



### DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

# CL528 SUSTAINABLE STRUCTURAL DESIGN

Module Registrar:	Taught To (Course): Elective to MEng Civil						
Viola Valentine	Engineering/Civil and Environmental Engineering						
Other Lecturers Involved:	Credit Weighting: 10 Semester: 2						
N/A							
Assumed Prerequisites:	Compulsory/ optional/	Academic	Suitable for				
All compulsory structural engineering classes up	elective class	Level: 5	Exchange: ¥/N				
to the end of 3 <sup>rd</sup> year and CL418 (60% average							
min) or equivalent							

### Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lec	ture	Tutorial	Laboratory	Group work	External	Online	Project	Assignments	Private Study	Total
10		4		10				26	50	100

### **Educational Aim**

This module aims to develop ability at conceptual and detailed design of structures using sustainable materials. Students will work in small groups to generate a unique and innovative design concept for a large structure, selected from a number of project briefs, followed by preparation of a contractual report summarising the design proposals.

### **Learning Outcomes**

On completion of the module the student is expected to:

- LO1: Generate a unique or innovative design concept for a large structure adopting sustainable and low-carbon/carbon-neutral materials.
- LO2: Assess the limitations of the proposed concept in terms of dynamic and sway sensitivity of lightweight structures.
- LO3: Prepare the detailed technical design of typical structural elements.
- LO4: Produce a coherent final report summarising the design proposals.
- LO5: Work and collaborate in a group on a complex design brief.

### **Syllabus**

The module will teach the following:

The class is run on the basis of being a mentored project, however several lectures are included in this module. Topics that students will learn about, especially through self-study are as follows:

- Conceptual design and optimisation of sustainable structures
- Preliminary sizing of structural elements
- Sway sensitivity of lightweight structures
- Dynamic behaviour of lightweight structures
- Methods of construction

### **Assessment of Learning Outcomes**

#### Criteria

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

# LO1: Generate a unique or innovative design concept for a large structure adopting sustainable and low-carbon/carbon-neutral materials.

- C1 Knowledge of structural forms for large sustainable structures
- C2 Ability at defining load paths for both gravitational and lateral loadings
- C3 Ability at initial sizing of typical structural elements
- C4 Knowledge of methods of construction for large sustainable structures

# LO2: Assess the limitations of the proposed concept in terms of dynamic and sway sensitivity of lightweight structures.

- C1 Ability to assess the sway sensitivity of lightweight structures in accordance with the relevant Eurocodes or British Standards
- C2 Knowledge of methods of assessing the dynamic behaviour of large lightweight structures

## LO3: Prepare the detailed technical design of typical structural elements.

- C1 Ability at selecting appropriate material properties
- C2 Ability at defining the loadings and load paths in a structure
- C3 Ability at detailed analysis of individual structural elements using also computer software
- C4 Ability at technical design of individual typical structural elements in accordance with relevant Eurocodes or British Standards
- Knowledge of connection design

## LO4: Produce a coherent final report summarising the design proposals.

- C1 Ability at producing a concise contractual report
- C2 Ability at preparing structural calculations
- C3 Ability at producing structural drawings of general arrangement and details

### LO5: Work and collaborate in a group on a complex design brief.

- C1 Ability to develop a complex design brief
- C2 Ability to work on delegated tasks and coordinate own work with others in the group

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

## **Principles of Assessment and Feedback**

(within Assessment and Feedback Policy at:

https://www.strath.ac.uk/staff/policies/academic/http://www.strath.ac.uk/learnteach/informationforstaff/staff/assessfeedback/12principles/

These are incorporated in this module as follows:

- The project activities are spread throughout the semester
- Feedback to groups is given on a weekly basis so that they have the opportunity to improve their work on an ongoing basis.
- The design reviews in week 5 have relatively low marks but allows feedback to be given at this key point in the project so that students can incorporate the advice given into their poster presentation and final design report.
- The group project encourages peer dialogue covering many issues and also, structured discussion with the teacher.
- Assessment covers a range of skills and abilities (oral presentations, writing, sketching, structural analysis and calculations and technical drawings) so that students who have strengths in some skills, but not others, can still do well in this class.
- Coursework is broken down into the specific topics to be covered and the proportion of the overall marks allocated to each topic is specified.
- Examples of the presentation standard required for calculations and engineering drawings are provided on Myplace.

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

	Examir	nations		Course	eworks	Projects		
Number	Month(s)	Duration	Weighting	Number	Weighting	Number	Weighting	

Indicate v	Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.											
Coursework / Sul Semester 2 weeks	omissions deadlines (acad 3, 5, 10 and 11.	demic weeks):										
Resit Assessmen Resubmission of p		mencement of the August exam diet.										
ttempt will be re- vith resit assessm	examined during the Aug lent procedures as above attempts will be transferr	0% to pass the module. Students who fail the module at the firs gust diet. This re-examination will consist entirely of courseworks. The resit mark will be 100% of the resit coursework. No marked to a new resit attempt.										
	-	echnical topics, as well as other general references are provided on										
Additional Stud (Please specify de	ent Feedback tails of when additional feedba	nck will be provided)										
Date	Time	Room No										
Session:												
Approved:												

100%

1, 2, 3, 4 and 5

(Updated May 2018)

**Course Director Signature:** 

**Date of Last Modifications:** 

August 2022

L/Outcomes

# **MODULE TIMETABLE**

Module Code: CL528 Module Title: Sustainable Structural Design

# **Brief Description of Assessment:**

• Material selection DP51 – 5% - Group – LO 1 & 5

• Design review DP52 – 10% - Group – LO 1 & 5

• Poster presentation DP53 – 15% - Group – LO 1,3 & 5

• Final Design Report DP54 – 50% - Group – LO 1,2,3,4 & 5

• Individual Contribution to the group DP55 – 20% - Individual – LO 1,2,3,4 & 5

# **Assessment Timing:-**

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment using the dropdowns provided. Dropdowns can be left blank. Add extra notes below the dropdowns.

Please note: Timings can and will change, this should only be used as a guide.

	W&D												
Semester	Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
One	Choose	Choose an											
	an item.	item.											
	Choose												
	an item.												

Semester	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
Two	Choose	Course	Choose	DP 51	Choose	DP 52	Choose	Choose	Choose	Choose	DP 53	DP 54	Choose an
	an item.	work	an item.	Submit	an item.	Submit	an item.	an item.	an item.	an item.	Submit	and DP	item.
	Choose	Set	Choose		Choose		Choose	Choose	Choose	Choose		55	
	an item.	Choose	an item.		an item.		an item.	an item.	an item.	an item.		Submit	
		an item.											