CIVE 440 – Open Channel Hydraulics

Term – Summer 2016 (201605)

Instructor

Dr. Mohammad Reza Najafi*; Dr. Ahmad Shakibaenia*

Phone: 250-721-7373*; 250-363-8963*

E-mail: rnajafi@uvic.ca; shakiba@uvic.ca*

Office Hours

Days: Tuesday

Time: 4:00 p.m.

Location: Department of Civil Engineering

List all prerequisites and co-requisites: CIVE 310, CIVE 340

LECTURE DATE(S)

Section: A / CRN30124

Days: Monday, Tuesday

Time: 5 p.m. to 6.20 p.m.

Location: ECS

TUTORIAL SECTIONS

Section: T

Days:

Time:

Location:

T1

13/06/2016

5 p.m. to 6.20 p.m.

ECS

T2

18/07/2016

5 p.m. to 6.20 p.m.

ECS

TA Name

Alireza Mohammadzadeh

E-mail

alirezam@uvic.ca

Office

Required Text

Title: Fundamentals of Hydraulic Engineering Systems

Author: Robert J. Houghtalen, A. Osman Akan and Ned H. C. Hwang

Publisher/Year: Prentice Hall/2009

Optional Text

Reference Materials:

Water resources engineering, Larry Mays, second edition, 2010


COURSE OBJECTIVES: Verbose description of the material being covered in the course. How does the course build/relate to other courses in the program.

Application of continuity, energy and momentum principles to flow in open-channels and closed conduits; design of channels considering uniform flow and flow resistance, non-uniform flow and longitudinal
profiles; design of channel controls and transitions; unsteady flow; theory and design of hydraulic structures.

Introduction to engineering hydrology and water resource systems; estimation of design discharge; statistical analysis of extremes; impacts of climate change on the hydrologic cycle, watershed analysis, snow, runoff.

**LEARNING OUTCOMES:** At the end of this course, students will be able to:

(refer Bloom’s Taxonomy Sharepoint Site for suggested verbs)

- An ability to design, conduct, analyse and interpret the hydraulic and hydrologic components in water resources systems such as pipe systems, river channels and lakes/reservoirs.
- An ability to integrate and apply knowledge of fluid mechanics, hydraulics and hydrology to solve water resources problems.
- An ability to function on a on a multi-disciplinary team, an understanding of professional designs, and understanding and effective communication.
- An ability to use the techniques, skills, and modern engineering tools for hydraulic and hydrologic problems.

<table>
<thead>
<tr>
<th>Weight &amp; Date(s) of Assessments</th>
<th>Weight</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments:</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Mid-term</td>
<td>20%</td>
<td>Date: 14/06/2016</td>
</tr>
<tr>
<td>Final Project</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Participation in Classroom activities</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
<td>Date: TBA</td>
</tr>
</tbody>
</table>

**ASSIGNMENTS (Include Assignment Schedule) (Description & Method of Delivery)** (remove example text)

- For assignments the quality of your work will be assessed based on restating problem goal, describing solution approach, application of appropriate software or tools, completeness, neatness in presentation, and correct answers.
- For the final project, the quality of your work will be assessed based on understanding of the problem demonstration of engineering solution concepts, detail in analysis of hydraulics and hydrologic components, safety in design, clarity, completeness, thoughtfulness, amount of supporting material, and organization.
- This course is designed to emphasize both quantitative and qualitative learning of hydraulic and hydrologic concepts, theory and practice, both in groups and individually.
- All assignments and projects should be uploaded through the CourseSpaces to reduce paper use (and may be analyzed by the Turnitin, a digital plagiarism program). All assignments and projects are due at 12 noon on the date shown on CourseSpaces or modified by the instructor or TA.
- The late penalty is 15% per day, starting at 12:05 on the due date (i.e. 15% will be deducted from an assignment handed in 12:06 on the due day).

**Bonus marks**

*Updated November 2015*
- 2% bonus to the most innovative solution for the final project case study

**Note:** The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar. **There will be no supplemental examination for this course. Alternative dates for the midterm or final will not be available unless students have sufficient documentation demonstrating a need for absence due to a death in the family or illness.**

**COURSE LECTURE NOTES**

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

**GENERAL INFORMATION**

**Note to Students:**
Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair’s Secretary to set up an appointment.

**Attendance**

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time....

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course.” UVic Calendar, (2015) [http://web.uvic.ca/calendar2015-09/FACS/Unin/UARe/Atte.html](http://web.uvic.ca/calendar2015-09/FACS/Unin/UARe/Atte.html)

**Accommodation of Religious Observance (AC1210)**  
[http://web.uvic.ca/calendar2015-09/GI/GUPo.html](http://web.uvic.ca/calendar2015-09/GI/GUPo.html)

**Discrimination and Harassment Policy (GV0205)**  
[http://web.uvic.ca/calendar2015-09/GI/GUPo.html](http://web.uvic.ca/calendar2015-09/GI/GUPo.html)

**Faculty of Engineering, University of Victoria Standards for Professional Behaviour**

“It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals....”

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.  

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the Undergraduate Calendar for the UVic policy on academic integrity.

**Policy on Academic Integrity**  
[http://web.uvic.ca/calendar2015-09/FACS/Unin/UARe/PoAcI.html](http://web.uvic.ca/calendar2015-09/FACS/Unin/UARe/PoAcI.html)
# Course Schedule

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WATER FLOW IN PIPES AND CLOSE CONDUITS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Friction head loss</td>
<td>Empirical equations for friction head loss, friction head loss-discharge relationships, local head loss in pipe systems.</td>
</tr>
<tr>
<td>4</td>
<td>Pipe systems</td>
<td>Simple pipe systems, water hammer phenomenon in pipelines, surge tanks, pipe networks, pipelines and pumps.</td>
</tr>
<tr>
<td><strong>FLOW IN OPEN CHANNELS</strong></td>
<td></td>
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<tr>
<td>5</td>
<td>Open channel flow characteristics</td>
<td>Free surface flow, energy principles, momentum principals, hydraulic jumps.</td>
</tr>
<tr>
<td>6</td>
<td>Steady uniform flow in open channels</td>
<td>Flow resistance, normal depth, hydraulic sections, energy principles in open channel flow.</td>
</tr>
</tbody>
</table>
| 7 | - Study session  
- Midterm exam | | |
| 8 | Gradually varied flow | Classifications of gradually varied flow, computation of water surface profiles, hydraulic design of open channels | M. R. Najafi |
| 9 | Hydraulic structures | Functions of hydraulic structures, dams and reservoirs, weirs, spillways, culverts; and environmental aspects. | M. R. Najafi |
| **ENGINEERING HYDROLOGY** | | |
| 10 | Hydrologic processes | Overview of hydrologic processes, Precipitation, snow, soil water, evaporation, run off and watershed properties; Project discussion | M. R. Najafi |
| 11 | Flood analysis | Climate change impacts on the hydrologic cycle, Flood frequency analysis, estimation of design discharge | M. R. Najafi |
| 12 | - Study session  
- Project discussion  
- Final exam | | |
| 13 | - Final Project Delivery | | |