جـــــامـــــعة المســـــتقبل

FUE - Future University in Egypt

Faculty of Engineering and Technology
Department of Architectural Engineering

Course Specifications

ARC 361: Environmental Control & Technical Installations (1)

Programme (s) on which the course is given:	B.Sc. in Architectural Engineering
Major or minor element of programs:	(Not Applicable)
Department offering the programme:	Architectural Engineering
Department offering the course:	Architectural Engineering
Academic year/Level:	Level Two – 3rd semester
Date of specification approval:	September 2019

A- Basic Information

Title: Environmental Control and Technical Installation (1) **Code: ARC 361**

Credit Hours: **2 Cr. Hrs.**
Lectures: **2 Hrs.**
Tutorial: **1Hrs.**
Total: **3 Hrs.**
Prerequisite: N/A

B- Professional Information

1- Catalog Course Description:

This course starts with the definition of the environment (natural and man-made) and its components. Then, it focuses on the "Room Acoustics". Many related topics will be introduced such as: nature of acoustics, weighted pressure levels, sound analysis, comfort and noise indices, acoustic design and noise control

In addition, the course addresses the main mechanical systems that are used in buildings to achieve vertical and horizontal circulation. Also, this course includes the hydraulic services that serve the user needs such as: water supply, sewerage, sewer and rainwater drainage, sanitary installations, firefighting, solid waste disposal.

2- Overall aims of the course:

The main aims of the course are to:

1. Prepare the students to investigate, evaluate and optimize the sound performance of simple architectural spaces.

2. Train the students to suggest proper mechanical systems to enhance and fulfill the needs of a moderate complex building regarding vertical and horizontal circulation, firefighting, and sanitary services.

3- Intended learning outcomes of course (ILOs):

3.1. Program ILOs related to course:

A08 Demonstrate knowledge and understanding of different building construction systems and execution design methods and techniques**.**

A20 Demonstrate knowledge and understanding of architectural physical and computer modeling, simulation, rendering and presentation techniques.

A23 Demonstrate knowledge and understanding of the principles of sustainable design and climatic considerations in addition to the different elements of the natural environment, different energy types, appropriate environmental control techniques and different technical installations in buildings.

B02 Compare, analyze and criticize different engineering problems and case studies, evaluate design alternatives and conclude results based on analytical thinking.

B08 Select, develop, implement and appraise appropriate ICT tools to a variety of architectural and engineering problems.

B10 Incorporate different dimensions of economy, society, environment, technology applicability, safety, site constraints, urban context and risk management in design.

B15 Derive different alternative solutions and assess their expected performance to reach architectural decisions.

C01 Ability to integrate knowledge and understanding of mathematics, science, art, information technology, design and engineering concepts to design and plan buildings and to solve problems.

C06 Use appropriate computer programs in engineering and architectural works.

C20 Provide leadership and education to the client particularly with reference to sustainable design principles.

D07 Search for information and adopt life-long self-learning.

3.2. Course Detailed ILOs:

a- <u>Knowledge and understanding:</u>

By the end of this course the student should be able to:

a1. Define acoustics principles and theories.
a2. List some methods and techniques of sound control.
a3. List some digital software of acoustics analysis.
a4. Define the differences between one pipe, two pipes, and three pipes plumbing systems.
a5. List some techniques of firefighting systems.
a6. List some of vertical and horizontal circulation mechanical systems.

b- <u>Intellectual skills:</u>

By the end of this course the student should be able to:

b1. Analyze the impact of space shape and finishing of the acoustics performance.
b2. Choose the proper digital software of acoustics analysis.
b3. Choose the proper plumbing system of a building.
b4. Evaluate the results of the analytical studies and conclude with architectural solutions and design requirements**.**

c- <u>Professional and practical skills:</u>

By the end of this course the student should be able to:

c1. Design a plumbing system: cold and hot water supply, sewage, and storm water discharge, of a moderate complex building to achieve efficient resources usage.
c2. Apply digital software to analyze and evaluate the acoustics performance of a building.

d- General and transferable skills:

By the end of this course the student should be able to:
d1. Search for relevant information.

4- Course ILOs versus Program ILOs relation

See table [1]

5- Contents:

#	Topic	Lec.	Tut.	Total
1	Acoustics: definitions and theories	4	2	6
2	Acoustics: design faults and problems	4	2	6
3	Acoustics: how to control and manipulate the space	4	2	6
4	Mechanical systems: horizontal circulation	4	2	6
5	Mechanical systems: vertical circulation	4	2	6
6	Plumbing systems	6	3	9
7	Firefighting systems	4	2	6
TOTAL		30	15	45

For the relation between the course contents and "Intended Learning Outcomes" (ILOs) see Appendix, table [2]

6- learning/teaching methods:

See Appendix, table [3]

7- ILOs Teaching & Assessment Method

See Appendix, table [4]

8- Weighting of assessments

- Final exam: 40%
- Year work: 50%
  - In Class Quizzes 10%
  - Assignments/Studio work 25%
  - Project 15%
- Performance & Participation 10%

9- List of references:

1. **Text Book:**

   Introduction to Architectural Science, The Basis of Sustainable Design**,** Routledge, Taylor & Francis, 2014

2. **Handouts**

3. **References/ Recommended Readings:**
   a. Sassi, Paola. Strategies for sustainable architecture. Taylor & Francis, 2006.
   b. Descottes, Hervé, and Cecilia E. Ramos.Architectural lighting: designing with light and space. Princeton Architectural Press, 2013.
   c. Bauer, Michael, Peter Mösle, and Michael Schwarz. Green building: guidebook for sustainable architecture. Springer Science & Business Media, 2009.
   d. International Plumbing Code

e. Architectural Acoustics: Principles and Design. Madan Metha, Jim Johnson, and Jorge Rocafort. Prentice-Hall, Inc. 1999.
f. NFPA
g. SMACNA

10- Facilities required for teaching and learning:

- Lecture hall
- White board
- Computer & Data show for presentations
- Internet web connection
- Library
- Computer lab with preinstalled environmental control software such as Ecotect (student version).
- Environmental control field measuring tools such as Lux meter, Sound meter, Thermometer, and Anemometer.

Course coordinator: **Prof. Dr. Ossama El-Rawi**
Head of Department: **Prof. Dr. Samir Sadek Hosny**
Date: **September 2019**

Course Instructor:

Appendix (1)

Table [1]: Course ILOs/ Program ILOs Matrix

		Program ILOs										
		A08	A20	A23	B02	B08	B10	B15	C01	C06	C20	D07
Course ILOs	a1.			●								
	a2.			●								
	a3.		●									
	a4.	●										
	a5.	●										
	a6.	●										
	b1.				●							
	b2.					●						
	b3.							●				
	b4.						●					
	c1.								●		●	
	c2.									●		
	d1.											●

Table [2]: Course Content/ILO Matrix

Topic	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	c2	d1
Acoustics: definitions and theories	●						●						●
Acoustics: design faults and problems		●	●				●	●				●	
Acoustics: how to control and manipulate the space		●	●				●	●				●	
Mechanical systems: horizontal circulation						●							●
Mechanical systems: vertical circulation						●				●			●
Plumbing systems					●				●	●	●		●
Firefighting systems				●						●			●

Table [3]: Learning Method/ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	c2	d1
Lecture	●	●	●	●	●	●	●	●	●		●	●	
Research and Assignments	●	●	●	●	●	●	●	●	●	●	●	●	●
Project			●				●	●		●		●	●

Table [4]: Assessment Method/ILO Matrix

Assessment Method		a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	c2	d1
Assignments/Studio work	25%	●	●	●	●	●	●	●	●	●	●	●	●	●
Project	15%	●	●	●				●	●				●	●
In class quizzes	10%	●	●	●	●	●	●	●		●	●	●		
Final Exam	40%													
Final Exam Mark Distribution														