30 Hours Certificate Course on Green Energy and Its Scope in the Present Scenario

Offered by the Department of Physics

DINABANDHU ANDREWS COLLEGE

GARIA, KOLKATA

Dipannita Das

Green Energy and Its Scope in the Present Scenario

Prerequisite: Any undergraduate (UG) student level with basic knowledge of prevailing global energy scenario

Course Duration: **30 hours (6 hrs per week x 5weeks)**
One Class (Theory): 1 Hour
Lab: 2 Hours
Final Assessment on the Last day

Course Fee: **Free of Cost**

Pedagogy: Lecture on theory and Practical

Instructors: Dr Arun Kumar Mukherjee, Dr Phalguni Gupta, Dr Rajsekhar Bhattacharyay Dr Arunima Chanda, Dr Suvrakanta Datta, Smt Dipanwita Das and Dr Pradyot Nanda

Mode of Teaching: Offline

Syllabus (9 modules):

Module 1: Fossil fuels and Alternate Sources of energy **5 Lectures**

Fossil fuels and nuclear energy, their limitation, the need for renewable energy, and non-conventional energy sources. An overview of developments in Ocean shore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, and Hydroelectricity.

Module 2: Solar energy **5 Lectures**

Solar energy, its importance, storage of solar energy, solar pond, non-convective solar pond, applications of the solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar greenhouses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, the role of maximum power point tracking for harvesting maximum energy and sun tracking systems.

Module 3: Wind Energy harvesting **4 Lectures**

Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies. (Only idea of synchronisation, current injection, islanding etc. with utility grid)

Module 4: Ocean Energy **4 Lectures**

Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, and Wave energy Devices. Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.

Module 5: Geothermal Energy **2 Lectures**

Geothermal Resources, Geothermal Technologies.

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Module 6: Hydro Energy **2 Lectures**

Hydropower resources, hydropower technologies, the environmental impact of hydropower sources.

Module 7: Piezoelectric Energy Harvesting **3 Lectures**

Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, piezoelectric parameters and modelling piezoelectric generators, piezoelectric energy harvesting applications.

Module 8: Electromagnetic Energy Harvesting **3 Lectures**

(a) Linear generators, physics mathematical models, recent applications

(b) Carbon-captured technologies, cell, batteries, and power consumption.

(c) Environmental issues and Renewable sources of energy, sustainability.

Module 9: Fuel cell **2 Lectures**

Introduction, Design principle and operation of the fuel cell, Types of fuel cells, the conversion efficiency of the fuel cell, application of fuel cells

Reference Books

1. Non-conventional energy sources, G.D Rai, Khanna Publishers, New Delhi

Additional Reference Books

1. Solar energy, M.P. Agarwal, S Chand and Co. Ltd

2. Solar energy, Suhas P Sukhative, Tata McGraw Hill Publishing Company Ltd

3. Renewable Energy, Power for a sustainable future, Godfrey Boyle, Oxford University Press, in association with The Open University

4. Solar Energy: Resource Assesment Handbook, Dr. P Jayakumar, 2009

5. Photovoltaics, J.Balfour, M.Shaw and S. Jarosek, Lawrence J Goodrich (USA)

EVALUATION POLICY FOR THE ADD-ON COURSE

The basic philosophy behind the Evaluation policy for this 30 Hours Add-on course is to objectively judge the participants (students) whether the concepts were understandable to them or not and whether they could apply these concepts to solve numerical and conceptual problems.

The Evaluation would be done through 2 components –

i) C1 Course-end Assessments (Written Test) [Total Marks: 30]

ii) C2 Practical /LAB [Total Marks: 20]

Total Marks of the Evaluation process would be – 50 Marks

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TABLE FOR QUALIFICATION

TOTAL SCORE (OUT OF 50)	GRADE
45 – 50	O – OUTSTANDING
40 – 44	E – EXCELLENT
35 – 39	A – VERY GOOD
30 – 34	B – GOOD
25 -29	C - FAIR
BELOW 25	F - FAILED

GENERAL RULES AND REGULATIONS

1. Students must attend and appear for all the Module-End Assessments. If any student fails to submit any of the Module-End Assignments or fails to attend any of the Module End Assessment examinations , the particular Student would NOT BE ELIGIBLE FOR CERTIFICATE.
2. Students must attend and appear for the Course-End Assessment Examination. If any student fails to submit the Course-End Assessment or fails to attend the Course-End Assessment Examination , the particular Student would NOT BE ELIGIBLE FOR CERTIFICATE.
3. Students must attend and appear for the Course-End Viva. If any student fails to fails to attend the Course-End Viva, the particular Student would NOT BE ELIGIBLE FOR CERTIFICATE.
4. Total Marks of Course Evaluation will be 50 Marks.
5. Minimum 50% Marks has to be scored to receive any Certificate. There will be only ONE Attempt allowed for each of the Module-End Assessments and the Course-End Assessment.
6. There will be NO PROVISION for Backlog Clearance.
7. General Rules and Regulations of the College must be followed without any exception.
8. **Minimum 75% attendance is required to receive the certificate of the course.**

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