



Universiti Teknologi Brunei

Module Specification

Faculty of Engineering

Last update: 7 August 2017

1. Module Title

Engineering Mathematics 1

2. Module Code

SM1101

3. Number of Credits

10

4. Level

1

5. Semester

1

6. Pre-requisites for admission to the module (if any)

Normal entry requirements

7. Module Coordinator (s)

Dr. D. S. Sankar

8. Aim

To introduce the basic calculus, complex numbers, hyperbolic functions, vector algebra and matrices, and their applications to various engineering fields.

9. Summary of Contents

Differential Calculus: Differentiation of functions from first principles, Differentiation of product and quotient of two functions, Differentiation of functions by the chain rule, Differentiation of Implicit and parametric functions, Higher derivatives, Polar, cylindrical and spherical coordinates, Single variable Taylor series, Linear approximation to Taylor series.

Partial differentiation: First and second order partial derivatives Small changes in variables, total derivative, Multivariable Taylor series, Tangent plane to a surface, Determination of maxima and minima of functions, Maximum power transfer theorem, applications of differentiation.

Integral Calculus: Integration as the anti-derivative, Definite and indefinite integrals, Integration by substitution, and by parts, Integration using partial fractions, Reduction formulae, Length of a curve, area under and between curves, Volume of solid of revolution, Mean and root-mean-square values, Double integration and their applications.

Complex numbers: Rectangular form, Sum, difference, product and quotients of complex numbers, Argand diagram, Polar form, De Moivre's theorem, Roots, powers and exponential form, Application of complex numbers.

Hyperbolic functions: Definitions, graphs and inverses, Differentiation and integration of hyperbolic functions, Evaluation of hyperbolic functions with complex arguments and solutions of equations involving hyperbolic function.

Vectors: Vector geometry, Addition and subtraction of vectors, Unit vector, Scalar and vector products. Triple product of vectors.

Matrices: Addition, subtraction and multiplication of matrices, Inverse of a matrix, Determinant of a matrix, Solutions of system of linear equations by Cramer's rule and by using inverse matrix, Eigenvalues and eigenvectors of matrices, and their applications in engineering problems.

10. Module Intended Learning Outcomes

Upon successful completion of this module, students will be able to:

No.	MILOs	Weightage
1	understand the basic concepts/methods in differential calculus and how they are used to describe the engineering problems.	20
2	analyse the formation of integration formulas of finding the length of a curve, area enclosed between curves, surface of revolution or	40
3	apply the concepts of differential and integral calculus and vectors algebra to solve the engineering problems, such as finding works	20
4	formulate electric circuit problems to build linear mathematical models using the concepts of complex numbers and matrices and	20

11. Teaching Learning Activities (TLAs)

MILO No.	TLAs	Functions	Hours/Week
1, 2, 3, 4	Lectures	Teaching and learning will be based on the lectures in various mathematical concepts and methods and their applications in various fields of engineering.	2
1, 2, 3, 4	Tutorials	Teaching and learning will be based on problem solving using various methods.	2

12. Assessment Tasks/Activities

MILO No.	Type of Assessment Tasks/Activities		Weightage (%)
1, 2	Course work	Quiz : 1	10
1, 2, 3, 4		Phase test: 1	15
1, 2, 3, 4		Assignment: 1	5
1, 2, 3, 4	University exam		70

In addition to the ITB minimum requirement to pass the module, a minimum of 30% marks, each in Coursework and University examination of the module, is also required to pass the module.

13. Attendance Requirements

Students are expected to attend all Lectures, Tutorials and Laboratory sessions. Penalty may be applied in case of students who miss any laboratory session without good cause.

14. Contribution to Programme Learning Outcomes

		Knowledge & Understanding	Application	Analysis & Evaluation	Creativity & Design
Maths and Science	Underpinning Science and Mathematics for the study of Engineering	√	√	√	
Core Engineering	The main principles and core subjects of the relevant Engineering Discipline		√		
Computing and IT	Computer-based methods for the analysis and modeling of Engineering problems	√		√	
Communication Skills	Communicate effectively using a variety of techniques both written and oral		√		
Engineering Practice	Practical application of engineering skills combining theory and experience				
Design	Creation, design and development of a product, process or system				
Management & Economics	Management and financial methods to achieve objectives in production and projects				
Social & Environmental	Professional and ethical conduct; sustainable development; health and safety; environmental impact				

15. Grading of Students Achievement

Letter Grade	% Marks	Grade definitions
A+	90-100	Excellent
A	85-89	
A-	80-84	
B+	75-79	Good
B	70-74	
B-	65-69	
C+	60-64	Adequate
C	55-59	
C-	50-54	
D+	45-49	Marginal
D	40-44	
F(fail)	<40	Fail

16. Resources

Primary text (s)

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
2	B. S. Grewal and J. S. Grewal	2014	Higher engineering Mathematics	43e	Khanna Publishers	8174091955
1	John Bird	2006	Higher Engineering Mathematics	5e	Newnes	978-0-7506-8152-0

Secondary text (s)

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
1	K. A. Stroud	2007	Engineering Mathematics	6e	Mac Millan	0-333-62022-4
2	E. Kreyszig	2006	Advanced Engineering Mathematics	9e	Wiley Int. Edition	0-471-72897-7

Online Resources

<http://tutorial.math.lamar.edu/>

<http://ocw.mit.edu/courses/#mathematics>