

CA4728: SMART VENTILATION AND INDOOR AIR QUALITY

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Smart Ventilation and Indoor Air Quality

Subject Code

CA - Civil and Architectural Engineering

Course Number

4728

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

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

The course aims to provide students with sound theoretical knowledge in air quality and thermal impact on the built environment; and also energy conservation measures. Particular emphasis will be placed on the local environment. The statutory requirements and possible constraints in designing HVAC&R systems will be realised. Green office concern in buildings.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 app.)		DEC-A2	DEC-A3
1	Explore and analyse different ventilation schemes and describe concepts various control strategies.		x	x	
2	Discover and analyse outdoor and indoor air quality and their human impacts.		x	x	
3	Apply mathematical modelling to study the air quality in the indoor environment.			x	x
4	Identify and describe the current regulations, standards and guidelines related to indoor air quality; human impacts of indoor air quality.		x	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	Lectures	Students will engage in formal lectures to gain knowledge about air quality and ventilation.	1, 2, 3, 4	
2	Tutorials	Students will engage in discussions on problems related to lecture themes.	1, 2, 3, 4	

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignment	1, 2, 3, 4	25	
2	Mid-term Test	1, 2, 3, 4	25	

Continuous Assessment (%)

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 APPLY theories and knowledge to topics related to air quality and ventilation.

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 EXPLAIN and DISCUSS theories and knowledge to topics related to air quality and ventilation.

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 EXPLAIN and DISCUSS theories and knowledge to topics related to air quality and ventilation.

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**

Ventilation. Indoor Air Quality. Heating, Ventilation and Air Conditioning, Thermal Engineering. Health.

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	American Society of Heating, Refrigerating and Air-Conditioning Engineers. ANSI/ASHRAE Standard 62.1-2019: Ventilation for acceptable indoor air quality. Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2019.
2	Zhang, Y.H. Indoor Air Quality Engineering 1st edition. CRC press, 2004.
3	Kuehn, T.H., Ramsey, J.W., Threlkeld, J.L. Thermal Environmental Engineering. 3rd edition. Prentice Hall, 1998.
4	American Society of Heating, Refrigerating and Air-Conditioning Engineers. ASHRAE handbook: Fundamentals. Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2009.
5	Burroughs, H.E. and Hansen, S.J. Managing Indoor Air Quality. 5th edition, Fairmont Press, 2011.