

<b>Module Title</b> <b>Engineering Analysis 1</b>	Reference EN3501 SCQF Level SCQF 9 SCQF Points 15 ECTS Points 7.5 Created May 2002 Approved March 2004 Amended July 2013 Version No. 2
<b>Keywords</b> Engineering Dynamics, Mechanics Of Materials.	

## This Version is No Longer Current

The latest version of this module is available [here](#)

### Prerequisites for Module

Mechanics of Solids (EN2701) and Dynamics (EN2500), or their equivalent.

### Corequisite Modules

None.

### Precluded Modules

None.

### Aims of Module

To provide the student with the ability to analyse and interpret the static and dynamic structural behaviour of engineering system components.

### Learning Outcomes for Module

On completion of this module, students are expected to be able

### Mode of Delivery

The module is delivered by means of lectures, tutorials and self-guided study and is integrated with applications in the laboratory.

### Assessment Plan

	Learning Outcomes Assessed
Component 1	2,4
Component 2	1,2,3,4

Component 2 is a closed book examination (70% weighting).

Component 1 consists of a dynamics coursework assessing learning outcome 2 (15% weighting) and a statics coursework assessing learning outcome 4 (15% weighting). In addition to the course

to:

1. Determine the natural frequencies and mode shapes of linear and rotational vibrational systems having two, three and more degrees of freedom.
2. Apply dynamic theory to the design of vibration isolators and absorbers, rotational machinery, gear shaft systems and shafts.
3. Analyse the behaviour of structural elements such as struts, cylinders, plates and rotating components.
4. Determine the effects of stress concentrations for standard cases and determine the fatigue life characteristics for simple components using a stress-based approach.

### **Indicative Module Content**

Dynamics of engineering systems of two and more degrees of freedom; vibrational analysis of engineering components; basic numerical methods for dynamic analysis; Rayleigh's energy method; the mechanics of engineering materials in common components such as struts, cylinders, plates and rotating components; effects of stress concentrations; fatigue analysis and life predictions of components.

documentation requirements, each coursework must be awarded at least 35%.

### **Indicative Bibliography**

1. RAO, S.S., 2017. Mechanical Vibrations. 6th ed. Upper Saddle River, NJ: Prentice Hall.
2. THOMSON W.T., 2013. Theory of Vibrations with Application. 5th ed. Cheltenham: Nelson Thornes.
3. MERIAM, J.L. and KRAIGE, L.G., 2016. Engineering Mechanics -vol. 2 Dynamics. 8th ed. Hoboken, NJ: Wiley.
4. HEARN, E.J., 1997. Mechanics of Materials, Vols. 1 & 2. 3rd ed. Oxford: Butterworth-Heinemann.
5. CASE, J., CHILVER, L. and ROSS, C.T.F., 1999. Strength of Materials and Structures. 4th ed. London: Arnold.
6. BENHAM, P.P., CRAWFORD, R.J. and ARMSTRONG, C.G., 1996. Mechanics of Engineering Materials. 2nd ed. Harlow: Longman.

## **Indicative Student Workload**

	Full	Part
<i>Contact Hours</i>	Time	Time
Assessment	3	3
Laboratory	3	3
Lectures	28	28
Tutorials	12	12
<i>Directed Study</i>		
Coursework preparation	24	24
Directed Self-Study	35	35
<i>Private Study</i>		
Private Study	45	45