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	O. Stalter	5	Lecture	ISE
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	1	Lecture	ISE
3.5 – Hands-on Solar Cell Processing	SS	J. Rentsch	3	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**		
Topic: Characterization & Modelling			*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
Topic: Photovoltaic Systems & Grids			*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
Topic: Solar Cell Technologies			*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
Topic: Resource Assessment & Finance | Cooperation with PennState University			*10*		
Module RF1: Solar Resource Assessment & Economics (EME 810)		**J. Brownson**	5	Lecture	PSU
Module RF2: Solar Project Development and Finance (AE 878)		S. Stewart	5	Lecture	PSU

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, ZHAW = Zurich University of Applied Sciences, ZSW = Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg, PSU = PennState University