Description: Hydraulics I

<table>
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<tr>
<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
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<td>ENV</td>
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<td>10560</td>
<td>1, 2002</td>
<td>ONC</td>
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Academic Group: FOENS
Academic Org: FOES03
HECS Band: 2
ASCED Code: 030999

STAFFING
Examiner: Ken Moore
Moderator: Mark Porter

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. There are no formal prerequisites for this course but students would be advantaged with prior studies in basic engineering statics and calculus.

OBJECTIVES
Upon successful completion of this course students should be able to:

- describe the relevant properties of fluids;
- calculate pressures and forces on immersed bodies;
- undertake simple stability analyses for small gravity dams or weirs;
- determine the rolling stability of a simple prismatic floating body;
- solve simple problems involving steady uniform and non-uniform open channel flow and simple pipeline networks;
- determine the operating point of a pumped pipeline system using single and multiple pumps;
- design rigid boundary channels;
• apply the concepts of specific energy and specific force in open channel flow;
• classify gradually varied flow profiles and calculate profile shape using the direct step method;
• estimate the head-discharge relationship for common flow measuring devices;
• undertake a dimensional analysis of a physical system incorporating many variables;
• design a scale model of a hydraulic system using Reynolds or Froude scaling;
• identify the thermodynamic laws and principles that apply to a given simple thermodynamic system; apply appropriate equations to analyse quantitatively a given simple thermodynamic system; identify the fundamental heat transfer modes present in a given appropriate situation; apply simple heat transfer by conduction formulae to simple multiple layer planes and pipes to quantify the heat transfer.

**TOPICS**

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

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at http://bookshop.usq.edu.au by entering the author or title of the text.

*ENV2103 Hydraulics I, External Study Package*, USQ Publication.

Note: Both texts are also used in the course ENV3104 Hydraulics II.

Any hand held battery operated calculator.


**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>
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<td>Directed Study</td>
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<td>Examinations</td>
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<td>Lectures</td>
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<td>Private Study</td>
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<td>Tutorial</td>
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**ASSESSMENT DETAILS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
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<th>Due Date</th>
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<tr>
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<tr>
<td>ASSIGNMENT</td>
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<td>20.00</td>
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<td>04 Mar 2002</td>
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<tr>
<td>3 HOUR CLOSED/RESTRICTED EXAM</td>
<td>700.00</td>
<td>70.00</td>
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</table>

**NOTES:**

1. Further details about the due dates are detailed in the assessment section of the Course Specifications.
2. Further details about the due dates are detailed in the assessment section of the Course Specifications.
3. Further details about the due dates are detailed in the assessment section of the Course Specifications.

**OTHER REQUIREMENTS**

1. Students should achieve at least 40% of the marks allocated for each assessment and at least 50% of the total allocated marks in order to successfully complete this course.
2. The due date for an assignment is the date by which a student must submit the assignment to the USQ. The onus is on the student to provide proof of the submit date, if requested 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.
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.

The Faculty of Engineering and Surveying will NOT accept submission of hand written or typed assignments by facsimile, e-mail or computer diskette. Students in remote locations who do not have regular access to postal services may be given special consideration.

Students are to retain a verbatim copy of all assignment work submitted, for submission in the event that the original is lost or damaged.

If students submit assignments after the due date without prior approval then a penalty of up to 20% of the assignment total marks will apply for each working day late.

The final examination is part closed and part restricted. For the restricted part of the examination, students are permitted access to any type of hand held battery operated calculator.

A closed examination is an examination where the candidates are allowed to bring only writing and drawing instruments into the examination.

Students must note the make and model of the calculator used on the front of the Answer Book or Examination Paper where applicable. This may be subject to checking by the supervisor.

The Faculty of Engineering and Surveying does not offer supplementary examinations.

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 the temporary grade: IM (Incomplete - Make up). An IM 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.

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; IDSM (Incomplete Deferred Examination and Make-up).

A minimum standard of communication skills must be demonstrated in order for a passing grade to be achieved.