



The University of Southern Queensland

Course specification

Description: Aircraft Materials

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
MEC	1206	34653	2, 2004	ONC	1.00	TWMBA

Academic group:	FOENS
Academic org:	FOES02
Student contribution band:	2
ASCED code:	030305

STAFFING

Examiner: Doug 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:

1. understand the characteristic properties, behaviour in service and typical applications of commonly used aircraft materials;
2. describe the common mechanical test procedures used to assess the performance of materials used in aircraft construction;
3. apply technical and conceptual skills in the application of mechanical test results to aircraft materials;

4. 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:

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).

MEC1201 Engineering Materials External Study Package, USQ Publication,

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

Askeland, DR 2003, *The Science and Engineering of Materials*, 4th edn, Brooks/Cole, (S1 Edition)

Russ, JC 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 1989, *Metals in the Service of Man*, 9th edn, Penguin,

Avner, SH 1974, *Introduction to Physical Metallurgy*, 2nd edn, McGraw Hill,

Baker, AA 1985, Advanced Fibre Composites and other New Materials for Airframe Applications, *Aviation 85*, IEAust/R Ac S Joint National Symposium, Melbourne, pp39-43.

Cuckson, IM *Manufacture of Bonded Composite Assemblies for Aircraft*, Ibidem, pp19-22. (pp 19-22)

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

Higgins, RA 1987, *Materials for the Engineering Technician*, 2nd edn, Hodder and Stoughton,

STUDENT WORKLOAD REQUIREMENTS:

ACTIVITY	HOURS
Assessment	20.00
Examinations	2.00
Lectures	39.00
Private Study	81.00
Tutorial	13.00

ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
ASSIGNMENTS	200.00	20.00	08 Oct 2004
CASE STUDY	200.00	20.00	22 Oct 2004
2 HOUR CLOSED EXAMINATION	600.00	60.00	END S2 (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 complete the practical component satisfactorily, students must submit, by the due date, a practical report which meets the requirements of the assessment scheme.
- 3 Penalties for late submission of required work:
A CMA submitted after the due date will not be marked if the results and answers have been released.
- 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 40% 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 Closed Examination, candidates are allowed to bring only writing and drawing instruments into 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/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

ASSESSMENT NOTES

- 1 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.
- 2 The Faculty will normally only accept assessments that have been written, typed or printed on paper-based media.
- 3 The Faculty will NOT accept submission of assignments by facsimile.
- 4 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.
- 5 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).