

CA4727: ADVANCED HVAC SYSTEMS

Effective Term

Semester A 2022/23

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 realised.

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.

Teaching and Learning Activities (TLAs)

	TLAs	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	

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	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 heat flow. 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

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