

**Summarized Course Description**

Course number: ECE 452	Course name: Fundamentals of Photovoltaics
لغة تدريس المقرر: English	Pre-requisites: ECE 350
Credit hours: 3 (3-0-0)	Course level: Level – 8 or 9

**Course Description**

وصف المقرر :

Fundamentals of photoelectric conversion: charge excitation, conduction, separation, and collection. Lectures cover commercial and emerging photovoltaic technologies and cross-cutting themes, including conversion efficiencies, loss mechanisms, characterization, manufacturing, systems, reliability, life-cycle analysis, risk analysis, and technology evolution in the context of markets, policies, society, and environment.

**Course objectives**

أهداف المقرر :

1. Show how solar cells are manufactured.
2. Introduce how solar cells are evaluated, what technologies are currently on the market.
3. Discuss the risk and potential of existing and emerging solar cell technologies.

**Course Outcomes**

مخرجات التعليم:

On successful completion this course, the student should be able to:

1. Explain how solar cells convert light into electricity.
2. Examine the potential and drawbacks of currently manufactured technologies (single- and multi-crystalline silicon, micromorph tandem cells, CdTe, CIGS, CPV, PVT).
3. Examine pre-commercial technologies (organics, biomimetic, organic/inorganic hybrid, and nanostructure-based solar cells).
4. Apply Hands-on laboratory to explore how a solar cell works in practice.
5. Scrutinize what limits solar cell performance and cost, and the major hurdles technological, economic, and political towards widespread substitution of fossil fuels.
6. Apply acquired knowledge towards developing and critiquing a solar energy technology prospectus.

**Textbook and references**

الكتاب المقرر والمراجع المساندة:

Text Book: Wenham, S. R., M. A. Green, M. E. Watt, R. Corkish. Applied Photovoltaics. 2nd .ed. New York, NY: Earthscan Publications Ltd., 2007. ISBN: 9781844074013.

**References:**

- Poortmans, J., and V. Arkhipov. Thin Film Solar Cells: Fabrication, Characterization and Applications. Hoboken, NJ: John Wiley & Sons, 2006. ISBN: 9780470091265.
- Green, M. A. Third Generation Photovoltaics: Advanced Solar Energy Conversion. New York, NY: Springer-Verlag, 2007. ISBN: 9783540265627.
- Luque, A., and S. Hegedus. Handbook of Photovoltaic Science and Engineering. Hoboken, NJ: John Wiley & Sons, 2003. ISBN: 9780471491965.
- Deutsche Gesellschaft für Sonnenenergie, *Planning and installing photovoltaic systems: a guide for installers, architects and engineers*, Edition 2, Publisher: Earthscan, 2008, ISBN 9781844074426