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## Definitive Module Document (DMD)

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**Module Code:**MAAD0017

**Title of Module**

**Full Title:** Aeroelasticity

**Short Title:** Aeroelasticity

## MODULE

MAAD0017 (A 05/6)

Aeroelasticity...

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**Version:** 1

**Credit Points:** 15

**Level / ECTS Level:** M

**First Offered:** 26/9/2005 00-00-00

### 6. Home Department:

AAD

### 7. Departments(s) contributing to teaching:

### 9. Module Aims:

- apply up to date methods of structural dynamics in aerospace and aerospace systems engineering
- develop sound understanding of dynamic aeroelastic phenomena and methods for their analysis

### 10a. Learning Outcomes: Knowledge and Understanding:

develop a knowledge and understanding of-

- vibrational behaviour and dynamic response of aerospace structures
- significant aeroelastic phenomena

### 10b. Learning Outcomes: Skills and Attributes:

- be able to solve aerospace vehicle structural dynamics problems analytically and by Finite

Element analysis.

- be able to analyse fundamental aeroelastic problems for typical sections or high aspect ratio

wings

### 11. Module Content

#### 11a Module Content:

This module introduces students to the dynamic structural analysis of aerospace vehicles, together with dynamic aeroelastic phenomena such as flutter. Some typical aerospace vehicle structural dynamic problems are considered, while flutter analysis is introduced through the consideration of the oscillation of a typical aerofoil and a high aspect ratio wing in bending and torsion.

Student learning will be supported by assignments making use of simulation packages and aeroelastic analysis software, a finite element analysis package and a flight simulator.

**11b. Further details on how the learning outcomes of the module will be achieved:**

The intended learning outcomes are facilitated through a combination of approaches to learning and teaching, typically this will include lectures, tutorials, supported by extensive use of a range of software which will include simulation and finite element analysis packages, and aeroelastic analysis programs. These activities will be supported by the module team and by encouraging the students to access a variety of resources, eg Studynet, electronic databases, relevant professional and academic text and cases and journals.

The module will cover the following topics-

**STRUCTURAL DYNAMICS**

- Beam vibration - extensional, torsional and bending
- Dynamic response of beams to time dependent loadings
- Structural response through the modal representation
- Application of Finite Element Methods to structural dynamics
- Some typical aerospace vehicle structural dynamic problems

**AEROELASTICITY**

- Review of aeroelastic phenomena - divergence, control reversal and flutter
- Introduction to unsteady aerodynamics prediction methods
- Flutter of a typical section
- Overview of flutter of complete configurations

**12. Language of Delivery:**

English

**13. Language of Assessment:**

English

**14. Assessment Details (Academic):**

Coursework: 40

Exam: 60

Other:

**Assessment Notes:**

Typically, in-course assessment will consist of-

A structural dynamics assignment to assess learning outcomes 1, 3 (20%)

An aeroelasticity assignment to assess learning outcomes 2, 4 (10%)

A phase test to assess learning outcomes 1 - 4 (10%)

There will be a 3 hour written examination (60%)

There is no overall requirement for passes in both elements of assessment.

**15. Locations(s):**

UH HATFIELD

**16. Pre and Co-Requisite:**

**Pre-Requisite**

**Co-Req**

**Prohibited**

**17. Subject Board of Examiner/s:**

AUTO ENG/DES/MGMT P/G COURSES

**18. Comments**

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