ECSA CPD
4 credits

AEE CPC
7.2 credits

The Energy Training Foundation (EηTF)

Training and certification of energy professionals in Southern Africa

- Sole approved training partner of the AEE for the Southern African region
- Affiliated training provider of the SAEE
- Fully accredited EWSETA training provider
- ECSA CPD credits for all training courses
- Training division of Energy Cybernetics (PTY) Ltd

Photovoltaic Technologies (PVTech)

Nelson Mandela Metropolitan University
for tomorrow

EWSETA
Energy and Water Sector Education and Training Authority

The Photovoltaic Technologies (PVTech) course will provide candidates an understanding and tools to design grid-tied photovoltaic (PV) systems within the South African solar resource, technical and legislative contexts.

The Nelson Mandela Metropolitan University (NMMU) has assembled the Photovoltaic Technologies (PVTech) short course which is offered by the Energy Training Foundation (EnTF) in Pretoria.

PVTech course covers grid-tied PV systems in the South African context the latest trends in manufacturing and modelling, technical aspects surrounding the PV cells and modules, standards, PV reliability and bankability, etc.

The underlying design criteria will be to optimise the energy yield versus lifecycle costs of the PV system within the given resource, technical and legislative constraints, i.e. the optimising of the financial viability of the system.

DELEGATE PROFILE

- From beginner level for information only to experienced persons wishing to learn more about Photovoltaic Technologies in South Africa.
- Persons that have to find ways of saving energy and provide alternative means of energy solutions.
- Consultants, engineers, technicians, renewable energy company employees, students, and any persons interested in the latest information regarding PV.

EXAMINATION

Daily revision tests will be written

A 90 minute examination on the last day of training

DURATION

5 days of class-based training

RECOGNITION

Engineering Council of South Africa (ECSA)

4 Continuing Professional Development (CPD) credits for ECSA registration

Association of Energy Engineers (AEE)

7.2 credits for Continuing Professional Competency (CPC) demonstration to relevant AEE certification programs

Nelson Mandela Metropolitan University (NMMU)

Certificate of Completion - Examination pass of 50%
Certificate of Completion Cum Laude – Examination pass of 75%

Attendance Certificate

Attendance certificate will be issued to all delegates that attend the full duration of the training course if the exam is not taken or not passed

COSTS*

R10 700.00 (excl VAT)

Includes: 5-day training course programme, examination, electronic training manual, marking and certificate fee, lunch, tea and coffees

BOOKINGS

Logon to **www.energytrainingfoundation.co.za** to register online or download a manual registration form and email it to **training@entf.co.za**.

TRAINING PROGRAMME OUTLINE

Module 1: PV Cells

- Short historical review
- Semiconducting Materials
- The PN Junction
- Basic PV Cell Structure
- PV Cell Performance

Module 2: PV Modules

- Silicon Module Structure
- Thin Film Modules
- Concentrator Photovoltaics
- I-V Curves
- Module Circuit Layout
- Effect of Module Shading
- Module Temperature
- Module Specification
- Module Certification
- Warranties

Module 3: Silicon Cell Manufacturing

- History
- Raw Materials
- Types of Si PV Cells
- Diffusion Process
- Si Cell Fabrication

Module 4: Latest Photovoltaic Trends

- Modelling Module Efficiency
- Solar Cell Efficiency
- PV Manufacturing Improvement
- Modelling Prices
- Manufacturing Cost
- Cost of PV Modules
- Projections
- Efficiency – Price Status and Projection
- Module Certification
- Warranties

Module 5: Photovoltaic Reliability and Bankability

- Financing a large PV project
- Financing: Risk Perceptions
- Risks: Lab-to-Fab Gap
- Risks: Performance Reduction
- Possible PV Plant Defects
- Bankability

Module 6: Photovoltaic Electricity Production Overview/Trends

- Drivers for PV in SA
- Drivers for RE in SA
- PV Electricity Production in SA
- PV Market in SA

Module 7: Review of Photovoltaic Module Failures

- Introduction
- Definitions
- Identification of PV module failures
- Failure modes in PV modules
- Adapting testing methods

Module 8: Introduction to PV module characterisation.

- I-V measurement methods
- IEC Standard (IEC12615)
- Standardised tests (STC, NOCT)
- Categories of degradation modes and loss mechanisms in PV modules

Module 9: Photovoltaic Module Testing and Research at NMMU

- Photovoltaic Test Laboratory
- Outdoor Research Facility
- Photovoltaic Research Laboratory

Module 10: Energy Yield Modeling Software and Case Studies

- Introduction to system specification and modelling / simulation tools
- Basic "free" simulation tools: Capabilities and limitations
- Activity: Spreadsheet sizing
- Activity: Off-grid sizing PVGIS online tool
- Activity: Off-grid sizing PVSyst or PVSol
- Overview of grid-tied PV plant energy yield calculation using PVSyst
- Case study
- PV Simulation – demonstration

* ***Terms and conditions***

1. *First paid first served policy applies for booking security*
2. *Booking security requires the following to be received six (6) working days prior to the commencement of the course:*
   a. *Full payment with proof of payment supplied.*
   b. *A deposit of 25% with proof of payment supplied.*
   c. *A purchase order for the full amount of the invoice.*
3. *Fees include coffee/tea/juice on arrival, mid-morning coffee/tea with pastries, mid-afternoon coffee/tea with biscuits, and lunch. For training the fee includes the black and white text books, course fee and one year membership of the SAEE. For examinations the fee includes the examination fee, marking fee, certification application fee, and 1 year membership of AEE for successful candidates.*
4. *It is the responsibility of the candidate attending the course to arrange their own travel, accommodation, breakfast and dinner.*
5. *Policy on international candidates*
   a. *Invoices exclude withholding and country-specific taxes. Should these be leveraged by your country government, we reserve the right to invoice the responsible entity/person to recoup the costs.*
   b. *VAT is payable for candidates attending training in South African borders, this may be claimed on departure from South Africa using the tax invoice.*
6. *Policy on cancellations*
   a. *Cancellations received within five (5) working days prior to the first day of training will carry a 25% cancellation fee. No course material will be supplied. For examinations a rescheduling fee of 25% will be leveraged.*
   b. *Cancellations received six (6) working days prior to the first day of training will receive a full refund.*
7. *Policy on accounts not in good standing*
   a. *The candidate in attendance at the course ultimately remains responsible for payment of the outstanding account and providing the proof of payment thereof.*
   b. *In the event that a candidate, or the candidate's organisation is not in good standing with us we reserve the right to withhold:*
      - *Certificates of Attendance*
      - *Course Attendance Registers*
      - *Issuing of ECSA CPD credits*
      - *Examination Results*
      - *AEE Certification Application and/or Renewal Submissions*
      - *AEE Certification Certificates*
      - *Listing on the AEE website*
8. *The Energy Training Foundation (EnTF) is a division of Energy Cybernetics (Pty) Ltd and the invoice will be made out by Energy Cybernetics.*
9. *Proforma invoices will be supplied, Tax Invoices will be raised on request but these are payable within 30 days of issue.*
10. *Right of Admission Reserved.*

About the Energy Training Foundation

The EnTF offers tailor-made training courses to fulfil the energy training needs of the industrial, mining and commercial industries in Southern Africa. EnTF is an accredited EWSETA training provider, and all courses carry CPD credits for ECSA requirements. EnTF is the sole approved US-based Association of Energy Engineers (AEE) training partner for the Southern African region. The most popular standard courses are: Certified Energy Manager (CEM®), Certified Energy Auditor (CEA™), Certified Measurement and Verification Professional (CMVP®), Certified Renewable Energy Professional (REP™), Certified Water Efficiency Professional (CWEP), Fundamentals to Energy Management Training (FEMT), Energy Management System Implementation (EnMSI), Building Energy Audit Training (BEAT) and Measurement & Verification Standard Training for South Africa (MVST-sa).

aee® The Association of Energy Engineers

The EnTF is the sole approved training partner for the Southern African region of the US-based Association of Energy Engineers (AEE) who has been promoting the scientific and educational interests of those engaged in the energy industry and developing energy engineering programmes since 1977. AEE certification qualifications are recognised world-wide in 98 countries.

saee The Southern African Association for Energy Efficiency

The EnTF is the affiliated training provider for the AEE's chapter in South Africa, the Southern African Association for Energy Efficiency (SAEE). The SAEE has been facilitating information dissemination, networking and training in the region since 2002.

EWSETA Energy and Water Sector Education and Training Authority

The EnTF is a fully accredited Energy and Water SETA (EWSETA) training provider in South Africa.

ECSA Engineering Council of South Africa

All EnTF courses have ECSA accreditation for CPD credits to ensure maximum benefit for professional development in the engineering industry of South Africa. ECSA CPD credits, where appropriate, may be used towards Professional Development Hours (PDH) or Continuing Education Units (CEU) for the AEE's re-certification programme to ensure Continuing Professional Competency (CPC).

For more information: • info@entf.co.za • 084 622 4770/084 011 5500 • www.entf.co.za