



MSc Solar Energy Engineering – Curriculum

Modules	Sem.	Lecturer	ECTS	Type	Institute
PREPARATORY MODULES			30		
Module A: The Global Energy Needs in a Nutshell	WS	W. Hoffmann	5	Lecture	ASE
Module B: Fundamentals of Maths and Physics			10		
B.1 – Mathematical Methods	WS	M. Datcheva	4	Lecture	BAS
B.2 – Physical Methods	WS	M. Glatthaar	6	Lecture	ISE
Module C: Fundamentals of Semiconductors			12		
C.1 – Semiconductor Processing Technology	SS	M. Zacharias	4	Lecture	IMTEK
C.2 – Solid State and Semiconductor Physics	SS	Ch. Nebel	8	Lecture	IAF
Module D: Electrical Engineering and Power Electronics	SS	O. Stalter	3	Lecture	ISE
MANDATORY MODULES			30		
Module 1: Solar Cells & Photovoltaic Systems			10		
1.1 – Solar Cells	WS	U. Würfel	5	Lecture	ISE/FMF
1.2 – Photovoltaic Systems	WS	R. Rüther	5	Lecture	UFSC
Module 2: Solar Thermal Systems			10		
2.1 – Fundamentals of Solar Thermal Collectors	WS	W. Platzer	5	Lecture	ISE
2.2 – Solar Thermal Systems Engineering	SS	W. Platzer	5	Lecture	ISE
Module 3: Crystalline Silicon Photovoltaics			10		
3.1 – Feedstock and Crystallization	SS	M. Schubert	2	Lecture	ISE
3.2 – Silicon Solar Cells – Structure and Analysis	SS	S. Glunz	2	Lecture	ISE/IMTEK
3.3 – Solar Cell Production Technology	SS	R. Preu	2	Lecture	ISE
3.4 – Silicon Module Technology and Reliability	SS	H. Wirth	2	Lecture	ISE
3.5 – Hands-on Solar Cell Processing	SS	J. Rentsch	2	Lab	ISE
RESEARCH PROJECTS			30		
Module R: Research Projects			30		
R.1 – Advanced Research Skills	WS	Th. Hanemann	5	Lecture	IMTEK
R.1b – R.3b – Research Projects 1b, 2a, 2b, 3a, 3b	WS/SS		5x5	Project	
MASTER MODULE			15		
Module M – Master Module	WS/SS		15	Thesis	
ELECTIVE MODULES			free choice of 15		
<i>Topic: Characterization & Modelling</i>			10		
Module CM1: Material and Solar Cell Characterization			5		
CM1.1 – Material and Solar Cell Characterization	WS	M. Schubert	3	Lecture	ISE
CM1.2 – Hands-on Measurement Instrumentation	WS	J. Haunschild	2	Lab	ISE
Module CM2: Device Modelling			5		
CM2.1 – Numerical Simulation of Solar Cells	WS	J. Schumacher	5	Lecture	ZHAW
<i>Topic: Photovoltaic Systems & Grids</i>			10		
Module PG1: Electronics for Photovoltaic Systems			6		
PG1.1 – Selected Semiconductor Devices	SS	O. Höhn	2	Seminar	ISE/IMTEK
PG1.2 – Grid Integration and Control of PV Systems	SS	B. Wille-Haußmann	4	Lecture	ISE
Module PG2: Renewable Energy Systems & Smart Grids			4		
PG2.1 – Technologies for Renewable Energy Conversion	SS	Th. Schlegl	2	Seminar	ISE
PG2.2 – Smart Grids & Energy Autonom. Communities	SS	Ch. Wittwer	2	Lecture	ISE
<i>Topic: Solar Cell Technologies</i>			10		
Module ST1: Thin-Film and Concentrator Photovoltaics			7		
ST1.1 – Inorganic Thin-Film Solar Cells	WS	M. Powalla	4	Lecture	ZSW
ST1.2 – III-V Solar Cells and Concentrator Systems	WS	G. Siefer	3	Lecture	ISE
Module ST2: Advanced Processing & New Cell Concepts			3		
ST2.1 – New Concepts for PV Energy Conversion	WS	U. Würfel	2	Lecture	ISE/FMF
ST2.2 – Advanced Solar Cell Processing	WS	M. Heinrich	1	Seminar	IMTEK

ABBREVIATIONS: WS = Winter Semester (Okt – Mar), SS = Summer Semester (Apr – Sept), ECTS = credit point after the [European Credit Transfer and Accumulation System](#), ASE = [Applied Solar Expertise](#), BAS = [Bulgarian Academy of Science](#), ISE = [Fraunhofer Institute for Solar Energy Systems](#), IAF = [Fraunhofer Institute for Applied Solid State Physics](#), IMTEK = [University of Freiburg - Department of Microsystems Engineering](#), FMF = [University of Freiburg - Freiburg Materials Research Center](#), UFSC = [Universidade Federal de Santa Catarina](#), ZHAW = [Zurich University of Applied Sciences](#), ZSW = [Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg](#).