Virtual and Practical Laboratory on Photovoltaic Power Systems by prof . G. M. Tina
From 8 to 31 January 2025

Course Overview:
This short course offers a comprehensive introduction to photovoltaic (PV) power systems, combining theoretical knowledge with hands-on experience. Through a blend of lectures, software simulations, and a technical site visit, you will gain a deep understanding of the design, operation, and analysis of PV systems.

Course Objectives:
Upon completion of this course, you will be able to:

- Understand the fundamental principles of photovoltaic energy conversion
- Utilize specialized software tools (e.g., PVsyst, SAM) to design and simulate PV systems
- Analyze the performance of PV systems under various conditions
- Evaluate the economic feasibility of PV projects
- Gain practical experience through a technical site visit to a real-world PV installation

Course Structure:
The course is divided into six sessions:

1. **Introduction to Photovoltaic Systems:**
    - Overview of PV technology and its applications
    - Solar radiation and its impact on PV performance
    - Key components of a PV system: solar cells, modules, inverters, and balance of system (BOS)
2. **Software Tools for PV System Design and Simulation:**
    - Hands-on training on using PVsyst or SAM software
    - Modeling PV system components and system configurations
    - Simulating system performance under different climatic conditions
    - Analyzing energy yield and economic viability
3. **Practical Laboratory Session:**
    - Conduct experiments on PV modules and inverters in the laboratory
    - Measure and analyze electrical parameters, such as I-V curves and power output
    - Explore advanced topics like maximum power point tracking (MPPT) algorithms
4. **Technical Site Visit:**
    - Visit a local photovoltaic power plant
    - Observe the installation and maintenance of PV systems
    - Learn about real-world challenges and best practices
5. **Advanced Topics and Case Studies:**
    - Discuss emerging trends in PV technology, such as bifacial modules and solar trackers
    - Analyze case studies of large-scale PV projects
    - Explore the integration of PV systems with energy storage systems
6. **Final Project Presentation:**
    - Present the results of your individual or group project
    - Discuss the design, simulation, and analysis of a PV system
    - Receive feedback from the instructor and peers