# Module Descriptor Form

## Civil and Environmental Engineering

**CL134 - Engineering Mechanics 2**

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|---|---|---|---|---|---|---|---|
| **Module Code** | CL134 | **Module Title** | Engineering Mechanics 2 | | | | |
| **Module Registrar** | Cochrane, Mr Neil A | | | | | | |
| **Other Staff Involved** | Dr James M Leak (Lecturer) | | | | | | |
| **Credit Weighting** | 20 | **Semester** | 2 | **Elective** | No | **Academic Level** | 1 |
| **Pre-requisites** | | | | | | | |
| **Required for** | | | | | | | |

**Module Format and Delivery (hours):**

| Lectures | Tutorials | Assignments | Labs | Private Study | Total |
|---|---|---|---|---|---|
| 10 | 20 | 60 | 10 | 100 | 200 |

### Educational Aim

*This module aims to:*

This module aims to provide a basic introduction to structural engineering, including the concepts of equilibrium, internal forces, pin-jointed trusses. These lay the foundation for subsequent classes in structural analysis and structural engineering.

### Syllabus

*This module will teach the following:*

Equilibrium
- Concept of force and moment
- Equilibrium of a particle
- Equilibrium of a rigid body
- Equilibrium of multipart structures

Analysis of pin-jointed trusses
- Internal forces in pin-jointed frame systems
- Method of joints
- Method of sections

Internal actions
- Axial force, shear force, and bending moments
- Internal action diagrams for statically determinate structures

**CL134 - Engineering Mechanics 2**

**Learning Outcomes**

*On Completion of the module, the student is expected to be able to:*

| | |
|---|---|
| LO: 1 | Find the resultant & equilibrant of a system of forces |
| LO: 2 | Understand the equilibrium of rigid bodies and multi-part structures |
| LO: 3 | Understand the equilibrium of rigid bodies and multi-part structures |
| LO: 4 | Calculate internal action diagrams for statically determinate structures |

*(UK SPEC suggests no more than 4 learning outcomes per module. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the programme specifications.)*

**Assessment of Learning Outcomes - Criteria**

Learning Outcome: **1**

| | **Criteria** |
|---|---|
| 1 | Ability to plot forces, moments, and resultants |
| 2 | Ability to apply Newton's laws of motion. |
| 3 | Ability to describe the equilibrium condition for concurrent and coplanar forces |

Learning Outcome: **2**

| | **Criteria** |
|---|---|
| 1 | Ability to evaluate if a structure is statically determinate |
| 2 | Ability to evaluate the support reactions in statically determinate structures |
| 3 | Ability to use trigonometry and geometry to draw the free body diagram of forces acting on rigid bodies of systems of rigid bodies |

Learning Outcome: **3**

| | **Criteria** |
|---|---|
| 1 | Ability to use the method of joints to compute internal forces in pin-joined frames |
| 2 | Ability to use the method of sections to compute internal forces in pin-joined frames. |

Learning Outcome: **4**

| | **Criteria** |
|---|---|
| 1 | Ability to use free-body diagram to calculate shear forces and bending moment. |
| 2 | Ability to take equilibrium at any location to predict the math expressions for BM and SF |
| 3 | Ability to draw internal force diagrams and validate the results by using different methods |
| 4 | Ability to evaluate internal force diagrams for basic structures |

## Assessment Method(s) Including Percentage Breakdown and Duration of Exams

To Pass the module, students need to gain a summative mark of: 40%

| Description | Semester | Start Week | Duration | Weight | Submission Week | Linked Criteria |
|---|---|---|---|---|---|---|
| EM2-1: Online Test – Support Reactions | 2 | 3 | | 5% | 5 | LO 1: C1, C2, C3<br>LO 2: C3 |
| EM2-2: Online Test – Multi-Part Structur | 2 | 5 | | 5% | 7 | LO 1: C1, C2, C3<br>LO 2: C1, C2, C3 |
| EM2-5: Individual Lab A – Equilibrium | 2 | 6 | | 5% | 8 | LO 1: C1, C2, C3<br>LO 2: C1, C2, C3 |
| EM2-3: Methods of Joints and Sections | 2 | 5 | | 10% | 9 | LO 3: C1, C2 |
| EM2-6: Individual Lab B – Trusses | 2 | 7 | | 5% | 11 | LO 1: C1, C2, C3<br>LO 2: C1, C2, C3<br>LO 3: C1, C2 |
| EM2-4: Internal Forces | 2 | 11 | | 10% | 11 | LO 1: C1, C2, C3<br>LO 2: C1, C2, C3<br>LO 4: C1, C2, C3, C4 |
| EM2-7: Examination. Closed Book | 2 | | 2.00 | 40% | E | LO 1: C1, C2, C3<br>LO 2: C1, C2, C3<br>LO 3: C1, C2<br>LO 4: C1, C2, C3, C4 |

## Principles of Assessment Feedback

• The assessment of the module has been designed to encourage student engagement and understanding of this topic . A range of assessment methods are used: examination (x1), online quizzes (x2), peer analysis and verification of hand calculations (x1), a take-home test (x1), and individual lab report submissions (x2).

• Assessments and methods are clearly explained to students at the start of the course .

• All assessments are marked in an appropriate, fair and transparent way with pre-specified marking criteria.

• Timely, constructive, and supportive feedback is given to students to help them understand the extent to which they have fulfilled the assessment criteria and support future development of their work.

• Tutorial classes are held regularly for one-to-one interaction between instructors and students and timely feedback.

• The course is reviewed every year, based on feedback from students collected in the form of a mid-term and one end-term questionnaire. Any recommended changes are reviewed and implemented in the next academic year.

## Additional Information

**CL134 - Engineering Mechanics 2**

**Resit Procedure**

Students must gain a summative mark of 40% to pass the module. Attendance at the end of semester exam is a requirement of this module. Absence from the final exam will result in an 'absent' mark being returned. Students who fail the module at the first attempt will be re-examined during the August diet. No marks from any previous attempts will be transferred to a new re-sit attempt.

**Recommended Reading**


978-1292247236 – Hibbeler, R.C. (2020) Structural analysis
978-0081025871 – Megson, T.H.G. (2019) Structural and stress analysis
978-0333677605 – Williams, M. & Todd, J.D. (2020) Structures: theory and analysis
978-0582256323 – Hannah, J. & Hillier, M.J., (1995) Applied mechanics,
978-1111577742 – Gere, J.M. & Goodno, B.J. (2013) Mechanics of materials
978-1315652139 – Millais, M. (2017) Building structures
978-0955631108 – Brohn, D. (2005) Understanding structural analysis
978-0333962558 – Smith, P (2001) An introduction to structural mechanics
978-0306812835 – Gordon, J.E (1991) Structures, or, Why things don't fall down
978-0140135978 – Gordon, J.E (1991) The new science of strong materials: or, Why you don't fall through the floor


**Module Timetable**

| Week | Semester 1 | Semester 2 |
|---|---|---|
| 0 | | |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | Submission 5% |
| 6 | | |
| 7 | | Submission 5% |
| 8 | | Lab 5% |
| 9 | | Submission 10% |
| 10 | | |
| 11 | | Submission 10%, Lab 5% |
| E | | Examination 40% |

**Date of Last Modification**

08-09-2025