Description: Hydraulics II

<table>
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<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
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</tr>
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<td>ENV</td>
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<td>20577</td>
<td>1, 2003</td>
<td>EXT</td>
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Academic Group: FOENS
Academic Org: FOES03
HECS Band: 2
ASCED Code: 030999

STAFFING
Examiner: Rod Smith
Moderator: Mark Porter

PRE-REQUISITES
Pre-requisite: ENV2103 or ENV1101

OTHER-REQUISITES
Pre-requisite: 70360/71013

SYNOPSIS
The emphasis of this course is the application of hydraulic theory to the solution of problems commonly encountered in engineering hydraulics and to the design of hydraulic systems and structures. The basic concepts of the conservation of mass, momentum and energy (introduced in Hydraulics I) are reviewed, extended and applied to a variety of hydraulic systems. New material on unsteady pipeline and open channel flows, loose boundary hydraulics and coastal hydraulics is presented and applied. Students are practised in the design and analysis of open channel, pipeline and pumping systems and a wide range of hydraulic structures.

OBJECTIVES
On completion of this course, students should be able to:

- evaluate and apply the equations available for the description of open channel and pipe flow;
- solve problems involving compound and branching pipes;
- solve simple pipe networks using an appropriate method;
- select a pump to meet a specified duty;
- match a pump to a pipeline system and determine the operating point of the pump;
• determine the maximum discharge and suction lift for cavitation free operation of a pump;
• apply rigid and elastic water hammer theory to the analysis of pipeline systems;
• calculate the maximum allowable rates for valve open and closure;
• design lined and erodible channels (including vegetative lined channels);
• solve the equations governing unsteady open channel flow and apply them to the solution of practical flow problems including: runoff on a plane surface, routing of a stream hydrograph, passage of a surge wave;
• predict the sediment load in an open channel or natural stream;
• design a range of hydraulic structures including: fixed and movable crest weirs; gated control structures; pipe conveyance structures; spillways and energy dissipation structure; critical flow measuring flumes; gulley control structures; weir and culvert type structures using the minimum specific energy concept.

TOPICS

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>1. Pipeline and pumping systems, pipe networks</td>
<td>20.00</td>
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<tr>
<td>2. Unsteady flow in pipelines - water hammer and surge</td>
<td>20.00</td>
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<tr>
<td>3. Unsteady free surface flow</td>
<td>20.00</td>
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<tr>
<td>4. Loose boundary hydraulics, stable channel design</td>
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<td>5. Hydraulic Structures</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.

A hand held battery operated calculator which does not have keys for the alphabet.


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.

Chow, V. T. 1959, *Open Channel Hydraulics*, McGraw Hill,

FAO Irrigation and Drainage Paper 26/1, 26/2 *Small Hydraulic Structures*,


Stephenson, D. 1981, *Pipeline Design for Water Engineers*, Elsevier, Development in Water Science 6,
USBR *Design of Small Canal Structures*,

**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>Private Study</td>
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**ASSESSMENT DETAILS**

<table>
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<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
<th>Required</th>
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<tr>
<td>ASSIGNMENT 1</td>
<td>150.00</td>
<td>15.00</td>
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<td>ASSIGNMENT 2</td>
<td>150.00</td>
<td>15.00</td>
<td>Y</td>
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<td>3 HOUR RESTRICTED EXAMINATION</td>
<td>700.00</td>
<td>70.00</td>
<td>Y</td>
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(see note )

**NOTES:**

- 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 complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available (or at least a grade of C-) for each assessment item.

3 Penalties for late submission of required work:
   If students submit assignments after the due date without prior approval then a penalty of 20% of the total marks available 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 submit all of the summative assessment items, achieve at least 50\% in the examination and at least 50\% of the available weighted marks for the summative assessment items.

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); calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during the examination).

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/SECARIAT/calendar/Part5/ or in the printed version of 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 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.

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).

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

OTHER REQUIREMENTS

1 Students will require access to e-mail and internet access to USQConnect for this course.