



The University of Southern Queensland

## Course Specification

### Description: Aircraft Materials

Subject	Cat-Nbr	Class	Term	Mode	Units	Campus
MEC	1206	14734	2, 2002	ONC	1.00	TWMBBA

<b>Academic Group:</b>	FOENS
<b>Academic Org:</b>	FOES02
<b>HECS Band:</b>	2
<b>ASCED Code:</b>	030305

### STAFFING

Examiner: Douglas Baddeley

Moderator: Mick Morgan

### RATIONALE

The aircraft industry makes great demands upon its materials. Not only must designs be efficient and as light as possible, but they must also ensure that failure in flight does not occur on account of the almost certain tragic consequences. To ensure reliable operation, the design must also include maintenance in the form of inspection and repairs due to corrosion or cracking due to metal fatigue. A knowledge of aircraft materials is of fundamental importance to those engaged in aircraft maintenance and modification.

### SYNOPSIS

This course provides a broad outline of the characteristic properties and behaviour in service of the commonly used aircraft materials, with particular emphasis on airframe materials. This knowledge allows an understanding of the consequences of the use of incorrect material for component replacement and provides a basis for appreciating the inspection procedures used as part of the maintenance schedule. Some newer materials likely to find more widespread use in aircraft in the future are also briefly covered.

### OBJECTIVES

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

- outline the characteristic properties, behaviour in service and typical applications of commonly used aircraft materials;
- briefly describe the common mechanical test procedures used to assess the performance of materials used in aircraft construction;
- describe the various non destructive testing techniques and the application of such techniques in aircraft maintenance.

## TOPICS

Description	Weighting (%)
1. Structure of Materials	6.00
2. Deformation and Annealing of Metals	4.00
3. Mechanical Properties and Testing	15.00
4. Alloys and Phase Diagrams	5.00
5. Steels	8.00
6. Aluminium Alloys	12.00
7. Magnesium Alloys, Titanium Alloys	5.00
8. Corrosion of Metals	15.00
9. Polymers	8.00
10. Adhesives	4.00
11. Composite Materials	8.00
12. Non-Destructive Testing	10.00

### **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.

*MEC1201 Engineering Materials External Study Package*, USQ Publication,

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

Askeland, D. R. 1996, *The Science and Engineering of Materials*, 3rd edition, Chapman & Hall,

(S1 Edition)

Russ, J. C. 1996, *Materials Science: A Multimedia Approach*, PWS Publishing, (CD-ROM)

### **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.

Alexander, W. & Street, A. 1982, *Metals in the Service of Man*, 8th edition, Penguin,

Avner, S. H. 1974, *Introduction to Physical Metallurgy*, 2nd edition, McGraw Hill,

Baker, A. A. 1985, *Advanced Fibre Composites and other New Materials for Airframe Applications*, Aviation 85 IEAust/R Ac S Joint National Symposium, Melbourne.

(pp 39-43)

Cuckson, I. M. *Manufacture of Bonded Composite Assemblies for Aircraft*, Ibidem, (pp 19-22)

Grover, H. J. 1966, *Fatigue of Aircraft Structures NAVAIR 01-1A-13*, Naval Air Systems Command, Dept of the Navy, US.

Higgins, R. A. 1987, *Materials for the Engineering Technician*, 2nd edition, Hodder and Stoughton,

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	20
Examinations	2
Lectures	39
Private Study	81
Tutorial	13

## ASSESSMENT DETAILS

Description	Marks Out of	Wtg(%)	Required	Due Date
ASSIGNMENTS	200.00	20.00	Y	30 Aug 2002
CASE STUDY	200.00	20.00	Y	18 Oct 2002
2 HOUR RESTRICTED EXAMINATION	600.00	60.00	Y	END S2 (see note 3)

### NOTES:

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

## OTHER REQUIREMENTS

- 1 Students must generally perform satisfactorily in each assessment to satisfactorily complete the course. Satisfactory performance is generally taken to be at least 45% of the marks in each assessment and at least 50% of the total marks for the course.
- 2 A minimum standard of communication skills must be demonstrated in order for a passing grade to be achieved.
- 3 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.
- 4 Students must retain a copy of each item submitted for assessment. This must be produced within five days if required by the Examiner.
- 5 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.

- 6 If students submit assignments after the due date without prior approval then a penalty of up to 20% of the total marks for the assignment will apply for each working day late.
  - 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 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.
  - 9 The final grades for students will be assigned on the basis of the aggregate of the marks obtained for each of the assessments in the course.
  - 10 Students are restricted in the final examination to the use of a hand held battery operated calculator which does not have keys for the alphabet.
  - 11 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.
  - 12 The Faculty of Engineering and Surveying does not offer supplementary examinations.
  - 13 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.
  - 14 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).
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