Course Outline

Course Details

Course Title	**Design and Renewable Energy**
Course Number	**10606460**
Academic Year	2023/2024
Term	2nd Semester
Prerequisite(s)	-
Course Type: Compulsory / Elective.	Elective
Credit Hours	2

Instructor Information

Instructor Name	Dr. Sameh Mona
Office	Office 2870
Email Address	samehmona@najah.edu

Class Details

Days	Sunday, Tuesday and Thursday
Time	9.30 – 11.00
Class Room	114050

Course Description and Objectives

The contents of this course are the following:

1. Introduction to energy and climatic design
2. Introduction to renewable energy
3. Introduction to thermal comfort, heat transmittance and solar gain calculation
4. Solar Energy: Sun position and sun path
5. Building materials and glazing selection for solar design
6. Passive design systems (solar window, solarium, solar wall, solar chimney, shading…
7. Active design systems: (Solar water heating systems, Photovoltaic,)
8. Geothermal energy design for buildings
9. Wind energy design for building
10. Introduction to computer software for renewable energy integration in building design.

This course aims to provide the students with the fundamental understanding of passive and active systems using renewable energy in building design. The course will provide the students in architectural engineering with the principles to integrate renewable energies (solar, wind, geothermal, biomass) in the project design, design concepts and materials.

Intended Learning Outcome (ILO's)

- An ability to design a building, or process to meet desired needs within realistic constraints such as environmental, social, ethical, health and safety, and sustainability
- An ability to identify, formulate, and solve architectural engineering problems
- The broad education necessary to understand the impact of architectural engineering solutions in a global, economic, environmental, and societal context
- An ability to use the techniques, skills, and modern architectural engineering tools necessary for architectural engineering practice

Textbook(s) and References

Textbook(s)
Passive solar energy, Bruce Anderson and Malcolm Wells, Brick house publishing co. (Text Book)
References
2005. ASHRAE Standard 55—thermal environmental conditions for human occupancy, Atlanta: ASHRAE Inc. الدليل الإرشادي لتصميم المباني الموفرة للطاقة, وزارة الحكم المحلي 2004,

Topics Covered / Weekly Lecture Schedule

Week	Topics
1	Introduction - Introduction to sustainable and climatic design - Introduction to Renewable energy - Introduction to thermal comfort, heat transmittance and solar gain calculation
2	Solar Energy: Sun position and sun path
3-4	Solar Energy integration in building design - Building materials and glazing selection for solar design - Passive design systems (solar window, solarium, trombe wall, solar wall, solar chimney, shading devices, Daylight design …etc) - Active design systems: (Solar water heating systems, Photovoltaic,…)
	Midterm Exam
5	Geothermal energy design for buildings,
6	Wind energy design for building
7	Introduction to computer software for renewable energy integration in building design
8	Project submission
8	Project presentation
8	Final exam

Assessment Measures and Methods of Evaluation

Evaluation	Percent (%)
Midterm Exam	20
Home works and Quizzes	10
Projects (second Exam)	20
Final Exam	50