Description: Hydraulics I

Subject: ENV
Cat-nbr: 2103
Class: 62372
Term: 1, 2007
Mode: EXT
Units: 1.00
Campus: Toowoomba

Academic group: FOENS
Academic org: FOES03
Student contribution band: 2
ASCED code: 030999

STAFFING
Moderator: Rod Smith

OTHER REQUISITES
Recommended prior or concurrent study: CIV1501 and MAT1102

SYNOPSIS
In common with many other areas of engineering, the body of knowledge within the traditional fluid mechanics areas has expanded widely to a point where the different disciplines of engineering need different specialised knowledge. This is reflected in the acceptance of "hydraulics" or "hydraulic engineering" as a specialist field of study of prime interest to civil, mining, environmental and agricultural engineers. Since water can largely be regarded as incompressible, some of the traditional concepts of fluid mechanics need to be treated only briefly to permit a greater grounding in the types of problems encountered by hydraulic engineers. The course seeks to provide a grounding in fluid statics, steady uniform and non-uniform incompressible flow in pipelines and channels, pumped systems, flow measurement, hydraulic similitude and introductory thermodynamics.

OBJECTIVES
The course objectives define the student learning outcomes for a course. The assessment item(s) that may be used to assess student achievement of an objective are shown in parenthesis. On completion of this course, students should be able to:

1. describe the relevant properties of fluids (Mid Semester Test, Exam);
2. calculate pressures and forces on immersed bodies (Mid Semester Test, Exam);
3. undertake simple stability analyses for small gravity dams or weirs (Mid Semester Test, Exam);
4. determine the rolling stability of a prismatic floating body (Mid Semester Test, Exam);
5. solve simple problems involving steady uniform and non-uniform open channel flow and pipeline networks (Mid Semester Test, Assignment 2, Exam);
6. determine the operating point of a pumped pipeline system using single and multiple pumps (Assignment 2, Exam);
7. design rigid boundary channels (Assignment 2, Exam);
8. apply the concepts of specific energy and specific force in open channel flow (Assignment 2, Exam);
9. classify gradually varied flow profiles and calculate profile shape using the direct step method (Assignment 2, Exam);
10. estimate the head-discharge relationship for common flow measuring devices (Exam);
11. undertake a dimensional analysis of a physical system incorporating many variables (Exam);
12. design a scale model of a hydraulic system using Reynolds or Froude scaling (Exam);
13. gain a basic understanding of the thermodynamic process and the laws of thermodynamics that govern them and apply these laws to simple systems (Exam);
14. gain a basic understanding of the different modes of heat transfer and estimate the heat transfer in simple thermal systems (Exam).

**TOPICS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. Fluid statics</td>
<td>20.00</td>
</tr>
<tr>
<td>2. Steady flow of incompressible fluids in pipelines</td>
<td>25.00</td>
</tr>
<tr>
<td>3. Pumped pipeline systems</td>
<td>10.00</td>
</tr>
<tr>
<td>4. Steady open channel flow</td>
<td>20.00</td>
</tr>
<tr>
<td>5. Dimensional analysis and hydraulic similitude</td>
<td>7.00</td>
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<tr>
<td>6. Flow measurement</td>
<td>7.00</td>
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<tr>
<td>7. Basic thermodynamics and heat transfer</td>
<td>11.00</td>
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**TEXT and MATERIALS required to be PURCHASED or ACCESSED**

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at http://bookshop.usq.edu.au click 'Semester', then enter your 'Course Code' (no spaces).

Any hand-held, battery-operated non-communicable calculator.


(Text is also used in the course ENV3104 Hydraulics II.)

Nalluri, C & Featherstone, RE 2001, *Civil Engineering Hydraulics*, 4th edn, Blackwell Science,

(Text is also used in the course ENV3104 Hydraulics II.)
REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.


STUDENT WORKLOAD REQUIREMENTS

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Assessment</td>
<td>12.00</td>
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<tr>
<td>Directed Study</td>
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<tr>
<td>Examinations</td>
<td>3.00</td>
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<tr>
<td>Private Study</td>
<td>33.00</td>
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ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks out of</th>
<th>Wtg(%)</th>
<th>Due date</th>
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<tbody>
<tr>
<td>ASSIGNMENT 1</td>
<td>100.00</td>
<td>10.00</td>
<td>05 Apr 2007</td>
</tr>
<tr>
<td>ASSIGNMENT 2</td>
<td>200.00</td>
<td>20.00</td>
<td>08 Jun 2007</td>
</tr>
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<td>3 HOUR RESTRICTED EXAM</td>
<td>700.00</td>
<td>70.00</td>
<td>END S1</td>
</tr>
</tbody>
</table>

(see note 1)

NOTES

1. Student Administration will advise students of the dates of their examinations during the semester.

IMPORTANT ASSESSMENT INFORMATION

1. Attendance requirements:
   There are no attendance requirements for this course. However, it is the students’ responsibility to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.

2. Requirements for students to complete each assessment item satisfactorily:
   To satisfactorily complete an assessment item a student must achieve at least 50% of the marks or a grade of at least C-. Students do not have to satisfactorily complete each assessment item to be awarded a passing grade in this course. Refer to Statement 4 below for the requirements to receive a passing grade in this course.

3. Penalties for late submission of required work:
   If students submit assignments after the due date without prior approval then a penalty of 10% of the total marks gained by the student for the assignment will apply for each working day late.
4 Requirements for student to be awarded a passing grade in the course:
   To be assured of receiving a passing grade a student must achieve at least 30% in each of
   the weighted assessment items, achieve at least 50% in the examination and at least 50%
   of the total weighted marks available for the course.

5 Method used to combine assessment results to attain final grade:
   The final grades for students will be assigned on the basis of the weighted aggregate of
   the marks (or grades) obtained for each of the summative assessment items in the course.

6 Examination information:
   In a Restricted Examination, candidates are allowed access to specific materials during
   the examination. The only materials that candidates may use in the restricted examination
   for this course are: writing materials (non-electronic and free from material which could
   give the student an unfair advantage in the examination); any type of hand-held, 
   battery-operated, non-communicable calculator.

7 Examination period when Deferred/Supplementary examinations will be held:
   Any Deferred or Supplementary examinations for this course will be held during the
   examination period at the end of the semester of the next offering of this course.

8 University Regulations:
   Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10
   Academic Misconduct for further information and to avoid actions which might contravene
   University Regulations. These regulations can be found at the URL
   http://www.usq.edu.au/corporateservices/calendar/part5.htm or in the current USQ
   Handbook.

ASSESSMENT NOTES

1 The due date for an assignment is the date by which a student must despatch the assignment
   to the USQ. The onus is on the student to provide proof of the despatch date, if requested
   by the Examiner.

2 Students must retain a copy of each item submitted for assessment. This must be produced
   within five days if required by the Examiner.

3 In accordance with University's Assignment Extension Policy (Regulation 5.6.1), the 
   examiner of a course may grant an extension of the due date of an assignment in extenuating 
   circumstances.

4 The Faculty will normally only accept assessments that have been written, typed or printed 
   on paper-based media.

5 The Faculty will NOT accept submission of assignments by facsimile.

6 Students who do not have regular access to postal services or who are otherwise 
   disadvantaged by these regulations may be given special consideration. They should 
   contact the examiner of the course to negotiate such special arrangements.

7 In the event that a due date for an assignment falls on a local public holiday in their area, 
   such as a Show holiday, the due date for the assignment will be the next day. Students are 
   to note on the assignment cover the date of the public holiday for the Examiner's 
   convenience.

8 Students who have undertaken all of the required assessments in a course but who have 
   failed to meet some of the specified objectives of a course within the normally prescribed 
   time may be awarded one of the temporary grades: IM (Incomplete - Make up), IS 
   (Incomplete - Supplementary Examination) or ISM (Incomplete -Supplementary 
   Examination and Make up). A temporary grade will only be awarded when, in the opinion
of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non directed personal study.

9 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination; IDM (Incomplete Deferred Make-up); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).