

Advanced Concepts in Photovoltaics – PhD summer school

The PhD School at the Faculty of Engineering at University of Southern Denmark

Arranged by the Mads Clausen Institute, SDU, Sønderborg and DTU Fotonik, Risø.

Danish title: Avancerede solcellekoncepter

Teaching language: English

ECTS and workload: 5 ECTS, 3 weeks workload

Period: August 24-28th 2020

Offered as: The summer school will be hosted fully online in 2020

Registration and information: <http://pvsummerschool.com/>

Responsible teachers:

Sergiu Spataru, RISØ Campus, Building 130, sersp@fotonik.dtu.dk and Gisele Alves dos Reis Benatto, Risø Campus, Building 130, garb@fotonik.dtu.dk - Department of Photonics Engineering, Technical University of Denmark.

Morten Madsen madsen@mci.sdu.dk and Vida Engmann engmann@mci.sdu.dk – the Mads Clausen Institute, University of Southern Denmark.

See <http://pvsummerschool.com/> for selected top researchers and teachers from world-wide renown universities.

Course type: PhD summer school

Recommended prerequisites: Knowledge within photonics, optics, nanotechnology, electrical engineering, materials science, chemistry and physics would be beneficiary.

Teaching method: Lectures, presentations, group work and 2 weeks of additional textbook and article studies

General course objectives: The aim of the course is to introduce the students to advanced concepts in photovoltaics (PV) and learn about the latest developments in thin films, multi-junction tandem solar cells, perovskite photovoltaics, organic photovoltaics and advanced characterization methods for photovoltaics.

Learning objectives:

A student who has met the objectives of the course will be introduced to:

- Metal-oxide based interfacial layers in PV devices
- Electromagnetic Wave Propagation, FEM and topology optimization for PV
- Multi-junction and tandem PV
- Fast prototyping of new PV materials
- Water-splitting using solar photons
- Drone based EL inspection of PV plants
- CZTS technology
- Basics of thin film PV
- SCAPS, numerical simulation of PV cells

- Perovskite PV
- Organic PV
- Synthesis and modeling of organic material systems for PV
- Lifetime characterization and stabilization of thin film PV

Content: The course is composed of total of 3 weeks. 1 week PhD summer school (including preparation for an oral presentation given by each participants) and 2 weeks study load of textbook and article reading with corresponding discussion with teachers. Students will be requested to read, at least, 2 weeks prior to the school, book-chapters and state-of-the-art journal papers on selected topics by the teachers. The reading material is selected in agreement with the teachers to make the best possible preparation of the students to participate in the summer school. Students will meet to discuss among themselves and with professors the reading material. The student will give an oral presentation during the summer school about the research topics of the students PhD project and feedback will be given by teachers and other PhD students. A short report will be requested after the summer school. Lectures will be delivered from primarily teachers at DTU Fotonik and The Mads Clausen Institute, SDU, and selected number of top researchers and teachers from world-wide renown Universities; see program at website link <http://pvsummerschool.com/>

Course Literature: Book chapters and State-of-the-art journal articles.

Evaluation:

Assessed by second internal examiner and evaluated passed/not passed based on an overall assessment of 1) oral presentation during the summer school and 2) short report handed in on time after the summer school.

Comments:

This summer school accepts a maximum of 50 students.

The summer school is international and addresses primarily PhD students, but others can attend.

This course gives the student an opportunity to prepare a project that may participate in DTU's Study Conference on sustainability, climate technology, and the environment (GRØN DYST). More information <http://www.groendyst.dtu.dk/english>.