

## Liverpool John Moores University

Title: Advanced Structural Analysis  
Status: Definitive  
Code: **7111BEUG** (120614)  
Version Start Date: 01-08-2019

Owning School/Faculty: Civil Engineering  
Teaching School/Faculty: Civil Engineering

| Team             | Leader |
|------------------|--------|
| Hassan Al Nageim | Y      |
| Ed Saul          |        |

**Academic Level:** FHEQ7      **Credit Value:** 20      **Total Delivered Hours:** 75  
**Total Learning Hours:** 200      **Private Study:** 125

### Delivery Options

Course typically offered: Standard Year Long

| Component | Contact Hours |
|-----------|---------------|
| Lecture   | 42            |
| Tutorial  | 24            |
| Workshop  | 6             |

**Grading Basis:** 50 %

### Assessment Details

| Category | Short Description | Description | Weighting (%) | Exam Duration |
|----------|-------------------|-------------|---------------|---------------|
| Exam     | AS1               | Exam        | 60            | 3             |
| Test     | AS2               | Test        | 20            |               |
| Report   | AS3               | Report      | 20            |               |

### Aims

*To extend the understanding of structural behaviour and to develop an understanding of the principles involved in the analysis and design of complex structures.*

## Learning Outcomes

After completing the module the student should be able to:

- 1 Evaluate the impact of large displacement behaviour in structures and develop a critical appreciation of theory underpinning structural dynamics.
- 2 Analyse and design cables and arches
- 3 Undertake critical structural analysis using influence lines and yield line analysis and evaluate the results.
- 4 Undertake structural analysis using matrix methods and evaluate the results.

## Learning Outcomes of Assessments

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

|                   |   |   |   |   |
|-------------------|---|---|---|---|
| Examination 3 hrs | 1 | 2 | 3 | 4 |
| Test              | 2 | 3 | 4 |   |
| Report            | 1 |   |   |   |

## Outline Syllabus

*Qualitative analysis of complex structures*

*Yield Line Analysis*

*Influence Lines*

*Torsion*

*Plastic analysis*

*Matrix methods of solution of structural problems*

*Nonlinear problems - Sources of nonlinearity, use of stiffness and finite element methods, Geometrically nonlinear analysis of simple problems, Eulerian and Lagrangian frames of reference,*

*Multiaxial stress - Nonlinear models for multiaxial states, Yield criteria and yielding in a multiaxial stress state; Multiaxial plasticity.*

*Structural Dynamics.*

## Learning Activities

Lectures, tutorials, problem solving sessions, laboratory practical work, use of specialist computer software.

## Notes

This module develops the students' experience of structural behaviour, building on the foundations of understanding laid down in previous modules. It provides students with the tools to enable them to understand the structural behaviour of complex structures.

