Module Code	4E3
Module Name	Engineering Research Methods
ECTS Weighting	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Dr. John Kennedy (jkenned5j@tcd.ie) Dr. Gareth Bennett
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On completion of this module, the student will be able to: 1. Evaluate the role of fundamental research in engineering, differentiating between the concepts of research, design and development in an engineering context 2. Experience and employ different elements of the research process including project planning, investigating background literature, designing and conducting experiments, analysing results, documenting processes, and ultimately reporting and presenting findings 3. Clearly understand the ethical considerations of research including the implications of plagiarism on their work 4. Demonstrate an ability to engage in team-based research incorporating the latest cloud based collaborative tools 5. Communicate the results of a research task to their peer group for an analysis of the results in a discussion 6. Assess their desire to engage in fundamental engineering research at a graduate level or in industry **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Enhanced To develop continuously - Enhanced To communicate effectively - Enhanced
Module Content	Students will conduct practical tasks representative of the process of engineering research over the course of this module. These tasks will involve the analysis of a physical experiment and a numerical research problem. The task will involve the design of a novel approach to solve a chosen research challenge. Students will work both individually and in teams representing a research group and with a division of tasks amongst the members.

Teaching and Learning Methods

The module makes use of a blended learning environment, including online discussion forums, to aid the weekly lectures and tutorials. The module lecture programme is supplemented by both a detailed experimental data and a numerical research problem. The teaching strategy will prepare the students to undertake their final task of the module, designing their own approach to investigating a novel research question.

Assessment Details
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 (provisional)
Assignment 1	Literature review of defined engineering research question	1,2,6	25	Week 3
Assignment 2	Research proposal in response to research question	2-3	20	Week 6
Assignments 3	Video presentation of research proposal	4-5	20	Week 8
Assignments 4	Journal style write up of research question	2,4	35	Week 12

Reassessment Requirements

Written Examination

Contact Hours and Indicative Student Workload Error! Bookmark not defined.

Contact hours: 22 (22 Lectures)
Independent Study (preparation for course and review of materials): 40
Independent Study (preparation for assessment, incl. completion of assessment): 44

Recommended Reading List

Thiel DV. Research Methods for Engineers. Cambridge: Cambridge University Press; 2014.

Heard SB. The scientist's guide to writing: how to write more easily and effectively throughout your scientific career. Princeton University Press; 2022 Feb 8.

Eng Choon Leong, Carmel Lee-Hsia Heah, Kenneth Keng Wee Ong, Guide to Research Projects for Engineering Students: Planning, Writing and Presenting 1st Edition, CRC Press, 2015

Module Pre-requisite	NA
Module Co-requisite	NA
Module Website	X
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	
Academic Year of Date	