



The University of Southern Queensland

## Course specification

### Description: Thermodynamics

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
MEC	2101	50414	1, 2006	EXT	1.00	Toowoomba

<b>Academic group:</b>	FOENS
<b>Academic org:</b>	FOES02
<b>Student contribution band:</b>	2
<b>ASCED code:</b>	030799

### STAFFING

Examiner: David Buttsworth

Moderator: Ruth Mossad

### RATIONALE

The rationale for the thermofluids strand of the Bachelor of Engineering requires that students are provided with a thorough fundamental understanding of the nature, dynamics and thermodynamics of fluids. A number of practical applications are covered to provide familiarity and reinforce this fundamental understanding. Expertise in this strand is expected of mechanical engineers in practice. In addition a small number of applications are taken to full professional practice level to provide the necessary personal development and allow the student to establish a measure of self confidence. This course has an educational as well as a training purpose. In view of the applicability of thermofluids laws and principles to universal and biological processes this course should serve as a foundation for those taking the specific study further and provide a broader appreciation of the universe to those students who will subsequently specialise to a subset of thermofluids such as "water engineering" or "hydraulics". It also provides a general appreciation of thermofluids to those students who will do no further courses which are directly dependent on this one. Courses in this strand are major studies for students doing the mechanical engineering major and electives to others.

### SYNOPSIS

Thermodynamics is that branch of physics which seeks to derive relationships between properties of matter, especially those which are affected by temperature, and a description of the conversion of energy from one form to another. Mechanical engineering systems are primarily about energy exchanges. All mechanical engineers must therefore be well grounded in the relationships which describe those exchanges. They must also be skilled in analysing machinery and systems in which the energy exchanges occur. Thermodynamics is therefore an essential and most important part of any mechanical engineering course of study.

## 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. apply thermodynamic laws and principles to the analysis of particular processes, cycles and thermodynamic hardware (Assignment 1, Assignment 2, Exam);
2. analyse a given thermodynamic problem by: (a) examining its nature and selecting appropriate techniques for its solution, (b) applying the selected techniques in a numerical analysis of the problem and (c) evaluating the results of the analysis (Assignment 1, Assignment 2, Exam);
3. apply thermodynamic principles to the analysis of common engineering systems (Assignment 1, Assignment 2, Exam);
4. discuss operational features of various thermodynamic systems and components (Exam).

## TOPICS

	Description	Weighting (%)
1.	Basic concepts	5.00
2.	Properties	10.00
3.	Energy Transfer	10.00
4.	First Law	15.00
5.	Second Law	10.00
6.	Entropy	10.00
7.	IC Engines	10.00
8.	Steam Power	10.00
9.	Refrigeration	10.00
10.	Air conditioning	10.00

## 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).

Cengel, YA & Boles, MA 2005, *Thermodynamics, an engineering approach*, 5th edn, McGraw Hill,

(In S1 units)

## 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.

Texts with titles such as 'Thermodynamics for Engineers', 'Fundamentals of Thermodynamics', 'Engineering Thermodynamics', or 'Introduction to Thermodynamics' are likely to cover the majority of the course content in a slightly different way. If you are having difficulty with the explanations in the set text, you may wish to consult one of these other titles.

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	15.00
Directed Study	137.00
Examinations	3.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
ASSIGNMENT 1	150.00	15.00	28 Apr 2006
ASSIGNMENT 2	150.00	15.00	09 Jun 2006
3 HOUR RESTRICTED EXAMINATION	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:  
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. Students will require email and internet access for this course.
- 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 5% 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); 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); one A4 sheet of paper with any formulae or other information the student chooses to list (both sides of the sheet may be used).
- 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).