

Spring 2012 Course Offering

EEE 598 Advanced Photovoltaics

Professor Meng Tao

Course Description: The course will cover both technical and broader issues related to photovoltaics for the production of electricity from solar energy. Topics to be covered include: The grand energy challenge. Different methods for solar energy utilization. Review of solar cell physics. Wafer silicon photovoltaic technology. Survey of other photovoltaic technologies. Optical/electrical loss mechanisms and remedies. Multijunction tandem cells and concentrating systems. Efficiency limits. Resource limitations to terawatt photovoltaics. Potential Earth-abundant materials for photovoltaics. Approaches to low-cost thin-film and 3-dimensional photovoltaics. Terawatt low-cost wafer silicon photovoltaics.

Credit Hours: 3-0

Prerequisites: Entry-level course on photovoltaics such as EEE 498 Solar Energy or EEE 598 Solar Cells, or EEE 436 and consent of instructor

Instructor's Contact Information:

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Textbook:

- Solar Cell Device Physics, by S. J. Fonash (2nd edition, Academic, 2010)

References:

- Basic Research Needs for Solar Energy Utilization (Report of the Basic Energy Sciences Workshop on Solar Energy Utilization, April 18-21, 2005, Department of Energy; available at <http://www.sc.doe.gov/bes/reports/list.html>)
- Crystalline Silicon Solar Cells, by A. Goetzberger, J. Knobloch, and B. Voss (Wiley, 1998)
- Third Generation Photovoltaics: Advanced Solar Energy Conversion, by M. A. Green (Springer, 2006)
- Solar Electricity, by T. Markvart (2nd edition, Wiley, 2000)
- Alternative Energy Resources: The Quest for Sustainable Energy, by P. Kruger (Wiley, 2006)
- Renewable Energy: Technology, Economics, and Environment, by M. Kaltschmitt, W. Streicher, and A. Wiese (Springer, 2007)
- Additional reading materials from the literature

Course Assignments: Homework, individual and team projects, a term paper, and an oral presentation at the end of the semester.