





## Short Course

Sponsored by the Australian High Commission in collaboration with UNDP

# Skills Development for Solar Photovoltaics Value Chain

The "Skills Development for Solar Photovoltaics Value Chain Short Course" has been developed by the University of Mauritius and is fully sponsored by the Australian High Commission (AHC) in Mauritius and in collaboration with the UNDP Mauritius. The short course aims at introducing the principles of photovoltaic technology, the basics of communications for community outreach and also enterprise development.

The course has been specifically designed to address capacity gaps in the RE sector; the ability to understand the basic technical aspects of PV technology, the capacity to engage with households and small businesses at grassroot level on the benefits of solar energy and awareness of the low carbon energy solutions available.

This course is mainly targeted for women as a first priority.



# **Overview**

The Australian High Commission in collaboration with the United Nations Development Programme is sponsoring female participants under the Direct Aid Programme for the short course entitled "Skills Development for Solar Photovoltaic Value Chain" offered by the University of Mauritius.

As per the 2019 Digest of Labour Statistics the 'Electricity, gas, steam and air conditioning supply' sector in Mauritius employed approximately 2,200 workers of which less than 10% are female. The advent of Covid-19 pandemic and the ensuing economic slowdown has caused an increase in unemployment with women and youth being considerably affected.

As countries, including Mauritius, are planning ahead for economic recovery, increasing the use of Renewable Energy (RE) is being prioritized to meet energy demand, drive employment opportunities and meet climate targets. In the recently announced 2021/2022 budget measures, the Government of Mauritius is taking the commitment to meet 60% of the country's need in energy with green sources by 2030 with rooftop solar photovoltaic (PV) as a key technology contributing to the decarbonization process. This will create employment opportunities and capacity gaps must be addressed to maximize gender inclusiveness so that women also benefit from jobs created throughout the supply chain.

In order to create an ecosystem for enhancing the penetration of all types of PV technologies in Mauritius there is a need for development of the skills, building capacity of the local people and empowering them to start up businesses in the field.

The "Skills Development for Solar Photovoltaics Value Chain" has been developed by the University of Mauritius and the short course aims at introducing the principles of photovoltaic technology, the basics of communications for community outreach and also enterprise development. The course has been specifically designed to address capacity gaps in the RE sector; the ability to understand the basic technical aspects of PV technology, the capacity to engage with households and small businesses at grassroot level on the benefits of solar energy and awareness of the low carbon energy solutions available.

Through a combination of highly interactive lecture sessions, group discussions, experimental sessions, computer based simulations, case studies and site visits, the participants will gain in depth understanding of PV technologies and develop competence in PV energy systems, communication skills and enterprise development.

Participants will also be provided with all the necessary material to accompany them during the course.

# **Aims and Objectives**

#### Main objectives of the course are:

- To introduce Renewable energy and photovoltaics
- To introduce fundamentals of solar engineering
- To introduce the fundamental principles of Photovoltaics and solar cell/module operation
- To introduce PV cell/module technologies and characteristics
- To design photovoltaic systems and assess their yield
- · To perform photovoltaic system component selection and sizing
- To model and Optimise performance of photovoltaic systems.
- To communicate effectively with a wide range of audiences
- To develop a business environment
- To plan and set up business
- To be conversant with legislative and Regulatory frameworks To organise and plan business (HR and Finance)
- To perform financing, HR management and accounting of business.

### **Resource Persons**

Dr Yatindra Kumar RAMGOLAM Dr Devkumar Callychurn Ms Christina CHAN-MEETOO

### Certificate

A Certificate of Attendance will be awarded by the University of Mauritius at the end of the course.

#### **Beneficiaries and Minimum Requirements**

Beneficiaries: 20 women (school leavers, fresh graduates or any women interested in the course)

requirements: Pass in English at O-Level. Min

The second batch has successfully completed in July 2022. Twenty applications are invited for the third batch. In case of over-subscription (i.e. more than 20 participants qualifying for the course), participants will be selected on a first-come, first-served basis. The remaining participants will join a waiting list for the forthcoming batches (to be confirmed). The participants will need to sign an undertaking with University of Mauritius to confirm their availability and attendance to all the session.

Batch size - 20 participants.

## **Duration and Schedule**

Duration of course is 53 hrs over 2 weeks intensive, from 0900 to 1630 on weekdays. Tentative dates for batch 3: 17 April - 28 April 2023

2 Weeks intensive

Detailed time table will be sent to selected participants

# Special arrangements/ Venue

The sessions will be conducted in the Electronics and the Innovative Solar Energy Laboratory of the Electrical and Electronic Engineering Department at the University of Mauritius

The Laboratories are equipped with necessary IT infrastructure. PCs with installed software. PV panels and PV kits for demonstration sessions.

Potential Candidates are recommended to have appropriate IT infrastructure such as а PC/Laptop/Tablet with camera and microphone and a good internet connectivity for ANY Online sessions in case of externuating circumstances.



Innovative Solar Energy Laboratory

















Off Grid set up

Course	Session Duration	Outline		
Photovoltaic Energy Systems - Resource Person: Dr Yatindra Kumar Ramgolam	PES 1 – 3hrs	<ul> <li>Need for Renewable energy and introduction to Photovoltaics</li> <li>Status and evolution of Photovoltaics Globally and Locally</li> <li>Solar cell technologies and evolution</li> <li>Applications of Photovoltaics</li> <li>Types of PV power systems (PVPS) and balance of system components</li> </ul>		
	PES 2 – 3hrs	<ul> <li>Solar Engineering fundamentals</li> <li>Sun path diagrams: Apparent motion of the sun</li> <li>Estimating Solar Energy on horizontal and inclined planes</li> <li>Sunshine hours, peak sun hours and sky clearness index</li> <li>Sources of Solar energy data: Satellite data and Ground Based Measurement; Solar Maps – Solar energy and power variations in Mauritius</li> </ul>		
	PES 3 – 3hrs	<ul> <li>Technologies of Solar cells</li> <li>Principle of operation</li> <li>Electrical properties of Solar cells</li> <li>Solar modules and arrays (Series /Parallel Connections)</li> <li>Types of modules and technological characteristics</li> <li>Reading cell/module datasheets</li> <li>Cell efficiency tables</li> </ul>		
	PES 4 – 3hrs	<ul> <li>Comparative analysis of commercially available cell technologies</li> <li>Quality of Solar Panels and related standards</li> <li>Effect of environment on cell/module performance and power output</li> <li>Effect of shading, series and shunt resistance on electrical characteristics.</li> <li>Protection Requirements for PV modules.</li> </ul>		
	PES 5 – 3hrs	<ul> <li>Balance of system (BoS) components: Module Level power electronics, Inverters, Charge Controllers, Battery Energy Storage, DC/AC switchgear.</li> <li>Quality of BoS components.</li> <li>Experimental session on PV technologies</li> </ul>		
	PES 6 – 3hrs	<ul> <li>Introduction to System Design Standards and Best Practice for PV system Design</li> <li>Grid CODE/Promotion Mechanisms</li> <li>Assessment of Electrical Demand</li> <li>Demand Assessment</li> <li>Site Assessment</li> <li>Adjustment for site conditions</li> </ul>		
	PES 7 – 3hrs	<ul> <li>Component Sizing and Selection</li> <li>System Voltage Selection; System selection</li> <li>PV Component selection and sizing; Array Sizing</li> <li>Battery Sizing and Selection; Regulator Sizing and selection</li> <li>Inverter Sizing and Selection</li> <li>Cable Sizing</li> <li>Metering and Electrical Protection</li> </ul>		
	PES 8 – 3hrs	<ul> <li>Installation and Safety Requirements of PV systems</li> <li>Mounting structures – Design configurations for optimised energy input.</li> <li>Performance monitoring and optimisation</li> </ul>		
	PES 9 – 3hrs	<ul> <li>Introduction to simulation software NREL SAM and PV SYST</li> <li>System simulation parameters</li> <li>Performance models parameters</li> <li>Case studies on Simulation of PV systems</li> </ul>		
	PES 10 – 3hrs	<ul> <li>Case study 1 - Design of Regulated stand alone with battery and DC load</li> <li>Case study 2 - Design of Regulated stand alone with battery and DC/AC loads</li> </ul>		
	PES 11 – 3hrs	<ul> <li>Case study 3 - Design of Grid Tied PV System (SSDG and MSDG)</li> <li>Implementation of Stand Alone system and monitoring of operation. Site visit to grid tied PV system</li> </ul>		
	PES 12 – 3hrs	<ul> <li>Financial Evaluation of PV Projects</li> <li>Simple Payback Period (SPP); Life Cycle Costing (LCC)</li> <li>Annualised LCC/Unit Cost of Electricity; FiT/Levelised Cost of Electricity (LCOE)</li> <li>Case Studies – Calculation of LCOE/FiT for PV projects</li> </ul>		

Course	Session Duration	Outline
Dutreach <b>Systems</b> - <i>on:</i> MEETOO	CCO 13 – 2hrs	Basics of communication         • The 5Ws + H         • Objectives to be achieved - inform/persuade/advise         • Communication styles         • Importance of adapting to the audience - The feedback loop         • Overcoming obstacles (interference, noise, misunderstanding)         • Channels of communication (oral, visual, text, video)
ınd Community ( Resource Persi ıristina CHAN-	CCO 14 – 3hrs	<ul> <li>Impactful communication</li> <li>Role play: scenarios (receptive vs non-receptive audiences)</li> <li>Interpreting and translating institutional material for the target audience <ul> <li>Translation from English to Creole</li> </ul> </li> <li>Designing an impactful message</li> </ul>
Communication a Ms Ch	CCO 15 – 3hrs	<ul> <li>Making more impact using creative tools</li> <li>Selecting preferred and impactful channels and formats</li> <li>Using accessible creative tools and technology to communicate</li> <li>Creating short video messages <ul> <li>Duration, background, lighting, sound</li> <li>Basic editing techniques</li> </ul> </li> </ul>
t	ED 16 – 3hrs	<ul> <li>Business Environment.</li> <li>Business development strategies</li> <li>Business planning</li> </ul>
<b>rise Developmen</b> i source Person: vkumar Callychurn	ED 17 – 3hrs	<ul> <li>Legislative and Regulatory Frameworks</li> <li>Licensing</li> <li>Business Registration</li> <li>Taxation</li> <li>Support Institutions</li> </ul>
Enterp Re Dr De	ED 18 – 3hrs	<ul> <li>Product and Service Design</li> <li>Marketing</li> <li>Planning: HR &amp; Finance</li> <li>Writing a Business Plan</li> </ul>

# How To Apply?

Applicants should browse to the link below or follow the QR code and fill in the Application Form over this LINK: https://forms.gle/6te7u1GGxkknujsGA

The Following documents should be sent by email to Dr Y K Ramgolam (y.ramgolam@uom.ac.mu) and copied to Dean (deanfeng@uom.ac.mu),

- Filled in Application Form
- Curriculum Vitae,
- National ID,
- Qualifications,
- Birth certificate

#### Deadline for Application: Friday 07 April 2023 by 4pm

Only the first 20 eligible applicants will be selected and notified of the outcome of their application. The remaining eligible applicants will join a waiting list and be notified of future running batches (to be confirmed).





# For more information

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