CA2123: ENGINEERING METHODS

Effective Term
Semester A 2023/24

Part I Course Overview

Course Title
Engineering Methods

Subject Code
CA - Civil and Architectural Engineering
Course Number
2123

Academic Unit
Architecture and Civil Engineering (CA)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
BC2123/BC2123P Engineering Methods

Exclusive Courses
Nil

Part II Course Details

Abstract

The course intends to provide students with knowledge in analytical/mathematical skills for preparing them readily to undertaking courses in civil and architectural engineering.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Evaluate mathematical methods used in analysis and design of civil and architectural engineering problems;	20	x		
2	Discover mathematical theories and apply them to basic engineering problems;	30		x	
3	Explain the importance of mathematical methods and theories for the fundamentals of more advanced studies;	20		x	
4	Simplify complicated engineering problems and discover their corresponding solutions.	30		x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Address the basic principles and theories for Multiple Integration, Ordinary Differential Equation and Curve Fitting.	1, 2, 3, 4	2
2	Tutorial	Explain how to get the solutions.	1, 2, 3, 4	1

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks
1	Assignment	1, 2, 3, 4	30	
2	Mid-term test	2	20	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%.

Assessment Rubrics (AR)

Assessment Task

Assignment

Criterion

ABILITY to USE suitable techniques to solve an engineering problem.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Mid-term test

Criterion

ABILITY to APPLY the basic principle and the scientific techniques in solving the problems involved in (1) Multiple integrals for finding volume, area, mass and inertia moment of structures, (2) Ordinary differential equation and (3) curve fitting techniques.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

CAPACITY to UNDERSTAND the mathematical theories and USE them in solving an engineering problem.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Differentiation and integration, Multiple integrals, Numerical integration, Ordinary differential equations, Approximate solution of ODE, Least squares regression.

Reading List

Compulsory Readings

	Title
1	Robert T. Smith, Roland B. Minton, Calculus, 4th Edition, New York : McGraw-Hill c2012.
2	Erwin Kreyszig, Advanced Engineering Mathematics, Seventh Edition, John Wiley & Sons, Inc. 1993.
3	C.R. Wylie, L.C. Barrett, Advanced Engineering Mathematics, Sixth Edition, McGraw-Hill 1995.

Additional Readings

	Title
1	Michael D. Greenberg, Advanced Engineering Mathematics. (2th edition). Prentice-Hall International, Inc. New Jersey. 1998.
2	Dean G. Duffy, Advanced engineering mathematics. Boca Raton, Fla. : CRC Press, 1998.
3	Erwin Kreyszig, Advanced engineering mathematics. (8th edition). New York : John Wiley, 1999.
4	Alan Jeffrey. Advanced engineering mathematics. San Diego : Harcourt Academic Press, 2002.
5	Ward Cheney, David Kincaid, Numerical Mathematics and Computing.(3rd edition). Pacific Grove, Calif.: Brooks/Cole Pub. Co., 1994.
6	Saturnino L. Salas, Calculus : one and several variables. (9th edition). New York : J. Wiley & Sons, 2003.
7	Vithala A. Patel, Numerical Analysis. Ft. Worth : Saunders College Pub., 1994.
8	Online Resources: Official course website at the Blackboard System of CityU.