

Liverpool John Moores University

Title: STRUCTURAL BEHAVIOUR AND DETAILING
Status: Definitive
Code: **4009BEHN** (102275)
Version Start Date: 01-08-2011

Owning School/Faculty: Built Environment
Teaching School/Faculty: Built Environment

| Team | Leader |
|------------------|--------|
| John McLoughlin | Y |
| William Atherton | |

Academic Level: FHEQ4 **Credit Value:** 12.00 **Total Delivered Hours:** 42.00
Total Learning Hours: 120 **Private Study:** 78

Delivery Options

Course typically offered: Semester 2

| Component | Contact Hours |
|-----------|---------------|
| Lecture | 24.000 |
| Practical | 6.000 |
| Tutorial | 12.000 |

Grading Basis: BTEC

Assessment Details

| Category | Short Description | Description | Weighting (%) | Exam Duration |
|----------|-------------------|-------------------------------|---------------|---------------|
| Test | AS1 | open book in class assessment | 50.0 | |
| Report | AS2 | minimum 2 assignments | 50.0 | |

Aims

To develop the concepts of structural mechanics to enable the analysis of beams, columns, frameworks and retaining structures of a statically determinate nature.

To apply mathematical and geometrical calculations to the determination of structural properties of sections.

To develop an understanding of the structural behaviour of materials, the relationship between ultimate stress and working stress and the likely modes of failure.

To develop an ability to size up sections to resist imposed loadings and relate this to both permanent and temporary works.

Learning Outcomes

After completing the module the student should be able to:

- 1 Identify the behaviour of various structural elements.
- 2 Analyse simply supported beams subject to point loads and UDLs, calculate reactions, shearing force and bending moment values.
- 3 Analyse various shapes of cross section to determine: cross sectional area, centre of gravity and second moment of area.
- 4 Evaluate the section modulus about major axes for various cross sections; use data to determine safe loadings for given beams or vice-versa, determine safe loadings for short columns subject to axial loadings.
- 5 Apply the concepts of resolution of forces.
- 6 Calculate the position and magnitude of forces produced by liquids or soils on vertically retaining walls, determine the stability and use appropriate factors of safety against sliding and overturning.
- 7 Determine section sizes for beams of timber and steel due to imposed loadings and calculate allowable and actual deflections.

Learning Outcomes of Assessments

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

| | | | | | | | |
|----|---|---|---|---|---|---|---|
| CW | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| CW | 1 | 2 | 3 | | | | |

Outline Syllabus

Materials used in structures, resolution of forces, principles of equilibrium, pin jointed frames, moments of inertia, shear force and bending moment calculations, retaining walls, columns, design of timber and steel beams, deflection.

Learning Activities

As the students are technologists and not pure science students the material will wherever possible be related to problems of a practical nature which occur in construction.

References

| | |
|------------------------|---|
| Course Material | Book |
| Author | Al Nageim, H., Durka, F., Morgan, W. & Williams, D. |

| | |
|------------------------|-----------------------|
| Publishing Year | 2003 |
| Title | Structural Mechanics |
| Subtitle | |
| Edition | 6th Edition |
| Publisher | Pearson Prentice Hall |
| ISBN | 0582431654 |

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|------------------------|---------------------------|
| Course Material | Book |
| Author | Gauld, B. |
| Publishing Year | 1995 |
| Title | Structures for Architects |
| Subtitle | |
| Edition | |
| Publisher | Longman |
| ISBN | |

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|------------------------|--------------------------|
| Course Material | Book |
| Author | Seward, D. |
| Publishing Year | 2003 |
| Title | Understanding Structures |
| Subtitle | |
| Edition | 3rd Edition |
| Publisher | Palgrave Macmillan |
| ISBN | 0333973860 |

Notes

The module develops the concepts of structural mechanics, and applies mathematical and geometrical calculations, to the determination of structural properties of sections.

It also develops an understanding of the structural behaviour of materials.