2209 MATH103 Course Outline

Subject Code	:	**MATH103**
Subject Title	:	CALCULUS III
Level	:	1
Credits	:	3
Teaching Activity	:	Lecture 45 hours
Prerequisite	:	MATH101: Calculus I, MATH102: Calculus II

Class Schedule :

Class	Time		Classroom	Date
D2	TUE	12:30-15:20	N317	2022/09/04 - 2022/12/17

Instructor	:	Dr. Ze Wang
Contact Number	:	(853) 6291 7848
Email Address	:	zwang@must.edu.mo
Office	:	A304a
Office hours	:	Mon - Fri: 9:00-13:00, 14:30-18:20

Course Description

This course is an important foundation course in mathematics for all majors in IT. It provides an introduction to calculus that supports conceptual understanding, and helps student to develop skills in abstract thinking, logical reasoning, spatial imagination and self-learning mathematics. The course covers the following topics: vector valued functions and motion in space (curves in space, arc length in space), partial derivatives (directional derivatives, gradient vectors, tangent planes, extreme values), multiple integrals (double integral, triple integral, triple integral in cylindrical and spherical coordinate), integrals and vector fields (line integrals, Green's Theorem, surface integrals, Stokes' Theorem), first order differential equations.

Textbook(s)

Book name：Thomas' Calculus

Author/Editor： Joel Hass, Christopher Heil, and Maurice D. Weir.
Edition：14
ISBN：978-0134438986
Publisher：Pearson
Date：2017

✧ **References**

Book name：高等数学.
Author/Editor：同济大学数学系
Edition：7
ISBN： 978-7-04-039663-8, 978-7-04-039662-1
Publisher：高等教育出版社
Date：2014

INTENDED LEARNING OUTCOMES

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

Identify the key concepts of function, limits and function continuity;

1. Identify the concepts of vectors, vector operations, lines and planes in three-dimensional space.
2. Know how to represent curves in space by vector valued function. Be able to evaluate arc length by integral of vector functions.
3. Understand basic concepts, calculation and application of partial derivatives.
4. Apply and evaluate multiple integrals.
5. Be familiar the line integrals of functions, Green's theorem, surface integral and Stokes' Theorem. Mater applications for these theorems.
6. Be able to solve the first order differential equations.

These intended outcomes will be exhibit in the following measurable outcomes:

1. Explain concepts
2. Discussion in class room
3. Developing mathematics model
4. Exercises
5. Midterm test
6. Final examination

Schedule

內容 Topic	學時 Hours	教學方法 Teaching Method	備註 Remarks
Vector-values Functions and Motion in Space Integrals of vector function; Projectile Motion, arc length, curvature and normal vectors of a curve, tangential and normal components of acceleration	3	lecture	
Vector-values Functions and Motion in Space Tangential and normal components of acceleration	3	lecture	
Partial Derivatives Function of several variable, limits and continuity, partial derivatives	3	lecture	
Partial Derivatives The chain rule, directional derivatives and gradient, tangent planes	3	lecture	
Partial Derivatives Extreme value, Lagrange Multipliers	3	lecture	
Test 1	3	lecture	
Multiple Integrals Double integral over rectangles, Double integrals over general region	3	lecture	
Multiple Integrals Double integrals in polar form, area by double integrals,	3	lecture	
Multiple Integrals Triple integrals, moment of centers of mass, triple integrals in cylindrical coordinate	3	lecture	
Integrals and vector fields Line integrals, vector fields and line integrals	3	lecture	
Integrals and vector fields Path independence, conservative fields, Green's theorem	3	lecture	
Integrals and vector fields Surfaces and area, surface integrals, Stokes' theorem	3	lecture	
Test 2	3	lecture	
Second-order differential equations Second-order linear equations	3	lecture	
Final Review	3	lecture	

ASSESSMENT APPROACH

Assessment method	Percentage %

1. Attendance (Class participation)	10
2. Assignment	10
3. Midterm	30
4. Final exam	50
Total	100

Guideline for Letter Grade:

Marks	Grade
93-100	A+
88-92	A
83-87	A-
78-82	B+
72-77	B
68-71	B-
63-67	C+
58-62	C
53-57	C-
50-52	D
0-49	F

Notes:

Students will be assessed on the basis of continuous assessment (i.e. coursework in the form of individual assignments and midterm exam) and by the end of semester one final examination.

The coursework assessment items evaluate students' ability to apply concepts, to construct knowledge and skills in analysing.

Final examination will primarily cover all contents.