ENGG*6840 Open Channel Hydraulics
Fall 2014

1 INSTRUCTOR

Instructor: Doug Joy, P.Eng.
Office: THRN 2342, ext. 53048
Email: djoy@uoguelph.ca
Office hours: By appointment

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*6840 Courselink site. You are responsible for checking the site regularly.

2.2 Required Texts

There is no assigned text for this course. However, access to an undergraduate fluid mechanics text is necessary. One suggestion is:


2.3 Recommended Texts

2.4 Additional Resources

Lecture Information: All the lecture notes will be posted on the web page at least one day prior to the lecture. You are expected to have access to these for each class.

Assignments: Download the assignments according to instructions given in class. No solutions will be posted but will be discussed in class as required.

3 ASSESSMENT

3.1 Dates and Grade Distribution

Assignments: 60%

There will be approximately 5 assignments distributed throughout the semester. These will be given out at least two weeks prior to their due date and be mostly computational in nature. The nature of the assignments will closely follow the lecture material and provide the student opportunities to go deeper into the material presented in class.

Project: 40%

The course project will be of the student’s choice and is intended to allow the student to explore an area of open channel flow either beyond the normal scope of the course or explore an area covered in the course in much greater depth.

Projects must be identified by the 3rd week of the course (September 24th) and be approved by the course instructor. An outline of the project must be submitted no later than the 5th week of the course (October 8th). The projects will be presented during the first week of the exam period (December 1-5) at the normally scheduled class time. Details of the project requirements and specific grading criteria will be handed out later in the course but will include both a written report and a presentation to the class.

Some example topics from previous years include:

1. Turbulence measurements in open channel flows
2. Optimization of Hydraulic Conditions and Earthwork Requirements for a Canal
3. Effects of ice on flow in open channels
4. Bed forms and their evolution in estuary conditions
5. Bed load Transport in Mountainous Streams
6. Hydraulic Effects of Stream Enhancement Structures
7. Effects of River Hydraulics on Fish Behaviour
8. Modern measurement (laser Doppler, acoustic, etc.) techniques for sediment transport in rivers
9. Application of:
   a. Dambreak
   b. HEC-RAS
   c. HEC-6
   d. GEO-RAS
   e. CANWET
10. Analysis of compound channel hydraulics
11. Modelling of open channel behavior
12. Backwater Profiles Under Low Flow Conditions

3.2 Course Grading Policies

When You Cannot Meet a Course Requirement: When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course in writing, with your name, id#, and e-mail contact. See the graduate calendar for information on regulations and procedures for Academic Consideration:

http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1400.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

In accordance with the policies of the office of graduate studies, the minimum grade required to pass the course is 65%

4 AIMS & OBJECTIVES

4.1 Calendar Description

Basic concepts, energy principle; momentum principle; flow resistance; non-uniform flow; channel controls and transitions; unsteady flow; flood routing.
4.2 Course Aims
This course is an advanced, graduate level, course dealing with the important concepts associated with open channel flows in natural and altered environments. The main goals of the course are (1) cover the fundamental calculations and problems with open channel situations for both natural and altered channels; and (2) apply state of the science approaches and models to actual open channel problems.

4.3 Learning Objectives
At the successful completion of this course, the student will have demonstrated the ability to:
1. Apply the basic flow resistance equations used in open channel flows to a variety of situations,
2. Apply knowledge of non-uniform flows and their calculations to determine water surface profiles in natural channels,
3. Use knowledge of basic flow characteristics in rivers to provide designs for bridges, control structures and river protection works,
4. Utilize knowledge of the basic software tools used open channel flows to aid in design and analysis,
5. Apply basic principles to analysis the attenuation of flood waves un open channels, and
6. Concisely and articulately communicate the results of an in depth assessment of an open channel flow problem and solution to colleagues in a professional manner.

4.4 Instructor’s Role and Responsibility to Students
The instructor’s role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink/D2L but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

4.5 Students’ Learning Responsibilities
Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

E-mail Communication: As per university regulations, all students are required to check their <uoguelph.ca> email account regularly: e-mail is the official route of communication between the University and its students.
Recording of Materials: Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

4.6 Relationships with other Courses

This course assumes the student has had a basic course at the undergraduate level in fluid mechanics (ENGG2230 at Guelph) and hydrology (ENGG3650) and some exposure to basic backwater profile calculations.

5 Teaching and Learning Activities

5.1 Timetable

Lectures:  
THRN 1427: Wednesdays 4-7:00 PM

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<tr>
<th>Course Topics and Schedule</th>
<th>Nominal Weeks</th>
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<tbody>
<tr>
<td>Topic</td>
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<tr>
<td>1. Review of basic fluid mechanics and hydraulics</td>
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<tr>
<td>a. Energy</td>
<td></td>
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<td>b. Momentum</td>
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<td>2. Flow resistance equations</td>
<td>2</td>
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<tr>
<td>a. Basic equations</td>
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<td>b. Velocity distributions</td>
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<td>3. Basic backwater calculations</td>
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<td>a. Uniform flow</td>
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<td>b. Non-uniform flow</td>
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<td>c. Control sections</td>
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<td>d. Sub and supercritical conditions</td>
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<td>4. Transitions</td>
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<td>a. Bridges</td>
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<td>b. Hydraulic jumps</td>
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<td>c. Channel section changes</td>
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<td>5. Unsteady flow</td>
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<tr>
<td>a. Basic Equations</td>
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<td>b. Models</td>
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<tr>
<td>c. Stability Concerns</td>
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<td>6. Sediment transport</td>
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5.2 Other Important Dates

**Drop Date:** The last date to drop this one-semester course, without academic penalty, is Thursday, October 30th. Refer to the Graduate Calendar for the schedule of dates:

http://www.uoguelph.ca/registrar/calendars/graduate/current/sched/sched-dates-f10.shtml

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6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

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7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University’s policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. The Academic Misconduct Policy is detailed in the Graduate Calendar:

http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1687.shtml

7.1 Resources

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:

http://www.academicintegrity.uoguelph.ca/

The School of Engineering has adopted a Code of Ethics that can be found at:

http://www.uoguelph.ca/engineering/undergrad-counselling-ethics
The Graduate Calendar is the source of information about the University of Guelph’s procedures, policies and regulations which apply to graduate programs:

http://www.uoguelph.ca/registrar/calendars/graduate/current/
8 Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible. For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.csd.uoguelph.ca/csd/