UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
CEE-468	Energy Efficiency of Buildings	5
Prerequisites	**Department**	**Semester**
CEE-151	Engineering	Fall
Type of Course	**Field**	**Language of Instruction**
Elective	Civil & Environmental Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr Loizos Papaloizou	4th
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Introduce the concepts of energy efficiency, energy conservation and thermal comfort in the built environment.
- Familiarize participants with the modes of heat transfer and heat losses in building materials.
- Explain the concepts of heat energy storage, cooling and ventilation in buildings.
- Obtain knowledge on the various properties of conventional and advanced building materials, used for thermal insulation and moisture control.
- Provide fundamental knowledge for the calculation of heat losses, moisture conditions and ventilation needs for typical buildings.
- Introduce students to the principles of bioclimatic building design and energy consumption monitoring.
- Guide attendees to employ methods for improving energy efficiency in the built environment, through knowledge on materials and sustainable technologies.

Learning Outcomes:

After completion of the course students are expected to be able to:

- Be in a position to identify the hygrothermal properties of various building materials.

- Be able to calculate the U-values of various building components (walls, windows, roof, floors, etc).
- Have a basic understanding of how to calculate a building's heat losses and how to select a heating source.
- Employ methods for the calculation of ventilation demands and moisture conditions in structures.
- Identify and implement energy saving opportunities and recognize energy efficient technologies.
- Acquaint with heating, refrigeration units, heat pumps, and ventilation systems.
- Demonstrate the concepts of energy performance certification of buildings.

Course Content:

- Introduction to Energy efficiency in buildings
- Lighting in buildings
- Fundamental issues and building physics: basic concept of heat and moisture transport through building materials
- Hygrothermal properties of building materials
- U-value and thermal capacity calculations for various types of building elements
- Calculation of heat losses and heating energy needs in buildings
- Thermal insulation and moisture monitor practices
- Insulation materials
- Thermal comfort in buildings
- Air-conditioning, heat pumps, domestic hot water, lightning, ventilation systems, renewable energy systems
- Ventilation, air quality and air-tightness in buildings
- Principles of bioclimatic building design
- Energy performance certification of buildings

Learning Activities and Teaching Methods:

Lectures, Experiments, in-class assignments, discussion.

Assessment Methods:

Homework, computer projects, mid-term exam, final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Materials for energy efficiency and thermal comfort in buildings	Matthew R. Hall (Ed.)	CRC (Elsevier)	2010	978-0081014882

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Energy Efficiency: Building a Clean, Secure Economy	James Sweeney	Hoover Institution Pres	2016	978-0817919542
Handbook of Energy Audits	Albert Thumann, Terry Niehus, William J. Younger	Fairmont Press	2012	978-1466561625