

CA3122: ENGINEERING ANALYSIS

Effective Term

Semester A 2024/25

Part I Course Overview

Course Title

Engineering Analysis

Subject Code

CA - Civil and Architectural Engineering

Course Number

3122

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

Level 4 in HKDSE Mathematics or equivalent qualification; or MA1200 and MA1201; or MA1300 and MA1301; or CA2123 Engineering Methods. (The Precursor requirements do not apply to Advanced Standing II students admitted in 2018/2019 and thereafter.) Students must have attempted (including class attendance, coursework submission, and examination) the precursor course(s) so identified.

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course is designed to provide basic knowledge of linear programming techniques, Fourier series and their application to solving partial differential equations, with the aim of updating and improving students' knowledge of engineering analysis methods to prepare them for their studies in civil and architectural engineering

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Learn and discover appropriate fundamental theories of partial differential equations, Fourier series and approximate methods for structural problems;	20	x		
2	Apply approximate solution approaches to analyse fundamental structural problems;	30		x	
3	Explain the importance of mathematical methods as 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 real-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.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Deliver basic principle and new concepts of Fourier series and linear programming techniques.	1, 2, 3, 4	2 hours/week
2	Tutorial	Demonstrate how to determine a solution to an engineering problem.	1, 2, 3, 4	1 hour/week

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignment	1, 2, 3, 4	30	
2	Mid-term test	1, 2, 3, 4	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 Fourier series, Partial differential equation and linear programming 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

Basic concepts and fundamental principles of Fourier series and linear programming techniques, including Fourier Series Expansion, application of Fourier series in solving Partial differential equation, Simplex method, and Transportation algorithm.

Reading List**Compulsory Readings**

Title	
1	Frederick S. Hillier, Gerald J. Lieberman, Introduction to Operations Research (Ninth Edition), McGraw Hill. 2010.
2	Erwin Kreyszig, Advanced Engineering Mathematics (7th edition), John Wiley & Sons, Inc. 1993.
3	Michael D. Greenberg, Advanced Engineering Mathematics (2th edition), Prentice-Hall International, Inc. New Jersey. 1998.

Additional Readings

Title	
1	Wylie, C Ray and Barrett, Louis C. (1995), Advanced Engineering Mathematics, 6th Edition, MaGraw-Hill, Inc.
2	Greenberg, Michael D. (1998), Advanced Engineering Mathematics, 2nd Edition, New Jersey: Prentice-Hall International.
3	Taha, Hamdy A. (1997), Operation Research - An Introduction, 6th Edition, Prentice-Hall.
4	Official course website at Blackboard System of CityU.