**RET Y4S2**

## SPE 2422 ENERGY MANAGEMENT AND AUDIT – 45 HOURS

**Prerequisites** SPE 2211 Introduction to Renewable Energy

**Purpose**

To equip the student with knowledge and skills for management and conservation of energy

**Learning Outcomes:**

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

1. State the global environmental and energy concerns
2. Discuss the fundamentals of energy resources management
3. Describe existing energy regulatory policies

**Course Description**

Review of energy development: sources, conversion, transport, losses, storage, conservation. Global environmental concerns:global warming and radiation hazards; Energy and energy resources management: financial management, information system, planning and training, marketing and communicating; Regulatory policy aspects Energy Management: Need for energy conservation, (Started with oil crisis) Environmental Aspects, Energy efficiency- its significance; Energy Conservation; Energy conservation in Domestic Sector; Energy conservation in Industrial sector; Energy conservation in Agriculture sector; Macro Level approach for energy conservation at design stage; Introduction to Energy audit and assessment; Energy usage data; Metering; Lighting; Water conservation; Plug loads; Building envelope; Renewable energy integration; Heating, ventilation and air conditioning (HVAC) systems; Energy modeling; Assessment implementation: financing, measurement and verification, incentives; Energy audit principle: Home energy audit, Industrial energy audits, Types of audits, Simulation based audit; Specific audit techniques: infrared tomography, pollution audit; Energy rating system, Introduction to energy efficiency planning and economics.

**Teaching Methodology**

Lectures, laboratory practical’s, class discussions, tutorials, and field excursions if necessary

**Instructional Materials/Equipment**

White board and white board markers, LCD projector, Laptop and Internet connection, Laboratory Equipments and Components

**Course Assessment**

Continuous Assessment 30%

End of Semester Examination 70%

**Core Reading Materials:**

**Course Textbooks**

1. Diwan P. and Yaqoot M. (2010). *Energy Management*. Pentagon Press, ISBN-13: 978-8182744776
2. Beggs C. (2009). *Energy: Management, Supply and Conservation, (2nd Ed.).* Elsevier Butterworth-Heinemann, ISBN-13: 978-0750686709
3. Krarti, M. (2010). *Energy Audit of Building Systems: An Engineering Approach, (2nd Ed.).* Taylor and Francis, ISBN-13: 978-1439828717
4. Miller F.P., Vandome A.F. and McBrewster J. (2009). *Energy Audit: Energy, Energy Conservation, Efficient Energy Use, Energy Recovery, Pinch Analysis, House Energy Rating, National Home Energy Rating*. Alphascript Publishing, ISBN-13: 978-6130262211

**Course Journals**

1. *Energy Conservation and Management-Elsevier ISSN:0196-8904*
2. *International Journal of Energy Sector Management, ISSN:1750-6220*
3. *Journal of Renewable and Sustainable Energy, ISSN:1364-0321*
4. *International Journal of Energy, Research ISSN:1099-114X*

**Reference Materials:**

**Reference Textbooks**

1. Capehart B.L., Turner W.C., and Kennedy W.J. (2008). *Guide to Energy Management*. The Fairmont Press, Inc. ISBN-13: 978-1439883488
2. Kreith F., and Goswani Y. (2008). *Energy Management and Conservation Handbook*. CRC Press, ISBN-13: 978-1420044294
3. Abbi Y.P. (2006). *Handbook on Energy Audit and Environmental Management*. Teri Press, ISBN-13: 978-8179930922

**Reference Journals**

1. *Journal of Renewable and Sustainable Energy ISSN:1099-114X*
2. *International Journal of Energy Research ISSN::1364:0321*
3. *Energy Conservation and Management-Elsevier ISSN:0196-8904*
4. *International Journal of Energy Sector Management ISSN:1750-6220*

**AOL/APCS/RET Y3S2**

## FSU 2303 RESEARCH METHODOLOGY – 45 HOURS

**Prerequisites:** MAT 2211 Probability and Statistics

**Purpose:**

To enable the student to understand experimental and comparative methods in research methodology as well as data collection and analysis methods

**Learning outcomes:**

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

1. Explain research as it is used in academic and engineering fields
2. Use qualitative and quantitative research methods and data analysis techniques
3. Explain problems that often hinder data gathering, and reliable interpretation of data

**Course description:**

Meaning and purpose of research, Role of research in technology, basic and applied research; selection and definition of the research problem; Importance and scope of Literature review; Developing the conceptual Framework; Research Design; Developing a research plan or proposal; sample design; Data collection; Data analysis and interpretation; Issues in Research. Research report. Research organization: planning, budgeting and costing of research projects.

**Teaching methodology:** Lectures, tutorials; and group discussions

**Instruction materials/equipment:**

1. Liquid Crystal Displays.
2. White boards/black boards
3. Flip charts

**Course Assessment:**

Continuous Assessment 30%

End of Semester Examination 70%

**Core Reading Materials:**

**Course Textbooks:**

1. Law A.M. (2014). *Simulation Modeling and Analysis*. (5th Ed.). McGraw-Hill Science/Engineering/Math. ISBN-13: 978-0073401324
2. Kumar R. (2014). *Research Methodology: A Step-by-step Guide for Beginners,* (4th Ed.). APH Publishing. ISBN-13: 978-1446269978
3. Kothari C.R. (2013). *Research methodology: methods and techniques*. New Age International Pvt Ltd Publishers. ISBN-13: 978-8122436235

**Course Journals**

1. *Journal of Research Methods and Methodological Issues,* Scientific Journals International. ISSN: 1556-6757
2. *Journal of Mixed Methods Research*, Sage publications ISSN: 1558-6898
3. *European Journal of Scientific Research*, Eurojournals. ISSN: 1450-202X

**Reference Materials:**

**Reference Textbooks**

1. Mohapatra A. (2014*). Research Methodology: A Handbook*. PartridgeIndia. ISBN-13: 978-1482817904
2. [Kuada](http://www.google.co.ke/search?tbo=p&tbm=bks&q=inauthor:%22John+Kuada%22&source=gbs_metadata_r&cad=5), J. (2012). *Research Methodology: A Project Guide for University Students*. Denmark: Samfundslitteratur Press. ISBN-13: 978-8759315545
3. Kumar, R. (2010). *Research Methodology*, New Delhi: APH Publishing. ISBN: 1849203016

**Reference Journals:**

1. *European Journal of Research Methods*, Elsevier. ISSN: 0377-2217
2. *International Journal of Social Research Methodology,* Taylor and Francis. ISSN: 1464-5300
3. *Scientific Research International Journals,* Scientific Journals. ISSN:2279–0543