UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Dall’energia solare all'elettricità: funzionamento e prospettive del fotovoltaico

2526-BbetweenSDG-08-01

Module description

The module aims at analysing the potential of solar energy within the energy transition. The aim is to provide students with the basic skills to be able to better understand the potential of photovoltaic conversion of solar energy by describing the different types of solar cells currently on the market. The advantages and disadvantages of the various technologies, their potential fields of application and a description of how a photovoltaic system works and how its performance is evaluated will be explained. The full sustainability of this inexhaustible source of renewable energy will also be demonstrated by describing the current recovery and recycling process of end-of-life solar panels.

Learning goals

General goal

Sustainability education in the field of energy and acquisition of an appropriate set of skills for everyone to be able to deal critically with the issue of energy related to climate change. Acquisition of basic technical-scientific knowledge in order to be able to assess current technologies and deal with the energy transition. Acquisition of basic environmental skills and related communication skills.

Specific skills and competences

Acquisition of specific skills in the scientific field related to photovoltaic devices, with a focus on devices currently

on the market. Becoming familiar with the production processes for the realisation of photovoltaic devices and systems and to be able to assess their impact in terms of sustainability and integration in cities and rural environments. Acquiring language and communication skills to promote sustainability, specifically related to the exploitation of solar energy as an inexhaustible source of energy in a sustainable energy transition process. Development of skills to take measures to reduce pollution and apply these acquired environmental skills and competences in the fight against climate change through sustainable behaviour choices.

Sustainable Development Goals of the 2030 UN Agenda

The proposed module is consistent with some Goals of Agenda 2030: Goal 7: Clean and Affordable Energy; Goal 11: Sustainable Cities and Communities; Goal 13: Climate Change.
In particular, it is ascribable to initiatives aimed at:
Goal 7.2 Increase substantially by 2030 the share of renewable energy in total energy consumption
Goal 11.3 By 2030, strengthen inclusive and sustainable urbanisation and the capacity to plan and manage participatory, integrated and sustainable human settlement in all countries
Goal 11.6 By 2030, reduce the negative per capita environmental impact of cities, [...]

Breakdown of meetings

Meeting 1. * 2 hours*, Photovoltaic energy in the current renewable energy scenario: state of the art and future prospects.

Meeting 2. *2 hours*, How does a solar cell work? General characteristics and operating principles of photovoltaic devices.

Meeting 3. *2 hours*, Types of solar cells on the market (crystalline silicon cells and thin film cells for building integration).

Meeting 4. *2 hours*, New materials and new types of cells: current research lines.

Meeting 5. *2 hours*, Photovoltaic modules and plants: how to quantify the energy produced by a domestic photovoltaic plant and how to calculate its economic and energy return + recycling processes of photovoltaic panels at the end of their life.
Meeting 6. *1 hour*, Photovoltaics everywhere: the photovoltaics of the cities and countryside of the future: from architectural integration in buildings to the exploitation of indoor lighting up to Agrivoltaics. *1 hour*, Forecast from 1 Terawatt (1000 GW) today to 70 TW of installed capacity in 2050 needed to reach the climate objectives set in the 2015 Paris agreement.

Next, visit to research laboratories if the number of participants allows it.

Number of participants

There is no limit to the number of participants.
The module is held remotely.

Language used in meetings

Italian

Delivery period of the module

Methods of assessing the outcomes of the learning process

Closed-question tests and open-question tests in specific exam's sessions.

Department of affiliation of the teacher

Dipartimento di scienza dei materiali

Sustainable Development Goals

AFFORDABLE AND CLEAN ENERGY | SUSTAINABLE CITIES AND COMMUNITIES