Course Outline

UNIT CODE	EEEQ548
UNIT NAME	Energy Conservation and Management
CLASS	Bachelor of Engineering in Electrical & Electronic Engineering. Year 5.2
LECTURER	Eng. BENARD MUMO MAKAA, PE. Email:ben@benardmakaa.com Website:www.benardmakaa.com Phone.+254716518555

Purpose

The aim of this course is to enable the student to:

1. Understand energy conservation
2. Understand energy management, demand side management.

Learning Outcomes

At the end of this course, the student should be able to:

1. Explain energy conservation measures
2. Explain concepts of energy management, demand side management.

Main Textbooks

1. Barney L. Cape hart, Wayne C. Turner (2016), Guide to Energy Management, Fairmont Press, ISBN: 1420084895
2. Clive Beggs (2002), Energy: Management, Supply and Conservation, Butterworth Heinemann, ISBN: 0750650966

Other Reference Materials

3. Wayne C. Turner & Steve Doty (2012), Energy Management Handbook, 7th Ed., Fairmont Press, ISBN: 142008870X
4. Paul W. O'Callaghan (1993), Energy Management, McGraw-Hill Professional, ISBN: 0077076788.
5. Principles of Power System by V.K. Mehta and Rohit Mehta.

Week	Topic Covered	Sub-Topic/Activity
1.	Global and national energy scenario	• Introduction to Energy Conservation and Management. • Introduction to global and national energy scenario.
2.	Energy and the Environment	Discussion on: • Introduction to Energy,Units of Energy • Energy and the Environment • Factors influencing energy conservation • The Laws of Thermodynamics
3.	Electrical Energy	Discussion on: • Sources of Energy • Importance of Electrical Energy • Generation of Electrical Energy • Efficiency • Calorific Value of fuels • Advantages of Liquid Fuels over the Solid Fuels and vice versa.
4.	Energy Efficient Electrical Services	Discussion on: • Power Factor • Power Triangle • Disadvantages of Low Power Factor • Causes of Low Power Factor. • Power Factor Improvement/Correction • Most Economical Power Factor
5.	Energy Efficient Electrical Services	Discussion on: • Electric Motors • Motor Sizing • Variable Speed Drives (VSD) • Principles of VSD Operation • Lighting Energy Consumption • Energy Efficient Lighting
6.	Variable Load and Load Curves	Discussion on: • Variable Load on Power Station • Effects of variable load • Load Curves, terms and factors. • Types of Loads • Load Duration Curve

		• Typical Demand and Diversity Factors. • Load Curves and Selection of Generating Units. • Method of Meeting the Load CAT 1 Administration
7.	Energy Audits and Surveys	Discussion on: • Energy Audits and Surveys • Types of Energy Audit • Audit Costs • Why is Energy Wasted? • Preliminary Energy Audits • Comprehensive Energy Audits • Energy Surveys • Management and Operating Characteristics • The Audit Report
8.	Energy Management	Discussion on: • Energy Management • The Need For Energy Management • Designing an Energy Management Program • Starting and managing an Energy Management Program
9.	Demand Side Management	Discussion on: • Demand Side Management • Demand-Side Management and Integrated Resource Planning. • Demand-Side Management Programs
10.	Thermal Energy Storage	Discussion on: • Thermal Energy Storage • Storage Systems: Full Storage Systems, Partial storage systems. • Storage Mediums: Chilled Water Storage, Ice Storage
11.	Energy and Transport Systems	Discussion on: • Energy and Transport Systems • Transport and the Economy • The History of Transport • Passenger Transport • Energy Consumption and Transport • Electric Vehicles (EV) • Hyperloop

		CAT 2 Administration
12.	Revision	Revision for the end of semester exams
13.	End of semester exams	Administration of end of semester examination
14.	End of semester exams	Administration of end of semester examination