



University/Academy: Arab Academy for Science, Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: B.Sc. Architectural Engineering and Environmental Design

Form no. (12): Course Specification

1- Course Data

Course Code: AR 362	Course Title: Environmental Studies 1	Academic Year/Level: 3rd year / 6th semester
Specialization: Architecture	No. of Instructional Units Credit 3 Lecture 2 Tutorial 2	Prerequisite None

2- Course Aim

This course offers students the opportunity to acquire and develop skills and to pursue interests in the field of **environmental design and sustainability**.

The course aims to:

- Emphasize an understanding of the impact of buildings upon the global environment through their demand for ever-diminishing sources of energy and the consequences of pollution and global warming and on the quality of the internal environment and indoor thermal comfort.
- Emphasize an understanding of the history of environmental design, which establishes a background for understanding the approaches of traditional and contemporary practices. Natural Elements (air, sun and water) are examined as they interact with human needs within buildings or building complexes.
- Provide the student with the main knowledge of related topics such, indoor thermal comfort, lighting, acoustic, elimination of wastes, circulation of air, methods of utilizing solar energy to provide heating, cooling, hot water and electricity for buildings and related techniques for reducing energy consumption. Sustainability of natural resources and the need for relying upon renewable energy resources are pointed out.

3- Intended Learning Outcomes

a- Knowledge and Understanding	Through knowledge and understanding, students will be able to: <ul style="list-style-type: none"> • Describe the impact of architectural professional solution on the society & the environment locally, regionally & globally. • Classify the relationship between buildings & their environments, and the need to relate buildings & the surrounding spaces to human needs & scale. • Define the role & responsibility of the architect in creating sustainable architecture suitable for the environment and the society's social, economical & cultural requirements.
b- Intellectual Skills	Through intellectual skills, students will be able to: <ul style="list-style-type: none"> • Determine the environmental context, its potential, and problems. • Apply passive environmental design techniques systematically along the design process, analyze environmental design vocabularies. • Use passive environmental design strategies and techniques for both cooling and heating in order to provide indoor thermal comfort in their design products and outcomes. Students should be able to apply and develop the passive environmental design techniques and to use the natural solar and ventilation characteristics of the local climate / environment to form environmentally-friendly buildings and societies in order to minimize the environmental damage and to save energy resources. • Suggest alternative passive solutions for cooling and heating in buildings and taking lessons from the past "traditional architecture", its theories and applications over the years. • Produce innovative environmental design ideas and concepts

c- Professional Skills	<p>Through professional and practical skills, students will be able to:</p> <ul style="list-style-type: none"> • Perform architectural & environmental design presentation and expression techniques (verbally, visually, drawing...etc). • Use instruments for environmental design simulation tools.
d- General Skills	<p>Through general and transferable skills, students will be able to:</p> <ul style="list-style-type: none"> • Write structural reports or essay in accordance with the standard scientific guidelines. • Present reports in seminars, discuss results, defend his/her ideas, and communicate effectively in writing, verbally and through drawings and models. • Independently seek knowledge, set aims, targets, objectives and plan to meet them with a deadline (time management). • Transfer techniques and solutions from one field of architecture to another.

4- Course Content

Week No.1	<p>INTRODUCTION Definitions, Built Environment, Physical Environment, Environmental Design Sustainable Design Energy Crisis – World Population – Developing Communities The Need For Passive Techniques Vs Limited Non-renewable Energy resources</p>
Week No.2	<p>Physics of Heat 1 Heat and Temperature Heat Flow: Conduction, Convection & Radiation Air flow</p>
Week No.3	<p>Physics of Heat 2 Heat and Temperature Heat Flow: Conduction, Convection & Radiation Air flow</p>
Week No.4	<p>Climate Sun-path diagrams, solar radiation Global climate, green house effect</p>
Week No.5	<p>Thermal Behavior of Buildings Solar Control Ventilation Dynamic response of buildings</p>
Week No.6	<p>Thermal Behavior of Buildings Solar Control Ventilation Dynamic response of buildings</p>
Week No.7	<p>MIDTERM EXAM</p>
Week No.8	<p>Thermal Design Passive Control of heat flows Control functions of design variables</p>
Week No.9	<p>Thermal Design Climatic design archetypes Condensation and moisture control Microclimatic controls</p>

Week No.10 Light
Physics of light
Visual performance
Daylight and sunlight
Design methods and computer tools

Week No.11 Sound
Physics of Sound
Hearing
Noise control
Room Acoustics

Week No.12 Continuation of the previous lecture and evaluation.

Week No.13 Green Building Assessment
Rating Systems
Calculators
Thermal Analysis Tools

Week No.14 Environmental Design Project

Week No.15 Environmental Design Project

5- Teaching and Learning Methods

The course comprises a combination of:
Lectures, studio project work, discussion sessions, practical training, class activities, and research assignment.

6-Teaching and Learning Methods for Students with Special Needs

- Consulting with lecturer during office hours.
- Consulting with teaching assistant during office hours.
- Private Sessions for redelivering the lecture contents.
- For handicapped accessibility, please refer to program specification.

7- Student Assessment

The course is classified as a practical application of environmental design knowledge and elements; therefore, the development of environmental design concepts, character and language is very important. Moreover, environmental awareness, sustainability and an understanding of the passive environmental design systems will be studied and addressed throughout the course and the design studio applications.

Methods of documentation may include: drawings; photographs; multi-media material; quantitative & qualitative data; 3D models or prototypes; web-based material. All presented materials and work should be recorded in graphic form and explained to a standard suitable for assessment purposes.

Asses No.	Procedures used		Start Week No.	Subm. Week No.	Weighting of Asses.
	Type	To assess			
1	Research	Knowledge and understanding Transferable skills	1	3	10%
2	Project	All skills.	3	7	10%
3	Written exam.	Knowledge and understanding Intellectual thinking skills	7	7	10%
4	Research	Knowledge and understanding Transferable skills	6	9	10%
5	Written exam.	Knowledge and understanding Intellectual thinking skills	12	12	10%
6	Project	All skills.	9	14	10%
7	Written exam.	Knowledge and intellectual skills Practical skills		16	40%
Total					100%

8- List of References:

a- Course Notes	Notes are handed out to the students throughout the semester.
b- Required Books (Textbooks)	<ul style="list-style-type: none"> • SZOKOLAY, S.V., <i>Introduction to Architectural Science – The Basis of Sustainable Design</i>, Elsevier Ltd, 2008.
c- Recommended Books	<ul style="list-style-type: none"> • ATTMAN, O., <i>Green Architecture: Advanced Technologies and Materials</i>. New York: McGraw-Hill Professional, 2009. • HYDE, R., <i>Bioclimatic Housing: Innovative Designs for Warm Climates</i>. London: Routledge, 2007. • JONES, D.L., <i>Architecture and the Environment: Contemporary Green Buildings</i>. London: Overlook Hardcover, 1998. • KWOK A. & GRONDZIK, W., <i>The Green Studio Handbook, Second Edition: Environmental Strategies for Schematic Design</i>. Architectural Pres, 2011. • NORBERT, L., <i>Heating, Cooling, Lighting: Sustainable Design Methods for Architects</i>, 3rd edition. New York: John Wiley & Sons, 2008. • WILLIAMS, D., <i>Sustainable Design: Ecology, Architecture, and Planning</i>. London: John Wiley and Sons, 2007.
d- Periodicals, Web Sites, etc.	<ul style="list-style-type: none"> • Eco Structure: (http://www.eco-structure.com/). Full color magazine covering all types of green building projects. Web site also includes links to podcasts and a weekly e-mail newsletter. • EEBA News: (http://www.eeba.org/media/newsletter/index.html). Newsletter of the Energy & Environmental Building Association. • Environmental Building News: (http://www.buildinggreen.com/index.html). Articles, reviews, and news stories covering energy-efficient, resource-efficient, and healthy building practices. • GreenSource: (http://greensource.construction.com/). The magazine of sustainable design. New York, NY: McGraw-Hill, 2006.