Photovoltaics Basics

Course Objective: To introduce the basic concepts of the operation of photovoltaic devices, the major technologies, and the impact of materials and device structure on the conversion efficiency. Students will gain a knowledge of the physics of operation of the major commercial solar cell technologies, and how they are integrated into solar cell systems.

Topics:

1) Photovoltaic Energy Conversion, Solar Spectrum, Light Absorption (3 hours)
2) Background on Material Properties and Device Physics (6 hours)
3) Photovoltaic Materials and Structures (3 hours)
4) Light Management (3 hours)
5) Homojunction Solar Cells (6 hours)
6) Heterojunction Solar Cells (3 hours)
7) Multi-junction Solar Cells (3 hours)
8) Organic PV (3 hours)
9) Photochemical/Dye Sensitized Solar Cells (6 hours)
10) Commercial Solar Cell Technologies (6 hours)
11) Module and Grid Integration Issues (6 hours)

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Schedule: Total course is for 48 hours

Prerequisites by Topic:

Basic background in electronic properties of materials

Textbook:

Stephen J. Fonash, Solar Cell Device Physics, 2nd Edition, Academic Press, 2010; ISBN 978-0-12-374774-7.