GMIT
INSTITIÚID TEICNEOLAÍOCHTA NA GAILLIMHE-MAIGH EO
GALWAY-MAYO INSTITUTE OF TECHNOLOGY

# MATH06023
# Engineering Mathematics 2 (Apprenticeship)

| | |
|---|---|
| **Full Title** | Engineering Mathematics 2 (Apprenticeship) |

| | | | |
|---|---|---|---|
| **Status** | Uploaded to Banner | **Start Term** | 2019 |
| **NFQ Level** | 06 | **ECTS Credits** | 05 |
| **Module Code** | MATH06023 | **Duration** | 15 weeks - (15 Weeks) |
| **Grading Mode** | Numeric | **Department** | Mechanical & Industrial Eng |

| | |
|---|---|
| **Module Author** | Paul ODowd |
| **Co Authors** | Clare Lundon, Aoife OBrien |

## Module Description

This module will provide students with a solid Statistics foundation relevant to a manufacturing engineer.

The module will develop the students' ability to analyse, solve and understand problems using relevant data in various applications in Manufacturing Engineering.

| | **Learning Outcomes**<br>***On completion of this module the learner will/should be able to:*** |
|---|---|
| 1. | Graphically display and numerically summarise data using methods of descriptive statistics. |
| 2. | Apply the rules of probability and use probability models for data analysis. |
| 3. | Compute and interpret point and interval estimates of population parameters. |
| 4. | Formulate and test hypotheses about a population mean and/or proportion. |
| 5. | Use mathematical and statistical techniques for fitting curves to data. |
| 6. | Construct and interpret control charts. |

## Indicative Syllabus

**Data Collection & Presentation**

Collection & presentation of data. Basic descriptive statistics. Histograms, box plots, stem & leaf plots. Calculation of summary statistics.

**Probability**

Classical, relative frequency and axiomatic definitions. Laws of probability, conditional probability, independent events, mutually exclusive events.

**Probability Distributions**

Random variables. Discrete and continuous distributions. Nature of probability density functions & cumulative density functions. Binomial, Poisson, normal, exponential distributions. Use of tables.

**Introduction to Sampling**

Sampling distribution of the mean and confidence intervals. Hypothesis testing.

**Curve Fitting**

Finite differences, Correlation, least squares regression, Lagrangian interpolation.

**Control Charts**

Common causes and assignable causes, control charts for the sample mean and the sample range. Tests for assignable causes.

**Teaching and Learning Strategy**

The teaching and learning strategy will include: direct-instruction strategy (including lecture, repeating an activity, review and feedback); activity-based strategy (including practice); cooperative strategy (including group work); ICT-based strategy (including the use of a virtual learning environment: Moodle and specific software); independent learning strategy (including homework and independent study); thinking-skills strategy (including problem solving, graphing).

**Assessment Strategy**

Engineering Mathematics 2 is a "Type 1" apprenticeship module. It is 100% assessed during the Academic Block.

A number of different assessment strategies will be used including: written assessments; assignments; Moodle quizzes; group work; problem and scenario-based exercises. Learning outcomes will be clearly linked to each assessment task.

Each student must get an overall grade of 40% to achieve the associated module learning outcomes.

**Repeat Assessment Strategies**

Students will be given the opportunity to take a repeat examination.

| **Indicative Coursework and Continuous Assessment:** | | **100 %** | | |
|---|---|---|---|---|
| ***Form*** | ***Title*** | ***Percent*** | ***Week (Indicative)*** | ***Learning Outcomes*** |
| Assessment | Self directed assessment | 20 % | OnGoing | 1,2,3,4,5,6 |
| Assignment | Tutorial tests | 20 % | OnGoing | 1,2,3,4,5,6 |
| Closed Book Exam | End of semester assessment | 60 % | End of Semester | 1,2,3,4,5,6 |

| **Full Time Delivery Mode Average Weekly Workload:** | | | **4.00 Hours** | | |
|---|---|---|---|---|---|
| ***Type*** | ***Description*** | ***Location*** | ***Hours*** | ***Frequency*** | ***Weekly Avg*** |
| Lecture | Lecture | Lecture Theatre | 2 | Weekly | 2.00 |
| Tutorial | Tutorial | Computer Laboratory | 2 | Weekly | 2.00 |

| **Part Time Delivery Mode Average Weekly Workload:** | | | **2.00 Hours** | | |
|---|---|---|---|---|---|
| ***Type*** | ***Description*** | ***Location*** | ***Hours*** | ***Frequency*** | ***Weekly Avg*** |
| Lecture | Lecture | Not Specified | 2 | Weekly | 2.00 |

**Recommended Reading Book List**

Montgomery, C., (2013). *Applied Statistics and Probability for Engineers, 6th Edition*. Wiley.

Walpole, E., (2011). *Probability and Statistics for Engineers and Scientists*. Pearson.

Bird, J., (2014). *Engineering Mathematics, 7th ed*. Routledge.

**Literary Resources**

**Higher Engineering Mathematics,** 7th Ed**.,** John Bird, ISBN**:** 978-0-415-66282-6 , Routledge 2014.

**Engineering Mathematics** 7th Ed., K.A. Stroud, Dexter J. Booth, ISBN-10: 1137031204, Palgrave Macmillan, 2013.

**Technical Mathematics** 6th Ed., Paul A. Calter, Michael A. Calter, ISBN 0-470-53492-2, Wiley, 2011

**Journal Resources**

**Online Resources**

learnonline.gmit.ie

http://www.mathtutor.ac.uk/

**Other Resources**

GMIT Maths Learning Centre

**Additional Information**

N/A

**Programme Membership**

GA_EMAJG_C06 201900 Higher Certificate in Engineering in Manufacturing Engineering (Apprenticeship)
GA_EMAJG_B07 201900 Bachelor of Engineering in Manufacturing Engineering (Apprenticeship)
GA_EMAPG_C06 201900 Higher Certificate in Engineering in Manufacturing Engineering (Apprenticeship)
GA_EMAPG_B07 201900 Bachelor of Engineering in Manufacturing Engineering (Apprenticeship)