

Department of Mathematics, Faculty of Applied Science
King Mongkut's University of Technology North Bangkok (KMUTNB)
Course Syllabus: 040283111 Engineering Mathematics I
Semester 1, Academic Year 2024

Course Title: 040283111 Engineering Mathematics I

Credits: 3(3-0-6)

Prerequisite: None

Learning Objectives:

By the end of this module learners must be able to:

1. Understand basic concepts of function, parametric equations and polar coordinates.
2. Understand the concepts and fundamental theorems of calculus of one-variable: limit and continuity; derivative; integral; differentiation and integration techniques; some applications of differentiation and integration in sciences and engineering situations.
3. Apply the obtained knowledge to study further in the area of interesting for each student.

Course Description:

Function, limit and continuity, derivative, differentiation of real-valued functions of a real variable, parametric equation, applications of derivative, indeterminate forms, integral, techniques of integration, applications of integral, Improper integral.

Reading List

Core reading book:

The main parts of the course are contained in

“Deborah Hughes-Hallett, Andrew M. Gleason, William G. McCallum, Daniel E. Flath and Patti Frazer Lock (2019) *Calculus: Single and Multivariable, Asia Edition, 7th ed.*, Asia: John Wiley and Sons Asia. (ISBN: 978-1-119-58573-2).”

Supplementary reading and study material:

1. Dennis G. Zill and Warren S. Wright (2011) *Calculus Early Transcendentals, 4th ed.*, Jones & Bartlett.
2. James Stewart (2012) *Calculus 7th ed. (Metric Version)*, Canada: Brooks/Cole CENGAGE Learning. (QA303 S738 2012).
3. George B. Thomas, Jr., Ross L. Finney, Maurice D. Weir and Frank R. Giordano (2003) *Thomas' Calculus 10th ed.*, Boston: Addison-Wesley. (QA303 T456 2003).
4. Howard Anton, Irl Bivens and Stephen Davis (2002) *Calculus with Analytic Geometry 7th ed.*, New York: John Wiley and Sons. (QA303 A5766c 2002).

Note: Students can use other textbooks which include calculus topics as similar to the topics in the teaching outline for each week.

Lecturers:

No.	Lecturer's Name	Section	Study Time	Class Room	Office Hour
1	Dr. Donny Passary (DPR)	1	M 09.00-12.00	81-428	(78-510) H 13.00-16.00 F 09.00-12.00
2	Asst.Prof. Dr. Panumart Sawangtong (PST)	2	H 09.00-12.00	89-502	(78-1004) M 13.00-16.00 F 13.00-16.00
3	Assoc.Prof. Dr. Pongpol Juntharee (PJT)	3	F 13.00-16.00	81-428	(78-505) W 09.00-12.00 H 13.00-16.00

Assessments:

Midterm examination	40 %
Final examination	40 %
During the course	
Assignments 4 times	20 %

Teaching / Learning Activities:

Week No.	Learning Topics	Topics in the Core Reading Book	Supplementary Activities
1	Review of Functions	1.1 Functions and change 1.2 Exponential functions 1.3 New functions from old 1.4 Logarithmic functions 1.5 Trigonometric functions 1.6 Powers, Polynomials, and Rational functions	
2	Limit of a Function	1.7 Introduction to limits and continuity 1.8 Extending the idea of a limit 1.9 Further limit calculations using Algebra	Self-Study Topics: 1.10 Optional preview of the formal definition of a limit
3	The Derivative	2.2 The Derivatives at a point 2.3 The Derivative function 2.4 Interpretations of the derivative 2.5 The second derivative 2.6 Differentiability	Self-Study Topics: 2.1 How do we measure speed?
4	The Derivative (Cont.)	3.1 Powers and Polynomials 3.2 The Exponential Function 3.3 The Product and Quotient Rules 3.4 The Chain Rule 3.5 The Trigonometric Functions	-
5	The Derivative (Cont.)	3.6 The chain rule and inverse functions 3.7 Implicit functions 3.8 Hyperbolic functions	Self-Study Topics: 3.10 Theorems about differentiable functions
6	Applications of the Derivatives	3.9 Linear approximation and the derivative 4.1 Using first and second derivatives	-
7	Applications of the Derivatives (Cont.)	4.2 Optimization 4.3 Optimization and Modeling 4.6 Rates and related rates	Self-Study Topics: 4.4 Families of functions and Modeling 4.5 Applications to marginality
8	Applications of the Derivatives (Cont.)	4.7 L'Hopital's rule, growth, and dominance 4.8 Parametric Equations	

<i>Week No.</i>	<i>Learning Topics</i>	<i>Topics in the Core Reading Book</i>	<i>Supplementary Activities</i>
Midterm Examination (Date: August 26th, 2024; Time: 09:00 – 12:00)			
<i>Week No.</i>	<i>Learning Topics</i>	<i>Topics in the Core Reading Book</i>	<i>Supplementary Activities</i>
9	Integrals	5.2 The Indefinite Integral 5.3 The fundamental theorem and interpretations 5.4 Theorems about definite Integrals 6.2 Constructing antiderivatives analytically 6.4 Second fundamental theorem of calculus	Self-Study Topics: 5.1 How do we measure distance traveled? 6.1 Antiderivatives graphically and numerically 6.3 Differential equations and motion
10	Techniques of Integration	7.1 Integration by substitution 7.2 Integration by parts	Self-Study Topics: 7.3 Table of integrals
11	Techniques of Integration	7.4 Algebraic identities and trigonometric substitutions	Self-Study Topics: 7.5 Numerical methods for definite integrals
12	Improper Integrals	7.6 Improper integrals	Self-Study Topics: 7.7 Comparison of improper integrals
13	Applications of the Integrals	8.1 Area and volumes	–
14	Applications of the Integrals (Cont.)	8.2 Applications to geometry	Self-Study Topics: 8.3 Area and ARC length in polar coordinates 8.4 Density and center of mass 8.5 Applications to physics
15	Applications of the Integrals (Cont.)	8.2 Applications to geometry	Self-Study Topics: 8.6 Applications to economics 8.7 Distribution Functions 8.8 Probability mean, and median
Final Examination (Date: October 28th, 2024; Time: 09:00 – 12:00)			

Contact Channels:

No.	Lecturer's Name	Section	Email address
1	Dr. Donny Passary (DPR)*	1	donny.p@sci.kmutnb.ac.th
2	Asst.Prof. Dr. Panumart Sawangtong (PST)	2	panumart.s@sci.kmutnb.ac.th
3	Assoc.Prof. Dr. Pongpol Juntharee (PJT)	3	pongpol.j@sci.kmutnb.ac.th

*Course coordinator