

COURSE SPECIFICATION

FACULTY OF SCIENCE AND TECHNOLOGY DIVISION OF COMPUTING SCIENCE AND DIGITAL TECHNOLOGY

SEMESTER 1st ACADEMIC YEAR 2025

HUACHIEW CHALERMPRAKIET UNIVERSITY

PART 1: General Information

1. **Code- Course Title and Credits:** MA1123 Introduction to Calculus Credit: 3 (3/3-0-0)
Course Name at KMITL: 1006710 INTRODUCTION TO CALCULUS 3 Credits
Teaching Hours per Semester: 45 hours.....
2. **Program or Course Type:** B1. Fundamental Courses
3. **Level and Year of study:** 1st year of B.Sc. Health Robotics (058)
4. **Prerequisite:** -
5. **Co-requisite:** -
6. **Name of Instructor:** Assoc.Prof.Dr.Puttha Sukkapalangkul (KMITL).....
Name of Co-instructors:-.....
7. **Course Venue:** .. Room HM – 402 Time: Thuesdat 01.00 – 02.30 p.m. & 03.00 – 04.30 p.m. ...
8. **Last modification date of the course:**23 June 2025.....
9. **Office Hours:**Room SC04 209 (School of Science) By Appointment

PART 2: Objectives & Learning Outcomes

1. Course Objectives:

1. Learner can describe and classify functions and draw graphs showing equations of functions.
2. Learner can explain the definition and theorem of limits and continuity of functions. As well as applying these definitions and theorems to find solutions to related problems.
3. Learner can apply the derivative of a function to find the optimum value of a system or phenomenon related to engineering work.
4. Learner can demonstrate procedures for performing and solving problems involving definite integrals and irregular integrals.
5. Learner can apply definite integrals to find the area under the graph and the volume of solid shapes.
6. Learner can identify infinite series and tests convergence of series.

7. Learner can explain the form of Taylor series and shows how Taylor series distributions of basis functions can be performed.

8. Learner can demonstrate responsibility and is punctual to class and assignments.

2. Course Description:

This course covers basic Calculus, including a study of Function, limit, continuity and their applications, mathematical induction, introduction to derivative, differentiation, applications of derivative, definite integrals, antiderivative integration, application of definite integral, indeterminate forms, improper integrals, numerical integration, sequences and series of numbers, Taylor series expansions of elementary functions vector analysis.

3. Course-level Learning Outcomes (CLOs):

Upon completion of this course, learners should be able to:

CLO1 Describe and classify functions and draw graphs showing equations of functions.

CLO2 Explain the definition and theorem of limits and continuity of functions. As well as applying these definitions and theorems to find solutions to related problems.

CLO3 Apply the derivative of a function to find the optimum value of a system or phenomenon related to engineering work.

CLO4 Demonstrate procedures for performing and solving problems involving definite integrals and irregular integrals.

CLO5 Apply definite integrals to find the area under the graph and the volume of solid shapes.

CLO6 Identify infinite series and tests convergence of series.

CLO7 Explain the form of Taylor series and shows how Taylor series distributions of basis functions can be performed.

CLO8 Demonstrate responsibility and is punctual to class and assignments.

4. The Alignment between Program Learning Outcomes (PLOs) and Course-level Learning Outcomes (CLOs):

PLOs/CLOs	CLO 1	CLO 2	CLO 3	CLO 4	CLO 5	CLO 6	CLO 7	CLO 8
PLO 1: Explain knowledge of mathematics, science, engineering, and health science	✓ (Understand)	✓ (Understand)	✓ (Understand)	✓ (Understand)	✓ (Understand)	✓ (Understand)	✓ (Understand)	
PLO 8: Learn a wide range of sciences and knowledge related to robotics to understand the impact on the economy, environment and society	✓ (Understand)	✓ (Understand)	✓ (Apply)	✓ (Analyze)	✓ (Apply)	✓ (Understand)	✓ (Understand)	✓ (Understand)

PART 3: The Development of Student Learning Outcomes

Course Learning Outcomes (CLOs)	Teaching Strategies	Assessment Strategies
CLO1 Describe and classify functions and draw graphs showing equations of functions. (understand)	Teach by introducing the concept of a function and draw graphs showing equations of functions. - Use Learning and Innovation Skills C1: Creativity and Innovation C2: Critical Thinking and Problem Solving C3: Communication C4: Collaboration	1.Assignments & Homework 2. Midterm examinations
CLO 2: Explain the definition and theorem of limits and continuity of functions. As well as applying these definitions and theorems to find solutions to related problems.	Teach by explaining the definition and theorem of limits and continuity of functions. As well as applying these definitions and theorems to find solutions to related problems.	1.Assignments & Homework 2. Midterm examinations
CLO 3: Apply the derivative of a function to find the optimum value of a system or phenomenon related to engineering work.	1. Stimulate students to critical thinking and guide students to apply the derivative of a function to find the optimum value of a system or phenomenon related to engineering work. 2. Encourage students to learn the content independently through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic.	1.Assignments & Homework 2. Midterm examinations 3. In-class Practice & Participation
CLO 4: Demonstrate procedures for performing and solving problems involving definite	Teach by demonstrating procedures for performing and solving problems involving	1.Assignments & Homework 2. Midterm and final examinations 3. In-class Practice & Participation

integrals and irregular integrals.	definite integrals and improper integrals.	
CLO 5: Apply definite integrals to find the area under the graph and the volume of solid shapes.	1. Stimulate students to critical thinking and guide students to definite integrals to find the area under the graph and the volume of solid shapes. 2. Encourage students to learn the content independently through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic.	1. Assignments & Homework 2. Final examinations 3. In-class Practice & Participation
CLO6 Identify infinite series and tests convergence of series.	Teach by explaining the Identify infinite series and tests convergence of series.	1. Assignments & Homework 2. Final examinations
CLO7 Explain the form of Taylor series and shows how Taylor series distributions of basis functions can be performed.	Teach by explaining the form of Taylor series and shows how Taylor series distributions of basis functions can be performed.	1. Assignments & Homework 2. Final examinations
CLO8 Demonstrate responsibility and is punctual to class and assignments.	Set firm assignment deadlines.	Assignments & Homework

PART 4 :Teaching Plan and Evaluation

4.1 Teaching Plan

Week	Topics / Details	Course Learning Outcomes (CLOs)	Learning Activities and Materials	Hours (Lecture/ Practice)	Instructor
1 1/07/25	Chapter 1: Function (1.1 – 1.4)	CLO 1 , 8	Teach by introducing the concept of a function and	3-0-0	Assoc.Prof.Dr. Puttha

Week	Topics / Details	Course Learning Outcomes (CLOs)	Learning Activities and Materials	Hours (Lecture/ Practice)	Instructor
			draw graphs showing equations of functions. - Use Learning and Innovation Skills C1: Creativity and Innovation C2: Critical Thinking and Problem Solving C3: Communication C4: Collaboration		Sukkapalangkul
2 8/07/25	Chapter 2: Limits and continuity (2.1 – 2.6)	CLOs 2, 8	Teach by explaining the definition and theorem of limits and continuity of functions. As well as applying these definitions and theorems to find solutions to related problems. - Use Learning and Innovation Skills C1: Creativity and Innovation C2: Critical Thinking and Problem Solving C3: Communication C4: Collaboration	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul
3 15/07/25	Chapter 3: Derivatives (3.2 – 3.5)	CLO 3, 8	1. Stimulate students to critical thinking and guide students to apply the derivative of a function to find the optimum value of a system or phenomenon related to engineering work. 2. Encourage students to learn the content independently	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul

Week	Topics / Details	Course Learning Outcomes (CLOs)	Learning Activities and Materials	Hours (Lecture/ Practice)	Instructor
			through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic.		
4 22/07/25	Chapter 3: Derivatives (3.6 – 3.7)	CLO 3, 8	1. Stimulate students to critical thinking and guide students to apply the derivative of a function to find the optimum value of a system or phenomenon related to engineering work. 2. Encourage students to learn the content independently through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic.	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul
5 29/07/25	Chapter 3: Derivatives (3.8 – 3.10)	CLO 3, 8	1. Stimulate students to critical thinking and guide students to apply the derivative of a function to find the optimum value of a system or phenomenon related to engineering work. 2. Encourage students to learn the content independently through online resources or readings before class.	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul

Week	Topics / Details	Course Learning Outcomes (CLOs)	Learning Activities and Materials	Hours (Lecture/ Practice)	Instructor
			3. Conduct realistic simulations or real-life experiences in teaching some topic.		
6 5/08/25	Chapter 4: Application of Derivatives (4.3 – 4.6)	CLO 4, 8	Teach by demonstrating procedures for performing and solving problems involving definite integrals and improper integrals.	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul
7 12/08/25	Chapter 7: Transcendental Functions (7.1 – 7.3)	CLO 1, 8	Teach by introducing the concept of a function and draw graphs showing equations of functions.	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul
8 19/08/25	Chapter 5: Integrals (5.1 – 5.4)	CLOs 4, 5, 8	1. Stimulate students to critical thinking and guide students to definite integrals to find the area under the graph and the volume of solid shapes. 2. Encourage students to learn the content independently through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic.	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul
Midterm Exam: 27 August 2025					
9 2/09/25	Chapter 5: Integrals (5.5 – 5.6)	CLOs 4, 5, 8	1. Stimulate students to critical thinking and guide students to definite integrals to find the area under the	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul

Week	Topics / Details	Course Learning Outcomes (CLOs)	Learning Activities and Materials	Hours (Lecture/ Practice)	Instructor
			graph and the volume of solid shapes. 2. Encourage students to learn the content independently through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic.		
10 9/09/25	Chapter 6: Applications of Definite Integrals. (6.1)	CLOs 4, 5, 8	1. Stimulate students to critical thinking and guide students to definite integrals to find the area under the graph and the volume of solid shapes. 2. Encourage students to learn the content independently through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic.	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul
11 16/09/25	Chapter 6: Applications of Definite Integrals. (6.2 – 6.3)	CLOs 4, 5, 8	1. Stimulate students to critical thinking and guide students to definite integrals to find the area under the graph and the volume of solid shapes. 2. Encourage students to learn the content independently	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul

Week	Topics / Details	Course Learning Outcomes (CLOs)	Learning Activities and Materials	Hours (Lecture/ Practice)	Instructor
			through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic.		
12 23/09/25	Chapter 6: Applications of Definite Integrals. (6.4 – 6.5)	CLOs 4, 5, 8	1. Stimulate students to critical thinking and guide students to definite integrals to find the area under the graph and the volume of solid shapes. 2. Encourage students to learn the content independently through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic. - Use Learning and Innovation Skills C1: Creativity and Innovation C2: Critical Thinking and Problem Solving C3: Communication C4: Collaboration	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul
13 30/09/25	Chapter 8: Techniques of Integration. (8.1 – 8.4)	CLOs 5, 8	1. Stimulate students to critical thinking and guide students to understand about techniques Integral. 2. Encourage students to learn the content independently	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul

Week	Topics / Details	Course Learning Outcomes (CLOs)	Learning Activities and Materials	Hours (Lecture/ Practice)	Instructor
			through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic. - Use Learning and Innovation Skills C1: Creativity and Innovation C2: Critical Thinking and Problem Solving C3: Communication C4: Collaboration		
14 7/10/25	Chapter 8: Techniques of Integration. (8.5, 8.8)	CLOs 5, 8	1. Stimulate students to critical thinking and guide students to understand about techniques Integral. 2. Encourage students to learn the content independently through online resources or readings before class. 3. Conduct realistic simulations or real-life experiences in teaching some topic. - Use Learning and Innovation Skills C1: Creativity and Innovation C2: Critical Thinking and Problem Solving C3: Communication C4: Collaboration	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul

Week	Topics / Details	Course Learning Outcomes (CLOs)	Learning Activities and Materials	Hours (Lecture/ Practice)	Instructor
15 14/10/25	Chapter 10: Infinite Sequence and Series	CLOs 6, 7, 8	1. Teach by explaining the Identify infinite series and tests convergence of series. 2. Teach by explaining the form of Taylor series and shows how Taylor series distributions of basis functions can be performed. - Use Learning and Innovation Skills C1: Creativity and Innovation C2: Critical Thinking and Problem Solving C3: Communication C4: Collaboration	3-0-0	Assoc.Prof.Dr. Puttha Sukkapalangkul
Final Exam: 22 October 2025					

4.2. Learning Outcomes Evaluation Plan

Course Learning Outcomes (CLOs)	Evaluation Methods (Report, Project, Quiz, Midterm, and Final examinations)	Evaluation Date & Time	Percentage
CLOs 3,4,5	In-class practice and participation	All Weeks	10%
CLOs 1,2,3,4,5,6,7,8	Assignment & Homework	All Weeks	20%
CLOs 1,2,3,4	Midterm Exam (Chapters III-V)	27/08/25	35%
CLOs 4,5,6,7	Final Exam (Chapters VIII-X)	22/10/25	35%
			100%

PART 5: Learning Resources

1. References

Thomas's Calculus: Early Transcendental in SI Units (14th Edition) Author: George B. Thomas, Jr.

2. Recommended supplementary, multimedia, and learning materials

HCU e-learning MA1123

PART 6 :Course Evaluation and Improvement

1. Students' Course Effectiveness Evaluation

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2. Teaching Evaluation Methods

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3. Teaching Improvement Methods

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4. Review of Learning Achievement and Outcomes

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5. Course Effectiveness Revision Plan and Process

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Course Instructor

Signature.....P. Sukkaplangkul.....

Date of report:1/07/25.....

Chairperson of the program

Signature.....P. Pluengphon.....

Date of report:1/07/25.....