Postgraduate Studies Program
«ENVIRONMENTAL ENGINEERING»

Specialization: 3-SEC: ENVIRONMENTAL MANAGEMENT, SUSTAINABLE ENERGY AND CLIMATE CHANGE

| Code: SEC 303 | Course: Advanced Studies on Energy Efficiency and Environmental Quality in the Built Environment |
| Required: X | Elective: |
| 1st semester | 2nd semester X |

Instructor: Assistant Professor D. Kolokotsa

Bibliography

Course objectives
The course targets to the analysis of the indoor environmental quality and its impact to energy efficiency. It starts with the study of thermal comfort thermal sensation and thermal balance of the human body is also analysed. Thermal comfort indices such as the Predicted Mean Vote index are discussed. Evaluation and Measurement of indoor comfort as well as tools for the evaluation of indoor comfort are presented. Adaptive thermal comfort models are discussed.
Moreover this course outlines the development of natural, mechanical and hybrid ventilation systems for buildings and introduces basic definitions. The principles of natural and hybrid ventilation systems used in buildings will be examined. In addition general principles of mechanical ventilation are described, the tasks of different air flows in the system are illustrated. Equations for the heating and energy demands of ventilation are presented.
In terms of lighting and daylighting of buildings, the present course deals with the basic meanings and photometric parameters, lighting calculations, as well as electric lighting such as lamps, luminaires, etc. The effective combination of electric lighting and daylighting is also discussed. Measurement devices and models for lighting and daylighting of buildings are presented. In addition guidelines for selecting the most appropriate tool and methods are presented. Finally advanced methods for energy demand and consumption calculations are performed.
Syllabus

1st week:
Thermal Comfort in Buildings Describe the basic concepts and elements of the theory of thermal comfort in buildings. Organize and execute a thermal comfort survey using European and International Standards.

2nd week:
Indoor Air Quality in Buildings Design monitoring procedure for IAQ assessment. Simulate indoor air pollutants and estimate personal exposures in indoor microenvironments. Recommend measures to improve IAQ.

3rd week:
Understand the concepts of natural ventilation. Techniques and Calculations. Successful applications and case studies

4th week:
Understand the concepts of mechanical and hybrid ventilation. Techniques and Calculations. Successful applications and case studies.

5th Week:
Visual Comfort indices, photometric parameters.

6th week:
Lighting calculations, as well as electric lighting such as lamps, luminaires, etc. Lumen Method.

7th week:
Advanced energy calculations. Thermal networks

8th week:
Dynamic energy calculations.

9th week:
Advanced calculations for Heating Ventilation and Air Conditioning.

10th week:
Progress of projects.

11th week:
Energy and Environmental Rating of Buildings. LCA of buildings.

12th week:
Green Buildings LEED Aand BREEAM

13th week:
Final Projects presentation

Student evaluation

1. Project (80%)
2. Final exam (20%)