Course guide
2400152 - 240MER57 - Photovoltaic Cells

Last modified: 27/04/2026

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: MASTER'S DEGREE IN RENEWABLE ENERGY ENGINEERING (Syllabus 2025). (Optional subject).

Academic year: 2026 **ECTS Credits:** 5.0 **Languages:** English

LECTURER

Coordinating lecturer: Joaquim Puigdollers

Others: Cristobal Voz
Edgardo Saucedo

PRIOR SKILLS

Basic background in semiconductor device physics and materials science

TEACHING METHODOLOGY

During the development of the course the following teaching methods will be used:

- Lecture or conference (EXP): presentation of the topics from professors lectures or by outsiders experts (through invited lectures).
- Participatory classes (PART): ressolution of exercises (individually or by group), group discussions with the professors about specific topic, classroom presentation of an activity carried out individually or in small groups.
- Theoretical or practical work supervised by the professor (TD): completion of a classroom activity or exercise (theoretical or practical), individually or in small groups with the professor's guidance.
- Project activity (PR): Learning activities focused on the development of an individual (or small group) activity of limited complexity and/or length, applying previous knowledge adquired at during the course and presentation of the results.
- Project work (PA): learning based on the design, planning and implementation of a project with higher complexity complexity, with the objective to extend the knowledge adquired at the class courses. A writing report summarizing the objectives, development, results and conclusions will be performed.
- Evaluation activities (EV).

LEARNING OBJECTIVES OF THE SUBJECT

Understanding the operating principles of solar cells.
Knowledge of the manufacturing technology and specific operating principle of solar cells based on crystalline silicon.
Knowledge of cells based on emerging semiconductors (Kesterites, Chalcogenides, Calcohalides)

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	100.00

Total learning time: 45 h

CONTENTS

Working principles of solar cells

Description:
What is a solar cell. photovoltaic parameters
Cell types.
Movement of electric charges.
Principles of operation. Absorber and selective contacts.

Specific objectives:
Understanding working principle of a solar cell.

Full-or-part-time: 15h
Theory classes: 15h

Crystalline silicon solar cells

Description:
Principles of operation of crystalline silicon cells
Manufacturing technology of crystalline silicon solar cells

Full-or-part-time: 15h
Theory classes: 15h

Solar cells based on emerging semiconductors

Description:
Synthesis and deposition of emerging thin-film semiconductors (Kesterites, Chalcogenides, Calcohalides, etc.)
Structural, chemical and electrical properties
Solar cells based on these semiconductors.

Full-or-part-time: 15h
Theory classes: 15h

GRADING SYSTEM

Written control test (PE): 70%
Work done individually or in groups throughout the course (TR): 30%

RESOURCES

Other resources:
Reserach papers provided during the course.
Visit Clean Room Facilities