



The University of Southern Queensland

## Course specification

The current and official versions of the course specifications are available on the web at <http://www.usq.edu.au/coursespecification/current>.  
Please consult the web for updates that may occur during the year.

### Description: Hydraulics I

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
ENV	2103	86297	1, 2009	ONC	1.00	Toowoomba

<b>Academic group:</b>	FOENS
<b>Academic org:</b>	FOES03
<b>Student contribution band:</b>	2
<b>ASCED code:</b>	030999

### STAFFING

Examiner: Joseph Foley  
Moderator: Rod Smith

### OTHER REQUISITES

Recommended prior or concurrent study: CIV1501 and MAT1502

### 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 (Assignments, Exam);
2. calculate pressures and forces on immersed bodies (Assignments, Exam);
3. undertake simple stability analyses for small gravity dams or weirs (Assignments, Exam);
4. determine the rolling stability of a prismatic floating body (Assignments, Exam);
5. solve simple problems involving steady uniform and non-uniform open channel flow and pipeline networks (Assignments, Exam);
6. determine the operating point of a pumped pipeline system using single and multiple pumps (Assignments, Exam);

7. design rigid boundary channels (Assignments, Exam);
8. apply the concepts of specific energy and specific force in open channel flow (Assignments, Exam);
9. classify gradually varied flow profiles and calculate profile shape using the direct step method (Assignments, Exam);
10. estimate the head-discharge relationship for common flow measuring devices (Assignments, Exam);
11. undertake a dimensional analysis of a physical system incorporating many variables (Assignments, Exam);
12. design a scale model of a hydraulic system using Reynolds or Froude scaling (Assignments, 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

	Description	Weighting (%)
1.	Fluid statics	20.00
2.	Steady flow of incompressible fluids in pipelines	25.00
3.	Pumped pipeline systems	10.00
4.	Steady open channel flow	20.00
5.	Dimensional analysis and hydraulic similitude	7.00
6.	Flow measurement	7.00
7.	Basic thermodynamics and heat transfer	11.00

## 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).

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

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

Chadwick, A, Morfett, J and Borthwick, M 2004, *Hydraulics in Civil and Environmental Engineering*, 4th edn, Spon Press, London.

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

(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.

Cengel, Yunus, A 1997, *Introduction to thermodynamics and heat transfer*, McGraw Hill, New York.

Roberson, JA, Cassidy, JJ & Chaudry, MH 1998, *Hydraulic engineering*, 2nd edn, Wiley & Sons, New York.

Streeter, VL & Wylie, EB 1985, *Fluid mechanics*, McGraw Hill, New York.

(S1 Edition)

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessments	9.00
Directed Study	53.00
Examinations	2.00
Lectures	30.00
Private Study	35.00
Tutorials	26.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
ASSIGNMENT 1	100.00	10.00	25 Mar 2009
ASSIGNMENT 2	100.00	10.00	06 May 2009
ASSIGNMENT 3	100.00	10.00	03 Jun 2009
2 HOUR RESTRICTED EXAM	700.00	70.00	END S1 (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:  
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and 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 extenuating circumstances then a penalty of 5% of the assigned mark may apply for each working day late up to a maximum of ten working days at which time a mark of zero can be recorded for that assignment.
- 4 Requirements for student to be awarded a passing grade in the course:  
To be assured of receiving a passing grade in a course a student must obtain at least 50% of the total weighted marks 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).