CA4727: ADVANCED HVAC SYSTEMS

Effective Term Semester A 2024/25

Part I Course Overview

Course Title Advanced HVAC Systems

Subject Code CA - Civil and Architectural Engineering Course Number 4727

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 CA3722 HVAC Engineering

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

The course aims to provide students with sound theoretical knowledge in thermal impact on the built environment; and also energy conservation measures and noise and vibration suppression techniques. Numerical methods and applications in HVAC engineering. Particular emphasis will be placed on the local environment. The statutory requirements and possible constraints in designing HVAC&R systems will be realized.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	discover the variables relevant to the built environment and human sensation;		X		
2	construct a consciousness in energy conservation;			X	
3	implement the design considerations on comfort, energy, noise and vibration requirements;				X
4	apply the thermal load requirement and its energy implications for buildings.			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.

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Introduction of parameters related to human sensation in built environment	1, 2, 3, 4	
2	Tutorials	Discussion on the concerns of comfort, energy, noise and vibration requirements in building engineering; analysis of application cases	1, 2, 3, 4	

Learning and Teaching Activities (LTAs)

Assessment Tasks / Activities (ATs)

3 CA4727: Advanced HVAC Systems

	ATs	CILO No.		Remarks (e.g. Parameter for GenAI use)
1	Coursework	1, 2, 3, 4	20	
2	Mid-term Test	1, 2, 3, 4	30	

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

Coursework

Criterion

ABILITY to UNDERSTAND, ANALYZE, and SOLVE the problem in applied sense

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 ANALYZE and SOLVE assigned questions related to applications in built environment

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 ABILITY to ANALYZE and SOLVE assigned questions independently

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

Thermal environment. Transient Moisture Transfer. Space air distribution. Cleanroom system. Energy conservation measures. Energy codes. Energy management. Noise and vibration control.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	m'al -
	Title
1	Kinsler, LE 1982, Fundamentals of Acoustics, 3rd ed. Publisher New York, Wiley.
2	Technical Memorandum for the assessment of noise from places other than domestic premises, public places or construction sites, EPD.
3	Inman, D. J., 1994, Engineering Vibration, Prentice-Hall, New Jersey.
4	Kelly, S. G., 1993, Schaum's Outline of Theory and Problems of Mechanical Vibrations, McGraw-Hill, New York.
5	ASHRAE Handbook Fundamental, ASHRAE, 2004.

5 CA4727: Advanced HVAC Systems

6	CIBSE GuideVolume A: Design data, CIBSE, 2004.
1	Guidelines on energy efficiency of air-conditioning installations, Energy efficiency office, Electrical & Mechanical Services Department, 1998.