

Academic Course Description

BHARATH UNIVERSITY
 Faculty of Engineering and Technology
 Department of Civil Engineering

BCE068 INDOOR AIR QUALITY
Seventh Semester, 2017 - 18 (Odd Semester)

Course (catalog) description

This subject covers types of Indoor air pollution and its impacts various methods and techniques to prevent and control it.

.Compulsory/Elective course : Elective for Civil students

Credit / Contact hours : 3 credits / 45 Hours

Course Coordinator : Dr.M.P.Chockalingam, Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Dr.M.P.Chockalingam, Professor	Fourth year Civil	Civil Block			9.00 - 9.50 AM

Relationship to other courses:

Pre –requisites : BCE 061 Air and Noise Pollution

Assumed knowledge : BCE 061 Air and Noise Pollution

Following courses : Nil

Syllabus Contents

UNIT I INTRODUCTION

9

Indoor activities of inhabitants – residence time. Levels of many pollutants in indoor and outdoor air. Design and operation of buildings for improvements of public health.IAQ policy issues: Sustainability; indoor air quality as a basic human right

UNIT II INDOOR AIR POLLUTANTS

9

Air pollutants in indoor environments, private residences, offices, schools sand public buildings, factors that govern pollutant indoors concentrations, including ventilation. Characteristics, Consequences.

UNIT III CONTROL OF POLLUTANTS

9

Control of several pollutant classes, such as radon ,toxic organic gases, combustion byproducts, and microorganisms such as molds and infectious bacteria. Case study by an exploration of public policy related to indoor air.

UNIT IV CONCEPT AND TOOLS

9

Concepts and tools: exposure, material-balance models, statistical models ventilation.

UNIT V INDOOR AIR POLLUTION FROM OUTDOOR SOURCES

9

Indoor air pollution from outdoor sources: particulate matter and ozone ;Combustion byproducts; Radon and its decay products. Volatile organic compounds: odors and sick-building syndrome, Humidity Bioaerosols: infectious disease transmission. Special indoor environments: A/C units in indoor: museums -labs; Measurement methods, Control Technologies, Control strategies

Total No. of Periods: 45**References:**

1. Thaddes Godish, Indoor air and Environment Quality, CRC press,2000.
2. Nazaroff W.W and L Aivarez-Cohen, Environmental Engineering Science Wiley Sons, New York, 2001.
3. Moroni Marco , Seifet Bernd and Lindrall Thomas, Indoor Air Quality: A Comprehensive Reference Book, Elsevier Science .Vol.3,1995.

Computer usage: Nil**Professional component**

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area: Sustainability/ IAQ policy issues/ Control Technologies**Test Schedule**

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1 st week	Session 1 to 14	2 Periods
2	Cycle Test-2	September 2 nd week	Session 15 to 28	2 Periods
3	Model Test	October 1 st week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

This subject covers types of Indoor air pollution and its impacts various methods and techniques to prevent and control it..	Correlates to program outcome		
	H	M	L
1. To make them understand the fundamentals of Design and operation of buildings for improvements of public health associated with indoor air quality CO2 To understand about the air pollutants in indoor environments and its characteristics	a,i	g	
2. To understand about the air pollutants in indoor environments and its characteristics, consequences	b,i	a,d	
3. To understand in detail about the classification and control of pollutants and case studies associated with it.	a,k		
4. To improve the knowledge on the Concepts and tools in indoor air quality along with the statistical models associated with it.	a	i	
5. To know about the basics of the Indoor air pollution from outdoor sources.	f,i	b	

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I INTRODUCTION			
1.	Indoor activities of inhabitants	No	[R1, R2]
2.	residence time	No	
3.	Levels of many pollutants in indoor air	No	
4.	Levels of many pollutants in outdoor air	No	
5.	Design and operation of buildings for improvements of public health	No	
6.	IAQ policy issues	No	
7.	Sustainability	No	
8.	indoor air quality as a basic human right	No	
9.	indoor air quality	No	
UNIT II INDOOR AIR POLLUTANTS			
10.	Air pollutants in indoor environment,	NO	[R1, & R3]
11.	Air pollutants in private residences,	No	
12.	Air pollutants in , offices	No	
13.	Air pollutants in schools	No	
14.	Air pollutants in public buildings	No	
15.	factors that govern pollutant indoors concentrations	No	
16.	ventilation	No	
17.	Characteristics	No	
18.	, Consequences	No	
UNIT III CONTROL OF POLLUTANTS			
19.	Control of several pollutant classes	No	[R2, & R3]
20.	radon	No	
21.	,toxic organic gases	No	
22.	combustion byproducts	No	
23.	microorganisms such as molds	No	

24.	infectious bacteria	No	
25.	Case study by an exploration of public policy related to indoor air	No	
26.	Case study	No	
27.	Case study	No	
UNIT IV UNIT IV CONCEPT AND TOOLS			
28.	Concepts	No	[R2, & R3]
29.	Tools	No	
30.	Case study	No	
31.	Exposure	No	
32.	material-balance models	No	
33.	statistical models	No	
34.	ventilation	No	
35.	Case study	No	
36.	Case study	No	
37.			
UNIT V INDOOR AIR POLLUTION FROM OUTDOOR SOURCES			
38.	Indoor air pollution from outdoor sources	No	[T1, & R3]
39.	particulate matter and ozone	No	
40.	Combustion byproducts, Radon and its decay products	No	
41.	Volatile organic compounds: odors and sick-building syndrome	No	
42.	Humidity Bioaerosols: infectious disease transmission	No	
43.	Special indoor environments: A/C units in indoor	No	
44.	museums –labs, Measurement methods	No	
45.	Control Technologies, Control strategies	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	5%
Assignment	-	5%
Attendance	-	10%
Final exam	-	70%

Prepared by: Dr.M.P.Chockalingam, Professor, Department of Civil

Dated :

Addendum**ABET Outcomes expected of graduates of B.Tech / Civil / program by the time that they graduate:**

- a. An ability to apply knowledge of mathematics, science, and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate, and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives**PEO1: PREPARATION**

Civil Engineering graduates will have knowledge to apply the fundamental principles for a successful profession and/or for higher education in Civil Engineering based on mathematical, scientific and engineering principles, to solve realistic and field problems that arise in engineering and non engineering sectors

PEO2: CORE COMPETENCE

Civil Engineering graduates will adapt to the modern engineering tools and construction methods for planning, design, execution and maintenance of works with sustainable development in their profession.

PEO3: PROFESSIONALISM

Civil Engineering Graduates will exhibit professionalism, ethical attitude, communication and managerial skills, successful team work in various private and government organizations both at the national and international level in their profession and adapt to current trends with lifelong learning.

PEO4: SKILL

Civil Engineering graduates will be trained for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS

Civil Engineering graduates will be installed with ethical feeling, encouraged to make decisions that are safe and environmentally-responsible and also innovative for societal improvement.

Course Teacher	Signature
Dr.M.P.Chockalingam, Professor	

Course Coordinator

HOD/CIVIL