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AEN 3107Rural Electrification

**Course Code:**

**Course Level:** Level 3

**Course Credit:** 3 CU

**Instructor:** Mr. Thomas Makumbi, BSc. Agric. Eng (Mak)  
Teaching Assistant

**Course type:** Core

### Brief Course Description

This course introduces students to the basic principles of energy and their application to provide energy to rural settings especially on farms. It covers topics like electrification, renewable energy systems such as solar, wind and hydropower as well as their applications and uses especially on commercial farms.

### Course Objective

- Students will be able to estimate the renewable energy potential at a given site
- Students will be able to select and design small scale renewable energy systems
- Students will be able to harness the energy through installation and maintenance appropriate renewable energy systems

### Course Outline

Lecture	Topic	Content	Methods	Tools/ equipment
1	Basic electrification	Electrical materials, Electric motors, Electrical measurement and power analysis	Interactive lecture (3 hrs)	Blackboard/ chalk, LCD
2	Basic electrification	Star and delta connections, Polyphase systems for electrical transmission, Electrical power grid structures	Interactive lecture (3 hrs)	Blackboard/ chalk, LCD
3.	Basic electrification	Electrical power distribution, supply and installation, Earthing and bonding	Interactive lecture (3 hrs)	Blackboard/ chalk, LCD
4.	Solar energy	Fundamentals of solar energy, Solar energy principles and non-solar electric applications	Lecture (3 hrs)	Blackboard/ chalk, LCD
5.	Solar energy	Overview of solar electric technology, Solar cell modules and Batteries	Lecture (3 hrs)	Blackboard/ chalk, LCD
6.	Solar energy	Charge controllers and load management, Lamps and appliances, Wiring and fittings	Lecture (3 hrs)	Blackboard/ chalk, LCD
7.	Solar energy	Planning a small solar electric system, Installing solar electric systems, Troubleshooting and system maintenance	Lecture (3 hrs)	Blackboard/ chalk, LCD
8.	Test 1	All the above topics	2 hrs	Stationery
9.	Wind energy	Fundamentals of wind power, Wind energy conversion systems, Wind turbine performance characteristics	Lecture (3 hrs)	Blackboard/ chalk, LCD

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9.	Wind energy	Wind system applications, Wind characteristics, Feasibility studies	Lecture (3 hrs)	Blackboard/ chalk, LCD
10.	Hydropower	Fundamentals of hydropower, Classification of hydropower plants, Small hydropower plants	Lecture (3 hrs)	Blackboard/ chalk, LCD
11.	Hydropower	Planning a hydropower project, The hydroelectric power system, Electric distribution system, Hydropower uses	Lecture (3 hrs)	Blackboard/ chalk, LCD
12.	Test 2	Wind and hydropower	2 hrs	Stationery

**Assessment:**

- Assignments (10%)
- 2 tests (30%)
- Final university examination (60%)

**References**

- Kristoferson L.A and Bokalders V (1991). "Renewable Energy Technologies". Intermediate Technology Publications 103/105 Southampton Row, London WC1B 4HH, UK.
- Hankins M (1984). "Solar Electric Systems for Africa".
- Stout B.A (1984). "Energy Use and Management in Agriculture". Breton Publishers, Wads worth Inc., Belmont, California.
- Stout B.A (1990). "Handbook of Energy for World Agriculture". Elsevier Science Publishers Limited, Crown House, Linton Road, Barking, Essex IG118JU, England.

**Other Resources**

- Computer laboratory connected to internet
  - University library
  - Faculty and department book banks
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