

THE UNIVERSITY OF WESTERN ONTARIO  
DEPARTMENT OF GEOGRAPHY

**Geography 3334a - Geomorphology of River Channels**

*Fall 2011*

**Class Times**

Lecture:	Mon.	10:30 a.m.- 12:30 p.m.	SSC 3006
Lab:	Tues	2:30 p.m.- 4:30 p.m.	SSC 1425

**Instructor**

**Dr. Peter Ashmore**

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**Calendar Description**

The mechanics of alluvial rivers, including fluvial hydraulics and sediment transport, river channel morphology and dynamics, floodplain sedimentation, the response of rivers to environmental change and selected applications to river management and conservation.

**Prerequisite:**

Geography 2330

Unless you have either the pre-requisites for this course or written special permission from your Dean to enroll in it, you will 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 Outline and Objectives**

Rivers are agents of erosion and sediment transport. One of the outcomes of this is the development a variety of landforms which are the focus for fluvial geomorphology. But rivers are also dynamic: they are a hazard, a habitat and a resource. They are often managed and manipulated to reduce hazards or enhance their value. The understanding of natural fluvial processes and forms is vital to their effective utilization and protection. The general objective of the course is to describe and explain the geomorphic processes and landforms associated with river systems. The course is concerned primarily with contemporary fluvial processes and forms rather than long term landscape development. It approaches the explanation of river morphology and dynamics quantitatively, using the fundamental physical principles of water flow and sediment transport in stream channels as the foundation. Thus, you can expect to use some simple mathematics and elementary physics in parts of the course, and in some of the practical exercises. If you are not comfortable with this at the beginning of the course then one of the objectives is to help you become so. There will also be a need to use statistical analysis in the discussion and explanation of some topics and I will be including some statistical analysis in the lab exercises (Geog 2210 will be an asset here, but not a necessity).

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

1. recognize, describe and explain the origins of common fluvial landforms and river morphology
2. understand the physical analysis of the processes of flow and sediment transport in rivers
3. explain the relationship between fluvial processes and fluvial landforms
4. explain, using examples, the physical effects of environmental change and human intervention on fluvial processes and landforms
5. describe applications of fluvial geomorphology to river management and other fields of fluvial science
6. apply techniques of data analysis and map and air photo reading to the solution of problems in fluvial geomorphology
7. give some case examples of river morphology, dynamics and human from rivers around the world

This is typically a small-enrolment class which works most effectively if you come to class prepared for discussion rather than a lecture. It also builds heavily on the course project and its relation to the course content. I will assign weekly readings and small assignments to build your understanding of the course material, support the class discussion and enlarge your knowledge of fluvial geomorphology and of rivers in general, including present day environmental and management concerns and applications.

### **Course Content and Reading**

There primary textbook is:

Ro Charlton. *Fundamentals of Fluvial Geomorphology*, Routledge, 2008, ISBN 9780415334549.

There are copies in the Campus Bookstore.

The table below highlights the chapters or sections of the book relevant to each part of the course to give you some guidance. I will assign a few other short readings for some topics and for the lab project.

### **Other useful books:**

The following may be helpful and have similar, or more advanced, coverage on the content of the course.

- Petts, G. and I. Foster *Rivers and Landscape*. Edward Arnold 1985.
- Morisawa, M. *Rivers: form and process*. Longman, 1985
- Richards, Keith *Rivers: form and process in alluvial channels*, Methuen, 1982
- Robert, Andre. *River Processes: an introduction to fluvial dynamics*. Arnold /

Oxford University Press, 2003. 214 pp

- Bridge, John. *Rivers and Floodplains: forms, processes and sedimentary record.* Blackwell, 2003 491 pp.
- Knighton, David *Fluvial Forms and Processes.*

References to more general texts on geomorphology may also help. I recommend *Process Geomorphology* by D.F. Ritter (3rd or 4<sup>th</sup> edition) which has two or three chapters on rivers and fluvial processes.

<b>Topic</b>	<b>Reading</b>
The fluvial system.	Ch 1 and 2 & 3-5
Hydraulics of alluvial channels - viscosity, turbulence, shear stress, resistance, velocity profiles	Ch 6
Fluvial erosion and sediment transport & beforms.	Ch 7
River morphology: controls & adjustment. Cross-sectional form of rivers.	Ch 8 117-133
Channel pattern types, sedimentary processes and characteristics and causes of variability.	Ch 8 117-133
Floodplain formation and sedimentology	Ch 8 133-136
Channel patterns and dynamics.	Ch 8 137-156
River channel change	Ch 9
River management and applications of fluvial geomorphology	Ch 10

## Assessment

There are four components:

### 1. Lab Report

The lab component of the course consists of:

- a) Some self-assessed practical exercises designed to allow opportunity for discussion and learning. This will include 3-4 lab sessions spent doing field-work on Medway Creek. Their purpose is to help you learn and develop skills in independent study and assessment, as well to allow you to gauge your understanding of the course material without penalty.
- b) A short project report in the form of a summary analysis of the geomorphology of Medway Creek based on your field results. Several of the lab sessions will be devoted to this project and you will be required to spend additional time on the project outside the lab times. This will be graded at the end of term and constitutes your grade for the lab component of the course.

The lab work will include elements of both individual and group work, but the assessment will be individual.

### 2. Applied Geomorphology Case Study

A short report on one case study of the impact of human activity on river channel morphology and dynamics. This will be taken from the academic research literature. You will hand in a short summary to be graded and there will be a class session to summarize the collective results from the whole group.

### 3. Midterm test October 24th in class.

### 4. Final Examination

No electronic devices will be allowed during tests and examinations.

Assessment	Date	Course marks
Mid-term test	Oct 24 (Mon)	20%
Lab Project	Nov. 21 (Mon)	30%
Applied geomorphology case study	Dec 12 <sup>th</sup> (Mon)	20%
Final exam	TBA	30%

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## **Academic Conduct**

Students are reminded of the **Senate Regulations** on Scholastic Offences and Absences Due to Illness.

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

[http://www.uwo.ca/univsec/handbook/appeals/accommodation\\_medical.pdf](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.

## **Plagiarism**

Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).

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/scholoff.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 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).

## **Official grades**

The mark awarded by an instructor in a course at UWO is only final when students receive it from the Registrar.