**Liverpool** John Moores University

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|---|---|
| Title: | Structural Dynamics |
| Status: | Definitive |
| Code: | **7112MECH** (121520) |
| Version Start Date: | 01-08-2021 |
| Owning School/Faculty: | Engineering |
| Teaching School/Faculty: | Engineering |

| Team | Leader |
|---|---|
| Dan Stancioiu | Y |

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| **Academic Level:** | FHEQ7 | **Credit Value:** | 20 | **Total Delivered Hours:** | 47 |
| **Total Learning Hours:** | 200 | **Private Study:** | 153 | | |

**Delivery Options**
Course typically offered: Semester 1

| Component | Contact Hours |
|---|---|
| Lecture | 22 |
| Practical | 3 |
| Tutorial | 22 |

**Grading Basis:** 50 %

**Assessment Details**

| Category | Short Description | Description | Weighting (%) | Exam Duration |
|---|---|---|---|---|
| Test | AS1 | VLE Test | 40 | |
| Portfolio | AS2 | FEA Project | 60 | |

**Aims**

*The module is aimed at extending students' knowledge of dynamics and applied finite element method to an advanced level. The module is intended to be practical in nature providing students with the skills to analyse and solve engineering dynamics problems by means of computational and analytical methods.*

## Learning Outcomes

After completing the module the student should be able to:

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|---|---|
| 1 | Set up and validate efficient and accurate FE models of a range of engineering components under dynamic loading |
| 2 | Critically evaluate the output from linear dynamic FE analysis and the influence of different dynamic or geometric parameters upon the accuracy of the result |
| 3 | Critically evaluate and analyse the FE dynamics outputs and appreciate different methods of presentation |
| 4 | Appreciate the basic theory that underpins linear aspects of dynamics and its relevance on the solution method selection |

## Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

| | | | |
|---|---|---|---|
| VLE test | 1 | 2 | 4 |
| FEA Project | 1 | 3 | |

## Outline Syllabus

*Practical aspects of FE Analysis. Element and solution method selection. General aspects of linear dynamics. Boundary value and initial value problems. Normal mode analysis. Properties of normal modes of undamped systems. Natural frequencies and modes. Presentation and analysis of the results. Basic cross-validation methods and FE updating.*
*Frequency response function in dynamic response estimation. Basic theory related to direct frequency response analysis. Basic theory related to modal superposition and normal modes response analysis. Structural and modal damping. Direct integration and modal-based analysis.*

## Learning Activities

Lectures, practical tutorials, laboratory experiment

## Notes

The module extends previous studies in engineering analysis and will provide students with a deep understanding of the application of linear dynamics FE analysis in engineering.