CLASS DESCRIPTION FORM

CL207 Structural Mechanics & Materials 2

Class Registrar: Dr Shangtong Yang	**Taught To (Course): CE and CEE**	
Other Lecturers Involved: Dr Marcus Perry	**Credit Weighting: 20**	**Semester: 1 & 2**
Assumed Prerequisites: CL132	**Compulsory~~/ optional/ elective class~~**	**Academic Level: 2**

Class Format and Delivery (hours):

Lecture	Tutorial	Laboratory	Project	Assignments	Private Study	**Total**
22	22	2		50	100	196

Educational Aim

To introduce the students to advanced topics in structural mechanics and structural simulation by software.

Learning Outcomes

On completion of the class the student is expected to be able to

Dr Shangtong Yang:

LO1 Able to analyse problems of torsion for simple structures, e.g., beams.

LO2 Able to draw bending moment and shear force diagrams for beams and frames.

LO3 Able to analyse beams with moving live loads.

LO4 Able to calculate deflection of simple beams.

LO5 Able to draw Mohr's Circle and analyse 2D stress and strain problems.

LO6 Able to analyse statically indeterminate structures.

Dr Marcus Perry

LO7 Able to design concrete mix

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

Syllabus

The class will teach the following:

Dr Shangtong Yang:

- Evaluation of load path and calculation of reaction forces.
- Analysis of pin jointed frames.
- Shear force and bending moment.
- Torsion of beams.
- Deflection of beams.
- Influence line for beams.

- Mohr's Circles of stress and strain
- Indeterminate structures.

Dr Marcus Perry:

- Concrete mix design

Assessment of Learning Outcomes

Criteria

For each of the Class Learning Outcomes the following criteria will be used to make judgements on student learning:

[Note: Criteria break the LO down into 'teachable' elements but do not become syllabus orientated i.e. no mention of CAD package names, components etc.]

LO1 Able to analyse problems of torsion for simple structures, e.g., beams.
- C1 Understand the basic concepts of torsion, e.g., torque, shear stress etc.
- C2 Able to calculate the shear stresses for given torques applied on different structures.

LO2 Able to draw bending moment and shear force diagrams for beams and frames.
- C1 Understand the basic principles of shearing and bending.
- C2 Calculate the shear stresses for structures including beams and frames and able to draw shear force diagram for the structures.
- C3 Calculate the bending moments for structures including beams and frames and able to draw bending moment diagrams for the structures.

LO3 Able to analyse beams with moving live loads.
- C1 Understand the basic principles of live loads and influence lines.
- C2 Able to construct influence lines of shear force and bending moment for beams.
- C3 Able to apply the influence lines to a number of loading cases for evaluation of structural safety.

LO4 Able to calculate deflection of simple beams.
- C1 Understand bending resistance property of cross-section of beams.
- C2 Calculate the 1st and 2nd moment of area.
- C3 Use double-integration method to calculate the deflection of beams.

LO5 Able to draw Mohr's Circle and analyse 2D stress and strain problems.
- C1 Understand the principles of stress and strain.
- C2 Calculate the stresses and strains for a few specific cases, e.g., one dimensional loading.
- C3 Understand the principles of Mohr's Circle of stress and how to draw a Mohr's Circle of stress.
- C4 Able to analyse stress problems based on Mohr's Circle and determine stresses at different angles of plane.

LO6 Able to analyse statically indeterminate structures.
- C1 How to judge if a structure is statically determinate or indeterminate.
- C2 Find the number of indeterminacy.
- C3 Release the same number of restrains and setup additional equations based on boundary conditions.
- C4 Procedures to apply flexibility and stiffness method.

LO7 Able to design concrete mix
- C1 Understand the basic principles of concrete materials and composition
- C2 Follow the design code
- C3 Understand the material-structure relation.

The standards set for each criterion per Class Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

JBM Programme Threads

Thread	Primary	Secondary	Contributory
Design	LO1-7		
Health, Safety & Risk Assessment		S21 Lab	
Sustainability			LO1, LO7
Maths for Engineers	LO4, LO6		
Industrial Engagement		LO7	
Digital Technologies			LO7

12 Principles of Assessment and Feedback
(on Learning & Teaching web pages: www.strath.ac.uk/learnteach/teaching/staff/assessfeedback/12principles/)

Please state briefly how these are incorporated in this class.

1. Marking criteria are outlined clearly in the assignment hand-out and multiple opportunities for questions are available, either in class or through electronic correspondence. Each marking sheet is taken directly from this handout.
2. Project and lab work encourages interaction between peer groups and with the instructor.
3. Tutorial questions are provided to support student self-assessment and reflection.
4. Departmental policy is to carry out mid-term class assessments and provide feedback to students.

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

	Examinations			Courseworks	
	Number	Duration	***Weighting***	Number	***Weighting***
	1	2 hours	70%	3	30%
L/Outcomes	LO1 – LO6			LO2, LO4, LO7	

Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines:

S21: Lab report – Semester 2, week 8 – 10%
S22: Class test 1 – Semester 1, week 7 – 15%
S23: Class test 2 – Semester 1, week 10 – 5%

Resit Assessment Procedures: exam or coursework as appropriate to the part(s) of the class which were failed

PLEASE NOTE:
Students need to gain a summative mark of 40% to pass the class and must make a serious attempt at all parts of the assessment. Students who fail the class at the first attempt will be re-examined during the August diet. This re-examination will consist of an exam or coursework, as appropriate, to the part(s) of the class which were failed.

Recommended Reading

'Structural and Stress Analysis', 2nd ed. by T.H.G.Megson, pub. Elsevier, 2005. ISBN 0 7506 6221 2

'Introduction to Structural Mechanics', by P.S. Smith, pub. Palgrave, 2001. ISBN 0-333-96255-9

'Understanding Structural Analysis' by David Brohn, ISBN 0-246-12238 – 2

'Structural Analysis' SI edition, by R.C. Hibbeler, pub. Pearson, 2005. ISBN 013-124-572-4

‘Structural Analysis’, 3rd ed. By A Kassimali, pub.Thomson, 2005. ISBN 0-534-39168-0

http://www.strand7.com/

Additional Student Feedback
(Please specify details of when additional feedback will be provided)

Session: mid-term oral feedback.

Approved:

Course Director Signature:
Date of Last Modifications: **25/09/19**

CLASS TIMETABLE

Class Code:	CL207	**Class Title:**	**Structural Mechanics & Materials 2**

Brief Description of Assessment:
One class test, one assignment and 2-3 laboratory computing sessions
Class test is set to take place at the 5th week of duration 1.5 hours subject to change.
Deadline of submitting assignments are expected to be in week 10 (1st semester) and week 8 (2nd semester).

Assessment Timing:-

Indicate on the table below the Start/Submission dates for each Assignment/Project and the timing of each Exam/Class Test(s).
Note all feedback to the assessment will be aimed to be provided within 3 weeks after actual assessment.

Semester One	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
							S22			S23		

Semester Two	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
								S21				