Module Information
معلومات المادة الدراسية

Module Title	**Engineering Mathematics**	**Module Delivery**	
Module Type	**Core**	☒Theory ☒ Lecture ☐ Lab ☒Tutorial ☐ Practical ☒ Seminar	
Module Code	**CYBT104**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	1	**Semester of Delivery**	2
Administering Department		**College**	TECCAIK
Module Leader		**e-mail**	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	31/12/2025	**Version Number**	1.0

Relation with other Modules

Prerequisite module		**Semester**	
Co-requisites module	Discrete Math (CYBT205)	**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Enhance Problem-Solving Skills: Develop the ability to analyze and solve mathematical problems using appropriate strategies, techniques, and mathematical reasoning. 2. Foster Mathematical Thinking: Cultivate critical thinking and logical reasoning skills necessary for understanding and applying mathematical concepts and principles. 3. Promote Conceptual Understanding: Develop a deep understanding of mathematical concepts, including algebra, geometry, statistics, and probability, by exploring their properties, relationships, and applications. 4. Cultivate Mathematical Modeling Skills: Apply mathematical concepts and techniques to real-world problems, formulate mathematical models, and interpret and analyze the results. 5. Promote Mathematical Technology Literacy: Utilize technology tools, such as calculators, graphing software, and spreadsheets, to enhance mathematical understanding, visualization, and problem solving.
Module Learning Outcomes	1. Numeracy Skills: Develop the ability to work with numbers, perform calculations, and solve mathematical problems accurately and efficiently. 2. Mathematical Reasoning: Develop logical thinking and problem-solving skills to analyze and solve mathematical problems using appropriate strategies and techniques. 3. Mathematical Communication: Express mathematical ideas and concepts clearly and effectively using mathematical language, symbols, and diagrams. 4. Mathematical Modeling: Apply mathematical concepts and techniques to real-world situations and formulate and solve problems using mathematical models. 5. Algebraic Reasoning: Understand and apply algebraic concepts and methods to analyze patterns, relationships, and functions. 6. Geometric and Spatial Reasoning: Understand and analyze geometric shapes, properties, and spatial relationships using visual representations, diagrams, and proofs.

Learning and Teaching Strategies

Strategies	1. Lectures and Presentations: Lectures are commonly used to present foundational concepts, theories, and methodologies in engineering analysis. 2. Practical Assignments and Problem-Solving Exercises: Hands-on assignments and problem-solving exercises allow students to apply the concepts learned in class to real-world engineering problems. 3. Case Studies and Real-World Examples: Presenting case studies and real-world examples helps students connect theoretical concepts with practical applications. By analyzing and discussing real-world engineering 4. Group Projects and Collaborative Learning: Group projects encourage collaboration and teamwork among students.

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	5.8
Total SWL (h/sem)	**150**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	2,4,6,7	LO #1, #2 and #9
	Assignments	9	10% (10)	1,2,3,4,5,6, 7,8,9	LO #1, #4,#5, #6,#7,#8,#9 and #6, #7
	Reading	2	5% (5)	5,7	LO #10, #12,#13
	Report	1	5% (5)	2	LO #5, #8 and #10
	Web Based Learning	4	5% (5)	1,5,8,10	LO #5, #8 ,#9 and #10
	Seminar	1	5% (5)	8	LO #9, #13
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

Summative assessment	**Final Exam**	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Matrix and Determinants • Matrix, properties, and operations • Determinants and properties of determinants
Week 2	**Matrix and Determinants** • Inverse of square matrix by determinants. • Solving linear System equations using the inverse of the coefficient matrix and Cramer's rule.
Week 3	**Review of Functions** • Algebraic functions. • Review of natural logarithm, the exponential function, trigonometric functions, inverse trigonometric functions and hyperbolic functions.
Week 4	**Derivatives** • Derivatives formula and chain rule. • Derivatives of natural logarithm, the exponential function.
Week 5	**Derivatives** • trigonometric functions , inverse trigonometric functions and hyperbolic functions • Applications of differentiation.
Week 6	**Integration** • Review of Integration, Indefinite and Definite Integral • Applications of integration.
Week 7	**Integration** • approximation (trapezoidal rule, Simpson's rule) • Area between curves.
Week 8	**Techniques of integration** • Basic integration formulas. • Integration by parts.

Week 9	**Techniques of integration** • Partial fractions. • Trigonometric substitutions. • Improper integral.
Week 10	**Applications of integration** • Volume and solid revolution • Length of plane curves.
Week 11	**Vectors** • Vectors – The Basics • Vector Arithmetic
Week 12	**Vectors** • Dot product • Cross product • Applications.
Week 13	**Complex numbers** • Complex numbers in Cartesian coordinates and polar from. • linear algebra for complex number in polar and Cartesian.
Week 14	**Linear Algebra** • Euler's formula. • DeMoivre's theorem to find powers and the nth roots of given complex numbers.
Week 15	**Review**
Week 16	**Final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Calculus I, Paul Dawkins, 2007.	Yes
Recommended Texts	Advance Engineering Mathematics, Alan Jeffrey, 2002.	Yes
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	(45-49)	More work required but credit awarded
	F – Fail	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.