

Module Code	CEU33A07
Module Name	3A7 TRANSPORTATION AND HIGHWAY ENGINEERING
ECTS Weighting	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Professor Margaret O'Mahony
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	<p>On successful completion of this module, students should be able to:</p> <p>PART 1 : HIGHWAY ENGINEERING</p> <p>LO1. Select the appropriate materials for use in different road layers</p> <p>LO2. Evaluate the quality and performance of unbound and bound road materials</p> <p>LO3. Perform road pavement design and analysis</p> <p>LO4. Develop an appropriate road monitoring and maintenance programme</p> <p>LO5. Interpret geometric design fundamentals, in relation to safety and driver comfort, focusing on horizontal and vertical alignment</p> <p>LO6. Design a road alignment.</p> <p>PART II: TRANSPORT ENGINEERING</p> <p>LO7. Design traffic signal timing programmes for junctions</p> <p>LO8. Perform the traffic studies necessary before making changes to or designing new road infrastructure</p> <p>LO9. Exposing them to interdisciplinary approaches in solving engineering problems</p>

LO10. Assess and conceptualise driver behaviour when developing engineering solutions to improve road safety

LO11. Appreciate the need for input from other disciplines to formulate policies for dealing with urban traffic congestion problems

LO12. Discuss and debate solutions to urban congestion

Graduate Attributes: levels of attainment

To act responsibly - Attained

To think independently - Attained

To develop continuously - Introduced

To communicate effectively - Enhanced

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.

PART 1 : HIGHWAY ENGINEERING

Module Objectives

The objective of this part of the module is to enable students to analyse road pavement structures, to differentiate between the different types of materials used and to design road pavements. The introduction of the design concepts, material properties and performance criteria are used together with vehicle loading criteria to demonstrate to the students how they are combined to design and construct road pavements. Another objective is to distil the principles of geometric design, both vertical and horizontal. To give the students the satisfaction of producing for themselves a full road pavement design, they are taken through one of the available methods and they perform examples so they can see how the principles and their application come together in a design.

Module content

1. Introduction
2. Unbound Flexible Pavement Materials – Capping and subbase materials
3. Bitumen – Properties and laboratory tests for property characterisation
4. Bituminous Materials – Open textured macadam, hot rolled asphalt, mastic asphalt and dense bituminous macadam
5. Flexible Pavement Design – Principles of design, design method and examples

6. Rigid Pavements – Properties of concrete, rigid pavement design and construction
7. Geometric Design – Fundamentals of forces on vehicles travelling on curved sections of road, horizontal and vertical alignment, designed on the basis of safety and driver comfort

PART II: TRANSPORT ENGINEERING

Module description, aims and contribution to programme

The first objective of this part of the module is to enable students to formulate the fundamental principles of traffic flow, traffic characteristic measurements and their interpretation for infrastructure changes or development. Traffic signal timing design is included with a number of worked examples along with urban traffic control. Road safety and driver behaviour also feature in the module given their importance in accident prevention.

Module content

1. Traffic Flow – Methods for measuring traffic flow, speed and other characteristics of traffic, capacity, Level of Service, traffic studies, accidents, impacts of new infrastructure.
2. Traffic Signal Timing Calculations – Saturation flow, optimum cycle time, effective green period and dealing with right turning traffic.
3. Urban Traffic Control
4. Driver Behaviour and Safety – Psychology of drivers, how drivers react in different situations, how to use knowledge of driver behaviour in designing engineering solutions.
5. Urban Congestion and Solutions – Public transport, demand management, promotion of non-car modes, integrated transport policies and freight management.

Teaching and Learning Methods

e.g., lectures, seminars, online learning via VLE, field trips, laboratories, practice-based etc...

Assessment Details¹ Please include the following: <ul style="list-style-type: none"> • Assessment Component • Assessment description • Learning Outcome(s) addressed • % of total • Assessment due date 	Assessment Component	Assessment Description	LO Addressed	% of total	Week due			
	Examination	2 hour written examination	LO1-12	100%				
Reassessment Requirements	100% written examination							
Contact Hours and Indicative Student Workload¹	<table border="1"> <tr> <td>Contact hours: 33</td> </tr> <tr> <td>Independent Study (preparation for course and review of materials): 55</td> </tr> <tr> <td>Independent Study (preparation for assessment, incl. completion of assessment): 37</td> </tr> </table>					Contact hours: 33	Independent Study (preparation for course and review of materials): 55	Independent Study (preparation for assessment, incl. completion of assessment): 37
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Recommended Reading List	<p><i>Highway Engineering, M. Rogers, Blackwell Publishing</i> <i>Highway Engineering, CA O'Flaherty, Edward Arnold</i></p> <p><i>Highway Traffic Analysis and Design, RJ Salter and NB Hounsell, Macmillan</i> <i>Principles of Highway Engineering and Traffic Analysis, FL Mannering and WP Kilareski, Wiley</i></p>							
Module Pre-requisite								
Module Co-requisite								
Module Website								
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.								
Module Approval Date								

Approved by

Academic Start Year

September 2022

Academic Year of Date

2022-23