CA4728: SMART VENTILATION AND INDOOR AIR QUALITY

Effective Term
Semester A 2025/26

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 app.)	DEC-A1	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 ("-" for nil entry)	Allow Use of GenAI?
1	Assignment	1, 2, 3, 4	25		Yes
2	Mid-term Test	1, 2, 3, 4	25		No

Continuous Assessment (%)

50

Examination (%)
50

Examination Duration (Hours)
2

Minimum Continuous Assessment Passing Requirement (%)
30

Minimum Examination Passing Requirement (%)
30

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.