

A EUROPEAN M.Sc. COURSE

SOLAR ENERGY: TECHNOLOGY AND MANAGEMENT

MODULE SPECIFICATIONS

1. Module title: Energy Management

2. Credits: 6 ECTS Credits

3. Keywords

Energy Management, Energy Audits, Energy Monitoring.

4. Pre-requisites: Basics I and II

Co-requisites: A number of the elective modules concerning basic specializations such as Solar Thermal Engineering, Wind Energy Technologies, PV, Biomass, etc.

5. Summary

This module has been designed to give anybody an opportunity to evaluate appropriate energy management techniques. These are designed to help industry and commerce manage energy effectively with the minimum effect on the environment. Also, to provide knowledge and skills for meeting the thermal loads cost-effectively.

6. Learning Objectives/Skills Development

On successful completion of this module students should be able to:

1. Critically analyze and evaluate the energy implications of alternative industrial and commercial processes.
2. Investigate the financial case for effective energy management and energy saving investments. That is to manage the energy source along with the load requirements and profiles.
3. Explore the limitations of energy surveys, monitoring and targeting techniques.
4. Design and use computer spreadsheet techniques for effective energy management.
5. Carry out energy audits and consultation for energy independent or green buildings.

7. Content/Knowledge Base.

1. 1. Estimating energy consumption
2. 2. Performance indicators
3. 3. Energy management techniques
4. 4. Energy markets; EU energy and transport policy, EU Directives on Energy and Environment
5. 5. Energy surveys, monitoring and targets; energy audits; labelling
6. 6. Financial investment, cost /benefit analysis in energy
7. 7. Environmental audits
8. 8. Rational issues of energy; energy (sources) management & load management.

8. Learning Strategies/ Activities	Hours	Comments
Lectures	30	
Practical/Laboratories	10	
Tutorials/Seminars	20	
Computer Laboratory	20	
<i>Student managed learning</i>	120	
Total hours	200	

9. Assessment	Weight %	Comments	Outcomes Tested
Assignment 1	40	<i>In class with any ref. Available</i>	<i>3 to 5 objectives in no.6</i>
Assignment 2	40	<i>Assigned to each student</i>	<i>1 or 2 objectives in no.6</i>
Lab work	20	<i>Lab experiments</i>	<i>To develop and confirm energy balance as in buildings, etc.</i>

10. References.

1. CIBSE, Energy Efficiency in Buildings, CLB SE Guide, 1998.
2. BRE 1995 *The Office Tool-Kit*
3. CIBSE 1983 *Energy Codes*
4. D.O.E Energy Efficiency Publications;.
5. LEVERMORE GEOFF 1997 *Building Energy Management Systems* E & FN Spon
6. MOSS J KEITH 1997 *Energy Management & Operating Costs in Buildings* E & FN Spon
7. CIBSE 1999 Memorandum 22 + software.
8. Solar Assisted Heat Pumps with Ground Storage: Workshop Preceedings. E.C. Publications, J.R.C. ISPRA

11. Learning Resources/Support.

1. Course material: text books and reference books as in no. 10. Case studies and project reports in various applications.
2. Journals such as: Renewable and Sustainable Energy, Resource and Energy Economics, Journal of Energy, Finance and Development, Environmental Management, Environmental Development and Sustainability, Corporate Environmental Strategy.
3. Proceedings of Conferences e.g. WREN, IASTED etc. Seminars, Symposia and Workshops.
4. A variety of environmental monitoring software.
5. Models of Buildings; Technical sky; Indoor lighting measurements.
6. Load management models and software

12. Thesis Projects, Case studies, Publications, Reviews and other issues related to the module

1. An energy balance model (measurements and performance) for hybrid buildings.
Project report TEI Crete and F.H. Aachen
2. The design and use of Energy Management software and hardware for buildings.
A project report and final year projects in TEI Crete.
3. An Energy Management software development
A project report by Anglia Polytechnic University.