Module Code	CEU33A12
Module Name	3A12 CIVIL ENGINEERING DESIGN CHALLENGE
ECTS Weighting	10 ECTS
Semester taught	Semester 1 & 2
Module Coordinator/s	Professor Margaret O'Mahony
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, the student will be able to: 1. Function as a member of a design team. Specifically, students will be able to: a. Allocate work between members of a group b. Plan as a member of a group c. Prepare oral and written presentations as member of a group 2. Apply engineering knowledge gained in other modules to formulate solutions to multidisciplinary design problems. 3. Communicate the details of their design solutions effectively, both verbally and in writing. 4. Interpret the requirements from a design brief and formulate and appraise potential solutions. In the case of a construction project, this involves the ability to: a. Identify functional and operational requirements b. Identify the transport and other infrastructural requirements c. Appraise the environmental and social impact of the development d. Identify and appraise potential sites before making a selection e. Develop general arrangement drawings, ensuring that the functional requirements are satisfied f. Refine and develop plans to produce detailed structural plans and a viable construction sequence, usually presented in the form of a Gantt Chart g. Write a technical specification h. Produce a bill of quantities and calculate approximate construction costs

i. Question the wider responsibilities of the engineering profession

Graduate Attributes: levels of attainment

To act responsibly - Attained
To think independently - Attained
To develop continuously - Attained
To communicate effectively - Attained

Module Content

Please provide a brief overview of the module of no more than 350 words written so that someone outside of your discipline will understand it.

The Civil Engineering Design Challenge replicates all the key stages in a real civil engineering project. The groups are given a series of design briefs and are required to develop solutions, critically evaluating and refining them as the design develops. At the end of each of the three design phases, each group produces a written report. During the project, relevant experts are invited to speak to the students on aspects of the design relevant to the particular design challenge.

The project comprises three stages: preliminary planning, structural design and construction planning.

Module content

Lectures on the module are directly related to and are sequenced with the required outputs of the project phases. In this regard, on completion of the module, the student will be able to:

- Describe the roles and obligations of the various parties to a contract in civil engineering and building
- Take off quantities and prepare a Bill of Quantities in accordance with the Civil Engineering Standard Method of Measurement for a simple structural element.
- Write a specification for a concrete or steel structure and have an appreciation of some of the forthcoming changes arising from the introduction of Eurocodes.
- Prepare a reinforced concrete detail drawing and from this prepare a bar bending schedule in accordance with standard principles.

- Develop an understanding of the properties of the ingredients of a concrete mix and be capable of designing a concrete mix to meet certain requirements in terms of durability, strength and workability.
- Identify the various formwork materials and support systems and be able to design formwork to resist certain concrete pressures to produce a finished structure to meet the specified dimensional tolerances.
- Analyse and explain the principles of construction, particularly within the context of the current building regulations
- Identify and design the detailed techniques and/or materials commonly used in the construction of buildings in Ireland.
- Recognise the symptoms of common defects in buildings and specify available remedial measures which may be used.
- Evaluate the environmental principles and practices underlying the construction of buildings.
- Develop a specification for and design environmental services for domestic, commercial and industrial buildings.
- Develop a specification for and design renewable energy options for domestic, commercial and industrial buildings.
- Design timber flooring systems for domestic and industrial use.

In addition, this module introduces other relevant content related to project management, for example, the development of Gantt charts, developing communication skills, problem solving skills and group working skills. The content summary that follows details the individual phases of the group design challenge.

Phase	Content
1	Site selection, planning and outline design. Access, traffic management and economic and environmental impacts.
2	Structural design linking with other modules in structural analysis undertaken by the students. Detailed reinforced concrete and structural steelwork for large spans which may require innovative solutions and the use of computer software for drawing and calculation.
3	Construction management and planning including the use of bar charts and critical path networks. Taking off quantities and preparation of a Bill of Quantities using the Standard Method of Measurement, preparation of materials specifications and the calculation of an overall cost estimate for the project.

Teaching and Learning Methods	Lectures and Group Design Sessions

Assessment Details[1] **Please include the following:** • **Assessment Component** • **Assessment description** • **Learning Outcome(s) addressed** • **% of total** • **Assessment due date**	Assessment Component	Assessment Description	LO Addressed	% of total	Week due
	Phase 1 Report	Written Report	All	27.75%	S1 (Wk 8)
	Phase 2 Report	Written Report	All	27.75%	S2 (Wk 8)
	Phase 3 Report	Written Report	All	15%	S2 (Wk 12)
	Phase 1 Presentation	Group Presentation	All	2.25%	S1 (Wk 8)
	Final Presentation	Group Presentation	All	2.25%	S2 (Wk 12)
	Site Visit Reports	Written Reports	All	9%	Various
	Class Test	Class Test	All	8%	S2 Wk1
	Tutorials	Tutorial Submissions	All	8%	Various

Reassessment Requirements	Coursework Assignment 100%

Contact Hours and Indicative Student Workload[1]	
	Contact hours: 44 lectures
	Independent Study (preparation for course and review of materials): 44 hours of supervised Group Design Sessions
	Independent Study (preparation for assessment, incl. completion of assessment): 37

[1] TEP Guidelines on Workload and Assessment

Recommended Reading List	• Developments in Structural Form, Rowland Mainstone, Architectural Press, England, 2001 • *Irish Construction Price Book.* Spon Second Ed. 2004 • Architect's Data, Ernst Neufert, Blackwell Science, U.K. 1987 • Philosophy of Structures, Eduardo Torroja, University of California Press, 1958 • Aesthetics and Technology in Building, P.L. Nervi, Harvard University Press, 1966 • Structures: from theory to practice, Alan Jennings, Spon Press • Structures: of why things don't fall down, J.E. Gordon, Penguin • The new science of strong materials: or why you don't fall through the floor, J.E. Gordon, Penguin • AC Twort and J Gordon Rees 4th Ed. 2004. *Civil Engineering Project Management.* Elsevier • DOE/BRE/TRRL. *Design of Normal Concrete Mixes.* HMSO • *Standard Method of detailing structural concrete.* I Struct.E. • *Civil Engineering Standard Method of Measurement.* CESMM3. ICE • Fleming, E. (2005) *Construction Technology, an illustrated introductio*n Blackwell Publishing. • Chudley, R. (2001) *Construction Technology Handbook. 4th ed*. Essex: Longman Scientific and Technical • *Building Standards/ Regulation:* • *National Sustainable Development Policy:* • *Building Conservation Guidelines:*
Module Pre-requisite	n/a
Module Co-requisite	n/a
Module Website	
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Module Approval Date	
Approved by	
Academic Start Year	September 2024

Academic Year of Date	2024-25