

<b>Module code</b>	SP-4303		
<b>Module Title</b>	Renewable Energy		
<b>Degree/Diploma</b>	Bachelor of Science (Applied Physics)		
<b>Type of Module</b>	Major Option		
<b>Modular Credits</b>	4	<b>Total student Workload</b>	8 hours/week
		<b>Contact hours</b>	4 hours/week
<b>Prerequisite</b>	SP-1303 or SP-1203 Thermal Physics and Optics		
<b>Anti-requisite</b>	None		
<b>Aims</b>			
This module emphasis is on renewable and sustainable energy sources and introduces the students to the nature of alternatives to traditional energy sources. How these renewables could be used to generate and store either green electricity or bio-fuels and the technologies involved for these conversion processes.			
<b>Learning Outcomes</b>			
<i>On successful completion of this module, a student will be expected to be able to:</i>			
Lower order :	40%	- understand the basic principles of renewable energy technologies for local and non-local situations -understand the working knowledge of PV generator	
Middle order :	40%	-describe the nature and scope of alternative energy, the application of electricity - compare different methods generating electricity, compare different techniques for storage and use of electricity -describe the applications and operation of different non electric energy systems, identify ways to better manage energy consumption -describe energy conservation techniques	
Higher order:	20%	-design PV standalone and hybrid systems, interpret and discuss the results of analyses on the renewable energy systems	
<b>Module Contents</b>			
Review of thermodynamics, fossil fuels, the electrical national power grid in Brunei, renewable energies and power production:			
<ul style="list-style-type: none"> <li>- Photovoltaic: PV solar cells, working of solar cells, effect of solar radiation, working temperature and shading on the performance of PV cells in natural and indoor environment, energy losses, designing of PV generators; Solar Thermal Energy: solar thermal devices, active and passive use of solar thermal energy, Solar Electricity: Photovoltaic and solar thermal</li> <li>- Wind Energy: wind energy conversion system, wind resource analysis, wind farms</li> <li>- Hydroelectric: hydroelectric power systems, pumped hydro; Geothermal Energy: resources, exploration and generation of electrical power, dry stream, flash stream and binary cycles power plants; Oceanic Energy: wave energy, tidal energy, ocean thermal energy</li> <li>- Hydrogen Technology: production, safety and uses; Bio-energy: biomass and bio-fuels</li> <li>- Fuel Cells: types of fuel cells theory and their applications; Energy Storage: mechanical, electrochemical, electrical and thermal; Energy Efficiency: energy management, environmental impact of different types of energy, energy conservation, outlook of fossil and green energy</li> </ul>			
<b>Assessment</b>	Formative assessment	Discussions and feedback	
	Summative assessment	Examination: 60% Coursework: 40% - 2 reports (20%) - 1 test (10%) - 1 project (10%)	