CIVE 345 Fluid Mechanics

SPRING 2016 (CRN: 20581)

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Office Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. C. Valeo</td>
<td>Days: TBA</td>
</tr>
<tr>
<td>Phone: 250-721-8623</td>
<td>Time: TBA</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:valeo@uvic.ca">valeo@uvic.ca</a></td>
<td>Location: EOW 543</td>
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Prerequisites: MATH 200, MECH 220, 295

LECTURE DATE(S)

| Section: A01 | Days: Mondays and Thursdays | Time: 2:30 pm – 3:50 pm | Location: ECS 104 |

TUTORIAL SECTIONS

| Section: T01 | Days: Wednesdays | Time: 3:30 pm – 4:20 pm | Location: ECS 124 |

LAB SECTIONS*

<table>
<thead>
<tr>
<th>Section: B (Multiple)</th>
<th>Days:</th>
<th>Time:</th>
<th>Location:</th>
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<tbody>
<tr>
<td>B01</td>
<td>Wednesdays</td>
<td>4:30 pm to 7:20 pm</td>
<td>ELW A140</td>
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<tr>
<td>B02</td>
<td>Thursdays</td>
<td>4:00 pm to 6:50 pm</td>
<td>ELA A140</td>
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* There are four labs. The lab schedule listing the dates for each lab and each group will be given in the Lab Schedule to be posted on CourseSpace

TA Name | E-mail
---|---
Kurt Fairfield | kfairfield@uvic.ca
Shahil Charania | shahilc@uvic.ca
Iman Niknia | iniknia@uvic.ca

Required Text | Optional Text
---|---
Title: Engineering Fluid Mechanics | WileyPlus Software available for this text
Author: CT Crowe, DF Elger, BC Williams, JA Roberson
Publisher/Year: Wiley, 10th Ed.

COURSE OBJECTIVES: This course describes the properties of fluids and the basic flow analysis techniques for determining forces exerted by a fluid when at rest (statics) and when in motion. Initial basic concepts preceding fluid statics include the concepts of velocity fields, flow lines and classification of fluid motion, capillary forces and fluid stress. These build on material properties taught in MECH 220 dealing with elasticity, compressibility and deformation. Fluid statics teaches the student how to determine pressure distribution from a static fluid body; hydrostatic forces on submerged surfaces; buoyancy and stability. This section requires material in MATH 200 including differential calculus. Integral analysis (requiring integral calculus in MATH 200) is used to model and understand fluid motion that uses the concepts of conservation of mass, momentum balance, and energy balance. Dimensional analysis and
similitude are also investigated to describe the importance of these fields in the field of experimental fluid mechanics. Laminar and turbulent flow in pipes and pipe systems are taught in order to lead to the design of pipe systems in civil engineering measurement and of course, flow measurement, which is an essential part of these applications.

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

1. Define, describe and explain the properties of fluids;
2. Determine the forces exerted by a static fluid on a body that is partially or fully submerged;
3. Describe the physics of hydrostatics and how pressure measuring instruments work;
4. Derive, describe and apply Bernoulli’s equation;
5. Derive and apply Reynolds transport theorem;
6. Understand and describe and apply the linear momentum equation;
7. Define head loss and apply the energy equation;
8. Explain and apply Buckingham Pi’s Theorem
9. Define friction and friction factor, pipe head loss, apply the Moody Diagram and determine minor losses;
10. Solve problems involving pipe networks and pumps.

<table>
<thead>
<tr>
<th>Assessments</th>
<th>Weight</th>
<th>Date</th>
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<tbody>
<tr>
<td>Labs (4)</td>
<td>16%</td>
<td>See Lab Schedule</td>
</tr>
<tr>
<td>Term Test 1</td>
<td>20%</td>
<td>Thursday, February 4th during lecture period</td>
</tr>
<tr>
<td>Term Test 2</td>
<td>20%</td>
<td>Monday, March 14th during lecture period</td>
</tr>
<tr>
<td>Final Exam</td>
<td>44%</td>
<td>TBA</td>
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LABORATORIES
- Attendance of the laboratory and completion of all four experiments are compulsory;
- Experiment schedule will be given before the labs start. Labs are to be done in groups of 3 and groups will be assigned by the instructor;
- Late Lab Submissions: No late labs will be accepted unless prior arrangements have been made with the instructor at least 48 hours before the assignment due date. Any late submissions will only be considered for health reasons or bereavement leaves.
- Lab reports are to be completed by each group and submitted electronically to the grading TA Mr. Kurt Kairfield at his email address given above. It is up to the student submitting the work to ensure that the files sent are retrievable in order to for the TA to grade them.
- The laboratories consist of the following four experiments: Experiment #1 – Linear Momentum Experiment; Experiment #2 – The Energy Equation in a Venturi-Type Flow; Experiment #3 – Friction in Laminar and Turbulent Pipe Flow; and Experiment #4 – The Hydraulic Jump (Flume)

NOTE There will be no supplemental examination for this course.

Failure to complete all laboratory requirements will result in a grade of N being awarded for the course. 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.

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.
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/UIRe/Atte.html

Accommodation of Religious Observance (AC1210) http://web.uvic.ca/calendar2015-09/GI/GUpo.html

Discrimination and Harassment Policy (GV0205) 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. http://www.uvic.ca/engineering/current/undergrad/index.php#section0-23

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/UIRe/PoAcI.html