Subject Description Form

Subject Code	ME6403
Subject Title	Renewable Energy Technologies
Credit Value	3
Level	6
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To understand the importance of renewable energy in solving the energy and environmental problems we are facing. 2. To provide students with fundamental knowledge of renewable energy conversion, storage and utilization technologies. 3. To enable students to design and analyze major renewable energy application systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) understand the concepts and components of renewable energy systems; b) apply the fundamental knowledge of renewable energy systems for applications and innovations; c) design and evaluate major renewable energy systems; d) obtain comprehensive knowledge and skills on selected topics in renewable energy systems.
Subject Synopsis/ Indicative Syllabus	***Introduction***: renewable energy resources, renewable energy use and environment, climate change. ***Energy Conversion:*** solar energy (resource, photovoltaic and concentrated solar power); wind energy (resource, wind turbine); geothermal energy (resource, power generation); biomass conversion; hydrogen and fuel cells; artificial photosynthesis (photo/electrochemical carbon dioxide and nitrogen reduction); nuclear energy. ***Energy Storage:*** portable energy storage (lithium-ion batteries); large-scale energy storage (flow batteries); energy storage in chemicals; site dependent energy storage (compressed air and pumped hydro). ***Energy Utilization:*** efficient usage of energy in industries and buildings; energy saving; pinch analysis.
Teaching/Learning Methodology	The realization of the intended learning outcomes will be primarily on the basis of lectures under adequate guidance from subject instructors. Students will also be directed to complete a team project with report and presentation to enhance understanding of the subject contents and practice presentation skills.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Homework	20%	✓	✓	✓	
2. Project	30%				✓
3. Examination	50%	✓	✓	✓	
Total	100 %				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Overall Assessment:

0.50 × Examination + 0.50 × Continuous Assessment

1. The continuous assessment will comprise two components: team project (30%) and homework (20%). The team project and homework are aimed at evaluating their understandings on renewable energy systems and enhancing the integration of their knowledge learnt.
2. The examination (50%) will be used to assess the knowledge acquired by the students for understanding and analysing the problems critically and independently, and to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture	33 Hrs.
▪ Project	6 Hrs.
Other student study effort:	
▪ Self-learning	66 Hrs.
Total student study effort	105 Hrs.

Reading List and References	J.A. Duffie, W.A. Beckman, Solar Engineering of Thermal Processes, Photovoltaics and Wind, 5th Edition, Wiley, Latest Edition. (Available in our library) A.V. da Rosa, J.C. Ordonez, Fundamentals of Renewable Energy Processes, 4th Edition, Elsevier Science, Latest Edition. (Earlier version is available in our library) A.L. Dicks, D.A.J. Rand, Fuel Cell Systems Explained, Wiley, Latest Edition. (Available in our library) J. Newman, K.E. Thomas-Alyea, Electrochemical Systems, Wiley, Latest Edition. (Available in our library) R. Korthauer, Lithium-Ion Batteries: Basics and Applications, Springer, Latest Edition. (Available in our library)

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