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>)

Mental Health

Students who are in emotional/mental distress should refer to Mental Health@Western <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

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://www3.registrar.uwo.ca/index.cfm>

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