

**AUSTRALIAN DEFENCE FORCE ACADEMY
SCHOOL OF
AEROSPACE AND MECHANICAL ENGINEERING**

**Course: AMEC 3508 Mechanics of Solids 2B
AMEC 3706 Aircraft Structures 1B**

LECTURER

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OBJECTIVES

- To provide an understanding of the principles of the Finite Element Method (FEM), its formulation and application to solid mechanics and structures problems.
- To provide practical experience with ANSYS[®], a finite element software widely used in engineering applications, and programming FEA code using MATLAB.

ASSUMED KNOWLEDGE

- It is assumed that the students have a reasonable understanding of Solid Mechanics, Numerical Analysis, MATLAB programming and basic UNIX skills.
- Students should acquire, if not already, sufficient knowledge to use an e-mail account to send/receive e-mail and to send/receive attachment files.

POLICIES

- All electronically submitted assignments should strictly comply with the required specifications.
- Codes that do not run will not be assessed and will be directly marked zero.
- Late submission penalties will apply.
- It is the discretion of the Lecturer to apply a bell curve to the assessment marks when calculating final grades. This means that your final grade may be higher or lower than the weighted average of your total assessment marks.
- All e-mail correspondence should be through official Academy issued addresses.

PRESCRIBED TEXT

- Handouts
- Lecture Notes will be available online (check the 3rd Year Bulletin Board on the web)

RECOMMENDED READING AND REFERENCES

- ANSYS User manuals (online)
- CHANDRUPATLA T.R. and BELEGUNDU A.D., *Introduction to FINITE ELEMENTS in Engineering*, Prentice-Hall, 1997. (second edition)

Assessment:

Assignments 1 and 2 (30% each)	60%
EXAM (closed book)	40%
TOTAL	100%

TIMETABLE 2001 - SEMESTER 2

LECTURE: 1010-1100 Wednesday, LT06
TUTORIALS: Tutorial A: 1500-1600 Monday, Room 225
 Tutorial B: 1700-1800 Wednesday, Room 225
 Tutorial C: 1400-1500 Thursday, Room 225
 Tutorial D: 1700-1800 Thursday, Room 225

- You are expected to attend the *Lecture* and **one** of the *Tutorials*. The tutorial groups will be set on the first day of lecture and will not be changed later without appropriate arrangements as the number of terminals in room 225 is limited.
- You will be using ANSYS and MATLAB for your assignments. While ANSYS usage will be taught, you are expected to use your prior knowledge in programming MATLAB.
- You have to chase up the activation of your accounts and logon to your accounts no later than the end of second week of class so that you are ready for the ANSYS tutorials starting week 3.

LECTURE #	TOPIC ¹	COMMENTS
1	Introduction to FEM -	Matrix manipulation. Computer usage policy
2	Scope of the FEM: DIRECT APPROACH UNIX , MATLAB warm-up	Using matrices with discrete systems file management, ...
3	Element assembly Using ANSYS for the first time, step by step simple solution with ANSYS.	Solving a simple problem and viewing the results.
4	Matrix manipulation and BC input ANSYS modeling techniques	Modeling concepts, bottom-up vs top to bottom.
5	Variational Approach Selecting entities in ANSYS, selective viewing	Use of selection filters and introduction to Boolean operations
6	Variational Approach Application of BCs in ANSYS	
7	The Method of Weighted Residuals Meshing in ANSYS	
8	The Method of Weighted Residuals Nonlinear options in ANSYS	The use of iterative solution techniques, parameters
9	The Finite Element Method (FEM) Programming in ANSYS	The use of macro files and parametric model generation
10	The Finite Element Method (FEM) Contact surfaces Input/output using external files	Accessing and manipulation of results using built-in functions
11	The Finite Element Method (FEM) Different post-processors in ANSYS	
13	More ANSYS	
14	Review	

Plagiarism will be severely punished at the full extent as prescribed in the Academy Guidelines. Your computer accounts can be monitored in substantiation of such misconduct. You are required to logon at least twice a week to your leofric account, otherwise all assignment marks involving computer usage will be forfeited. Sharing of account passwords will be in breach of Academy Computer Usage Policy and will attract account termination. All assignments required to be submitted via e-mail will have to be submitted from your OWN leofric account, failure to do so will preclude further assessment. By submitting an assignment via e-mail you agree to the above conditions, and the material submitted will be considered as a document that you claim the authorship.

¹ Topic content, order and delivery rate may vary
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