

Module code	SP-4310		
Module Title	The Physics of Solar Cells		
Degree/Diploma	Bachelor of Science (Applied Physics)		
Type of Module	Major Option		
Modular Credits	4	Total student Workload	12 hours/week
		Contact hours	4 hours/week
Prerequisite	None		
Anti-requisite	None		
Aims			
This module aims to give students an understanding of the device physics, materials, and characterisation techniques relevant to solar cells.			
Learning Outcomes			
<i>On successful completion of this module, a student will be expected to be able to:</i>			
Lower order :	0%		
Middle order :	30%	<ul style="list-style-type: none"> - describe common solar cell characterisation techniques and standard test conditions - qualitatively explain the operation of conventional p-n junction solar cells and emerging excitonic solar cells. 	
Higher order:	70%	<ul style="list-style-type: none"> - apply simple mathematical models to predict and analyse the current voltage characteristics of various types of solar cells - understand solar cell models based on continuity equations governing the generation, transport, and recombination of charge carriers - understand the predominant loss mechanisms in various types of solar cell - explain why there is a theoretical limit to the efficiency of solar cells - work independently and also collaboratively in a team - interpret the results of analyses, and make appropriate reports and presentations for effective communication 	
Module Contents			
The main contents of the module are:			
<ul style="list-style-type: none"> - terrestrial solar irradiance spectrum - photovoltaic parameters - spectral quantum efficiency - Shockley–Queisser detailed balance approach - continuum models - recombination mechanisms - operating principles of mono- and poly-crystalline Si, CIGS, CdTe, dye-sensitized, organic, perovskite and multi-junction solar cells - third-generation concepts including intermediate band cells and multiple exciton generation 			
Assessment	Formative assessment	In-class questions and homework problems will be used to test and give feedback on learning.	
	Summative assessment	Examination: 0% Coursework: 100% <ul style="list-style-type: none"> - Two (2) class tests (50%) - Three (3) written assignments (30%) - One (1) literature survey (10%) - One (1) oral presentation (10%) 	