Module Descriptor

Academic Session	2023/24
Module Title	Basic Mathematics
MTC Module Code	MTCG1016
MTC Owning Department	Foundation Programme Department
MTC Module Coordinator	Mr. Rajendar Palli

Term Taught	1
Notional Hours	100
Scheduled Hours	55

Overview

This module helps students to bridge the gap in mathematical skills between Foundation and Engineering courses. It is common to all engineering students and is aimed at preparing the students to have a common foundation of basic mathematics skills that will enable the students to solve pure mathematics and engineering problems as well as to understand other mathematics courses they will do in their engineering curricula.

Notes/Accreditation Information

The contents of this module meet the requirements of OAAAQA GFP standards (Oman Academic Accreditation Authority and Quality Assurance of Education, 4.2.1 - a, b, c, d, e, f, g, j, k, l, m, n, o) and the EASA (European Aviation Safety Agency) Part 66 Module 1 for Licensed Aircraft Engineering, 1.1, 1.2a, 1.3a, 1.3b and 1.3c, except for their assessment strategies.
Contribution to ROSQA Learning Outcomes: (Knowledge (K), Cognitive Skills (CS), General Competencies (GC)):
The attributes delivered in this module are designed to meet ROSQA Learning Outcomes for OQF Level 1 (Certificate).

Requisite Modules	
Module Title	**MTC Code**
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Aims (10 max)	
1.	To ensure that students are equipped with the mathematical understanding and skills necessary to meet the cognitive and practical requirements of postsecondary or higher education studies in a variety of disciplines.
2.	To provide the knowledge on fundamentals in elementary mathematics and familiarize with its terminology.
3.	To develop the student's mental mathematical skills.
4.	To apply mathematical concepts and procedures to some real-life problems.

Learning Outcomes (Recommended 6) – On successful completion of this module, students should be able to:	
1.	Describe the set of real numbers, all its subsets and their relationship.
2.	Identify and use the arithmetic properties of subsets integers, rational, irrational numbers.

3.	Demonstrate an understanding of the exponent laws, and apply them to simplify expressions and manipulate fractions, ratios, decimals and percentages.
4.	Simplify rational expressions by rationalizing numerators or denominators.
5.	Solve linear equations, equations involving radicals, fractional expressions and inequalities.
6.	Perform operations on polynomials and manipulate numerical and polynomial expressions.
7.	Use the quadratic formula to find roots of second-degree polynomial equations.
8.	Understand measurements and conversion from one unit to another, Scientific notation.
9.	Translate worded problems into mathematical expressions and model simple real-life problems with equations and inequalities.
10.	Know the relationship between degree and radian measure of an angle and find the length of a circular arc and the area of a sector.
11.	Understand trigonometric and circular functions and use the fundamental trigonometric identities in various problems.
12.	Solve right angled triangles using angles of elevation and depression.
13.	Apply knowledge of basic algebra and trigonometry in real life problems.
14.	Use coordinate plane to solve algebraic and geometric problems and understand geometric concepts such as equation of a circle, perpendicular, parallel, and tangent lines.
15.	Use the three types of symmetry of an equation to sketch its graph.

Syllabus (10 max.) - The topics covered in the unit will include:	
1.	**Number System** • Sequence of Arithmetic Operations and Laws • Basic Theory of Numbers • Directed numbers and properties of numbers
2.	**Set Theory** • Definition of a Set, types of sets • Subsets • Cardinality • Complement of a set • Union and intersection of sets • Venn Diagrams
3.	**Basic Arithmetic** • Factors and Multiples • Highest Common Factor (HCF) & Lowest Common Multiple (LCM) • Addition and Subtraction of Fractions • Multiplication and Division of Fractions • Decimals (addition, subtraction, multiplication and division) • Scientific Notation (Multiplication and Division) • Percentages • Ratio and Proportion
4.	**Basic Algebra (Part-1)** • Power Number algebra and laws of Indices • Algebra- Use of symbols & Substitution • Polynomials • Addition and subtraction of polynomials • Multiplication of polynomials • Brackets & Factorisation of polynomials
5.	**Basic Algebra (Part-2)**

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	• Simplify rational expressions • Rationalize numerators and denominators
6.	**Linear Equations, Radicals and Inequalities** • Solve linear and simultaneous linear equations • Solve equations involving radicals • Inequalities
7.	**Quadratic Equations** • Solve Quadratic Equation • Formation of quadratic equation
8.	**Units and Measurements** • Conversions from one unit to another unit
9.	**Modelling simple real life problems** • Word problems on Equations • Word problems on Inequalities • Formula Transposition/subject change in formula
10.	**Measure of Angle** • Types of Angles, Basic theory of angles in a plane • Conversion from radian to degree • Conversion from degree to radian • Length of the arc • Area of the sector
11.	**Trigonometry** • Circular Trigonometric Functions. • Trigonometric identities (sine, cosine and tangent) • Problem solving using trigonometric ratios between 0° and 360°
12.	**Right Angle Triangle** • Problems on angle of Elevation • Problems on angle of depression
13.	**Trigonometry in real life problems** • Pythagoras Theorem Problems • Trigonometric Graphs
14.	**Coordinate Plane Geometry** • Represent the Equation of a Straight Line and solve problems involving the components of the equation (meaning of **m** & **c**) • Parallel and Perpendicular lines • Draw graph of the straight line function based on its equation. • Equation of Circles (Centre and radius of the circle, Formation of the equation of circle) • Draw graph of the circle
15.	**Graph Sketching** • Three types of symmetry of the graph of an equation. • Sketching the graphs of straight lines and simple curves.

Learning and Teaching Strategy

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The module will be delivered in one term through five contact hours per week via presentations, lectures and remedial classes/tutorials. The module adopts an integrated / a student-centered approach to learning & teaching.
Students will be provided with comprehensive teaching/learning material, worked examples in class and problem sheets to develop their skills.
Students will undertake Guided Self Study including the use of the VLE, and directed to resources such as online tutorials, notes, interactive presentations and simulations, including use of videos etc.
Practice Quizzes with feedback, will be given throughout the module in the Moodle to help the student to prepare for the summative assessment of the module.

Scheduled Activities						
#	**Activity Type**	**QAA Activity**	**Description**	**No. of sessions**	**Duration**	**Hours**
1.	Lecture	Lecture	4 hours per week	44	50 minutes	44
2.	Tutorial	Tutorial	1 hour per week	11	50 minutes	11

Assessment Strategy and Schedule

The module will be assessed through formative and summative assessments, namely: Continuous Assessment-1 (CA1), Continuous Assessment-2 (CA2), and the Final Exam.
The Generic feedback on CA1 & CA2 will be provided to the students through Moodle/ Module Teacher. Generic feedback on the Final Exam will also be provided on Moodle.

The minimum passing mark is overall 50%.
Deferred First Attempt Assessment (DFAA): DFAA for Continuous Assessment 1, 2 and final exams will be a different set of exams but will cover the same Learning Outcomes of exam(s) missed. The deferred assessment will also have the same exam duration as the first attempt assessment.
Second Attempt Assessment (SAA/Re-sit) will be 90 minutes examination to cover all Learning Outcomes.
The maximum marks obtained by the students will be capped at 50% (minimum passing requirements).

Item	Assessment	Artefact Code	Weighting	Assessment Type	Final Artefact	Description
1.	CA1	BMA1	20%	Written Exam	N	30 Minutes duration
2.	CA2	BMA2	30%	Written Exam	N	45 Minutes duration
3.	Final Exam	BMA3	50%	Written Exam	Y	75 Minutes duration

	Indicative Reading		
	Title/Edition/Author	**Publisher**	**ISBN**
1	***College Algebra with Trigonometry,*** (9^{th} Edition 2010), Raymond A. Barnett,	McGraw Hill	9780077350109

	Michael Ziegler and Karl Byleen, David Sobecki,		
2	***Basic Engineering Mathematics,*** (8th Edition 2021*),* Bird J.	Routledge	9780367643676
3	***Engineering Mathematics***, (8th Edition 2020), Stroud K.A and Booth D.J,	Red Globe Press	9781352010275