Zurich University of Applied Sciences

School of Engineering

t.PCSR - Physik und Chemie der Sonnenstrahlung

Person responsible for the course:	Hans Ulrich Fuchs, fusa
Credits:	4
Valid for:	2011/2012
Last saved:	26.03.2012 09:51

Learning objectives:

This course concentrates upon the physics and chemistry of solar radiation, i.e., upon the role of radiation in specific applications. The basic question asked is how the nature of (solar) radiation determines aspects of the engineering of solar energy systems. To this end, we study the availability and the thermodynamics and chemistry of solar radiation and investigate a small number of applications from natural systems (atmosphere and biosphere) and chemical processes (such as photovoltaic cells and the production of fuels).
Students are expected to learn how to calculate the availability of solar radiation and how to model the effect of solar radiation upon a given system based upon their understanding of thermodynamic and chemical aspects of radiation. Readings of original papers and book chapters are encouraged.

Course content:

Availability of Solar Radiation (The Sun and the Earth, Measurement of solar radiation, Calculating solar radiation upon surfaces, Calculating synthetic time series).
Thermodynamics and Chemistry of Solar Radiation (Thermal radiation and solar radiation, Quantum theory of thermal radiation, Photochemistry: Radiation as a chemical substance).
Applications (2 to 4 subjects will be chosen):
Concentrating optics for solar radiation
Solar radiation in heating and cooling
Solar absorptance and transmittance of materials
Solar radiation and the atmosphere
Solar radiation and photovoltaic cells
Solar radiation and chemical processes
Solar radiation and biological systems

Previous knowledge:

Introductory physics and mathematics.

Teaching method:

Type of lesson:	Number of lessons per week:
Lecture	14x2
Tutorial/Practicum	
Group teaching	14x2
Block instruction	
Seminar	

Assessment:

According to the table or as specified in writing by the lecture at the beginning of the semester!

Number	Type	Weighting
1	End of term exam	2 Periods (60%)
1	Exam during the semester	1 Period (20%)
1	Further assessments	Presentation of paper from literature (20%)

Language of instruction:

German

Instruction material:

Fuchs H. U. (2010): The Dynamics of Heat. Springer, New York.

Iqbal M. (1983): An Introduction to Solar Radiation. Academic Press, Toronto.

Duffie J. A., Beckman W. A. (1991): Solar Engineering of Thermal Processes. Se-cond Edition. Wiley, New York.

Rabl A. (1985): Active Solar Collectors and their Applications. Oxford University Press, Oxford, UK.

Lecture Notes

Comments:

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