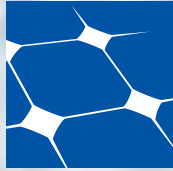


Master
Online



Photovoltaics

A Distance Learning
Master of Science Program

UNI
FREIBURG



Fraunhofer
ISE

Master Online Photovoltaics means:

Distance learning

- Study from any place via internet
- Use pauses on business trips and commuter trains to educate yourself
- Enjoy a well-established e-learning platform
- Experience two workshops per year in Freiburg

Master of Science Degree

- Awarded by University of Freiburg
- Benefit from expertise of Fraunhofer ISE
- Focus on physics and engineering
- Qualify for post-graduate studies towards a PhD

Designed for professionals in

- Research & Development
- Production
- Technical & Business Consulting

Requirements:

- An academic degree in a scientific or technical field
- One year of professional experience

Apply now:

- Deadlines: March 1st and September 1st
- www.pv-master.com

Welcome!



Thank you for your interest in our distance learning program *Master Online Photovoltaics*. The program is offered by the University of Freiburg in close cooperation with the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg.

Our innovative program has been designed to meet the intense demand for highly qualified professionals in the areas of photovoltaic research, development and consulting. Experts and analysts in these fields are convinced that the present growth and future fate of renewable energies and photovoltaics will depend mainly on the availability of people who are willing and able to invest their skills and training in this R&D-focused market segment.

We are pleased to invite you to become part of our successful and renowned community of scientists and engineers by studying with Europe's top R&D experts in the new *Master Online Photovoltaics* program at one of Europe's leading universities.

The convenience and flexibility of our advanced e-learning environment, combined with personal and enjoyable workshops and events in Freiburg, will ensure that both employers and employees benefit from this educational program.

A handwritten signature in black ink, appearing to read 'Mi K' followed by a long horizontal stroke.

Martin Kasemann
Program Manager

Why join the Master Online Photovoltaics?

The *Master Online Photovoltaics* provides profound insight into the physical, technological and system design aspects of photovoltaics. It enables students to develop, design and optimize semiconductor devices and photovoltaic systems with respect to efficiency, cost and lifetime.

The University of Freiburg awards a Master of Science degree upon successful completion. This degree qualifies you for further post graduate work towards your PhD, irrespective of your qualifications prior to entering the Master Online program.

Excellent researchers and teachers from the Fraunhofer ISE and the University of Freiburg provide instruction based on the latest scientific and technological knowledge. The close relationship between the Fraunhofer ISE and leading players in the photovoltaic market, as well as an experienced advisory board, guarantee that the state-of-the-art technology is being presented.

Due to its online character, the program can be studied from all over the world. It enables you to effectively use pauses on business trips, commuter train rides or elsewhere for your further education.



Who are we looking for?

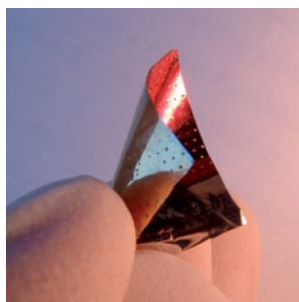
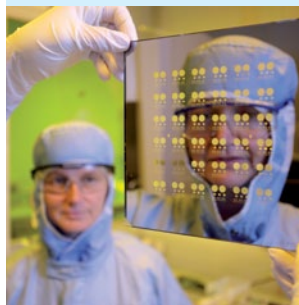
The *Master Online Photovoltaics* program is designed for highly motivated **professionals** who want to enhance their knowledge and abilities in the field of photovoltaic technology. Photovoltaics is one of the most important green energy sources and a major player in the future world energy market. Brilliant engineers are required to make the dream of a clean and safe energy supply come true. So join the team and become an excellent researcher, a brilliant and effective developer and a high performer in your company or at one of our industry partners.

Admission to the program requires a previous academic degree in a scientific or technical field and one year of work experience in photovoltaics or other fields. Applicable academic degrees include: physics, chemistry, electrical / mechanical engineering, materials science, technical physics, technical computer science and combined degrees in engineering and business. Please contact us to check your individual qualifications if you do not find yourself in this list.

We also encourage **companies** to incorporate the *Master Online Photovoltaics* into their human resources development strategies and trainee programs. Companies can greatly benefit from the knowledge and teaching experience of the University of Freiburg and the Fraunhofer ISE.

In short

- Gain in-depth knowledge of photovoltaic technology
- Learn first-hand from experienced researchers
- Study from anywhere via internet
- Qualify for admission to PhD programs
- Provide your best employees with world-class knowledge



Blended learning – the modern learning experience.

Blended learning combines traditional distance learning with online meetings and campus phases to provide an effective teaching and learning environment.

Students spend most of their time studying online from any place in the world. Downloaded scripts and e-lectures provide them with the freedom to use free time slots on business trips, commuter train rides or elsewhere for their education and career building.

The free study phases are supplemented by online meetings, where students can pose questions, discuss problems and get in contact with the teaching staff. Online meetings in the Master Online Photovoltaics are limited to one meeting per week so that students do not have an overwhelming amount of fixed appointments in their schedules.

The highlights of every semester are the so-called campus phases, where the students gather for several days in Freiburg. During these phases, students experience personal contact with teachers and fellow students, hands-on training, seminars and socializing events. In some of the campus phases, workshops with invited speakers from science and industry will bring you deeper into the photovoltaics community – a community that is growing in number and importance.

Online	Campus
E-Lectures	Hands-on training
Book chapters	Seminars
Journal Papers	Examinations
Online Meetings	Socializing
Self Assessments	Mini-conferences
Problems	

**>>> Educate yourself on business trips,
commuter train rides and other free time slots.**



Prof. Dr. Eicke R. Weber



Prof. Dr. Leonard Reindl



Dr. Stefan Glunz

Your teachers are leading experts.

Prof. Dr. Eicke R. Weber

is Director of the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg and holds the chair in Applied Physics and Solar Energy at the University of Freiburg. Before coming to Freiburg, Eicke Weber was a professor at the Department of Materials Science and Engineering at the University of California, Berkeley for 23 years. As a material researcher, he dealt mainly with defects in silicon and III-V-semiconductors. He formed a new field of research around the key-word »dirty silicon«, which investigates how silicon with a high metal content can be processed into efficient solar cells.

Professor Weber was the Founding President of the Berkeley Chapter of the Alexander von Humboldt Association of America (AvHAA) and President of the AvHAA from 2001 – 2003. In 1994, Eicke Weber was awarded the Alexander von Humboldt-Prize and in 2006, he received the Federal Cross of Merit.

Prof. Dr. Leonard M. Reindl

is a full professor at the Laboratory for Electrical Instrumentation in the Institute of Microsystems Engineering (IMTEK) of the University of Freiburg. Before accepting this position, he worked in the Siemens Corporate Technology Department in Munich, Germany.

Leonard Reindl is a member of the IEEE and several other professional associations, including the European Security Research and Innovation Forum ESRIF. He holds more than 30 patents and has authored or co-authored more than 150 papers in his field.

Dr. Stefan Glunz

is head of the Department of Silicon Solar Cells – Development and Characterization at the Fraunhofer ISE and a lecturer in the Technical Faculty of the University of Freiburg.

His research focuses on new solar cell designs and advanced metallization concepts for thin silicon wafers. The superior results achieved in his department include the world record efficiency for multicrystalline silicon solar cells and the world record efficiency for fluorescent collectors.

Further Teachers	
Teacher	Affiliation
Prof. Dr. Bruno Burger	Fraunhofer ISE
Dr. Mathias Czaika	University of Freiburg
Dr. Peter Kailuweit	Fraunhofer ISE
Martin Kasemann	University of Freiburg
Dr. Christoph E. Nebel	Fraunhofer IAF
Prof. Dr. Dr. h.c. Gerhard Oesten	University of Freiburg
Dr. Michael Powalla	ZSW Stuttgart
Dr. Ralf Preu	Fraunhofer ISE
Prof. Dr. Holger Reinecke	University of Freiburg
Dr. Jochen Rentsch	Fraunhofer ISE
Dr. Gerald Siefer	Fraunhofer ISE
Dr. Thomas Schlegl	Fraunhofer ISE
Dr. Jürgen Schumacher	Zurich University of Applied Sciences
Dr. Wilhelm Warta	Fraunhofer ISE
Dr. Uli Würfel	Fraunhofer ISE
Prof. Dr. Jürgen Wilde	University of Freiburg
Prof. Dr. Margit Zacharias	University of Freiburg

What will you learn?

The *Master Online Photovoltaics* focuses on the physics, technology and system design of photovoltaics. The lectures will go deep into every technological aspect of photovoltaics.

The technological excellence is supplemented with a selection of courses providing you with a comprehensive insight into the economic and environmental aspects of photovoltaics and renewable energies.

Courses in the *Master Online Photovoltaics* program.

Please check the homepage www.pv-master.com for changes and details.



Semester	Course Title	Mode	ECTS points
Preparation courses			
Prep	Fundamentals of Semiconductor Physics	Online	6
Prep	Semiconductor Devices and Technology	Online	6
Prep	Advanced Research Skills	Online	3
Mandatory Courses on Solar Cell Technology			
1	Fundamentals of Solar Cells	Online	6
2	Silicon Solar Technology – Material and Cells	Online	6
2	Material- and Solar Cell Characterization	Online	6
2	Measurement Instrumentation	Hands-on	3
3	Thin-Film Solar Cells	Online	6
3	Process- and Production Technology	Online	3
4	Solar Cell Processing	Hands-on	6
Mandatory Courses on Photovoltaics System Technology			
1	Fundamentals of Photovoltaic Systems	Online	6
1	Selected Semiconductor Devices for PV Systems	Seminar	3
3	Photovoltaic Module and Concentrator Technology	Online	3
3	Green-Energy Production Technology	Seminar	3
Electives			
4/5/6	Numerical Simulation of Solar Cells	Online	6
4/5/6	Advanced Material and Solar Cell Characterization	Online	3
4/5/6	New Concepts for Photovoltaic Energy Conversion	Online	3
4/5/6	Advanced Solar Cell Processing	Online	3
4/5/6	Electronics for Photovoltaic Systems	Online	3
4/5/6	Economics of Photovoltaic Systems	Online	3
4/5/6	Service Life Analysis of Photovoltaic Systems	Online	3
4/5/6	Grid Connection and Remote Application	Online	3

How long will you study?

The *Master Online Photovoltaics* program is flexibly designed to allow for the admission of students with a wide range of qualifications. Your prior academic degree and your individual qualifications determine the length of your studies.

The European Credit Transfer System (ECTS) defines credit points as a measure for the average student work load. One ECTS point corresponds to 30 hours of work for the student. Since the Master Online Photovoltaics is a continuing education program that is studied in parallel to an employment, it credits 15 ECTS points per semester, which is half the work load of a full-time student.

A master's degree requires students to obtain the total sum of 300 ECTS points, minus credit you receive for your highest prior degree. Master or diploma degrees of German Universities, or equivalent international degrees, count 240 credit points. German master or diploma degrees of Universities of Applied Sciences (Hochschule or Fachhochschule) count 210 ECTS points. A prior bachelor's degree counts 180 ECTS points. Together with the 15 ECTS points per semester, the gap between your previous degree and the required 300 ECTS points determines the length of your studies.

Tables 1 to 3 show the three most common qualification levels of applicants and the resulting curricula necessary to obtain a master of science in photovoltaics with this program.

Please be aware that you can transfer additional credit for certain academic courses passed during your prior studies. Professional experience in some photovoltaic-related areas may also be taken into account to reduce the length and cost of your studies. Please contact info@pv-master.com in order to optimize your curriculum.

1

If you have a master/diploma degree awarded by a German university, or an equivalent international degree, this could be your curriculum:

Semester		ECTS points
1	Mandatory courses 1	15
2	Mandatory courses 2	15
3	Mandatory courses 3	15
4	Mandatory 4 & Electives 1	15
5	Master's thesis	15
		75

2

If you have a master/diploma degree awarded by a German university of applied sciences (Fachhochschule/Hochschule), or an equivalent international degree, this could be your curriculum:

Semester		ECTS points
1	Preparation courses	15
2	Mandatory courses 1	15
3	Mandatory courses 2	15
4	Mandatory courses 3	15
5	Mandatory 4 & Electives 1	15
6	Master's thesis	15
		90

3

If you have bachelor degree, this could be your curriculum:

Semester		ECTS points
1	Preparation courses	15
2	Mandatory courses 1	15
3	Mandatory courses 2	15
4	Mandatory courses 3	15
5	Mandatory 4 und Electives 1	15
6	Electives 2	15
7	Electives 3 & Scientific project	15
8	Master's thesis	15
		120

University of Freiburg

The Albert Ludwig University of Freiburg is one of the most renowned universities in Germany. Since its establishment in 1457, it has been home to numerous excellent and influential scientists and teachers, including nine Nobel Prize winners. Known for its future-oriented strategy and high standards, the University of Freiburg has been selected as one of the nine »Universities of Excellence« in Germany.

Green energy production and the sustainable use of resources have always been an important issue for the University and in the city of Freiburg. Over the past years, the university has identified renewable energies as one of its priorities for future activity and founding the »Centre for Renewable Energy« (Zentrum für Erneuerbare Energien ZEE) was one of the consequences of this strategic decision. The role of the ZEE is to coordinate fundamental, practical and industry-related research and teaching, by bringing together different university institutions with external partners such as the research institute of Fraunhofer ISE.

www.uni-freiburg.de

www.zee.uni-freiburg.de



In short

Freiburg University:

- Established in 1457
- University of Excellence
- Nine Nobel Prize winners

Fraunhofer ISE:

- Largest solar energy research institute in Europe
- Established in 1981
- Several world records

Fraunhofer Institute for Solar Energy Systems ISE



With a staff of approximately 880 members, the Fraunhofer ISE is the largest solar energy research institute in Europe. Its work comprises investigation of scientific and technological fundamentals for solar energy applications, development of production technology and prototypes, and the construction of complex demonstration systems.

With currently more than 90 doctoral candidates and over 100 diploma students, numerous practical trainees and part-time student employees, the institute makes a large contribution to the education and training of highly qualified staff in R & D of solar energy technology. Researchers at Fraunhofer ISE are among the most successful and sought-after scientists in the world.

www.ise.fraunhofer.de

What does it cost?

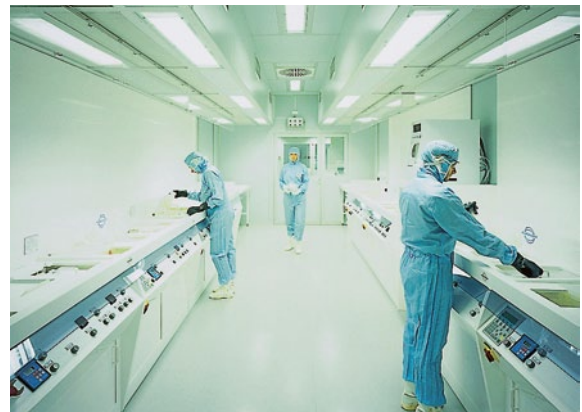
The *Master Online Photovoltaics* is a non-profit program. The program fees cover the expenses for the program without financial benefits for the participating institution. The fees are:

1	Administration fee	500 € per semester
2	Course fee for standard courses (i.e. except for no. 3)	200 € per ECTS point
3	Course fee for master's thesis and scientific project	100 € per ECTS point
4	Repetition of an examination	130 €

The fees for the first two semesters are due before enrollment. The fees for the higher semesters are due before the start of each semester.

In Germany, expenses for continuing education programs are usually tax deductible. Please contact your local tax authority or tax consultant for exact information about possible tax benefits.

We also encourage you to ask for incentives from your employer to pursue the *Master Online Photovoltaics* program. Please contact us at info@pv-master.com if you need help and arguments to convince your employer to invest in your and his future.



Tax deduction may reduce your effective cost significantly!
Please ask your tax consultant for advice.

Apply now!

Please visit www.pv-master.com to download the application form. Send it together with the following documents as scanned PDF files to application@pv-master.com.

- Filled-in application form
- CV in English
- Diplomas and degrees
- Transcript of courses with grades
- Certificates of professional experience
- Signed 1-2 page motivation letter in English

The motivation letter should contain information on why you intend to study, how the Master Online Photovoltaics adds to your existing knowledge and which benefits you expect for your career. Certificates and transcripts in languages other than English or German must be accompanied by an official English or German translation.

In case of admission, please be prepared to send in notarized copies of your documents if requested. Applicants from China, Vietnam and Mongolia must be prepared to hand in an APS ("Akademische Prüfstelle") certificate from the German Embassies in Beijing, Hanoi and Ulan-Bator, respectively.

Application Process

- ↓ Send in your application documents
- ↓ The admission committee decides about your admission
- ↓ In case of admission, the university sends you the enrollment documents
- ↓ Send back enrollment documents
- ↓ You receive a bill asking for payment of study fees
- ↓ After payment you are enrolled at the University of Freiburg

Application deadlines are:

March 1 for the preparation courses

September 1 for the mandatory courses.

>>> Send your application to
application@pv-master.com

We look forward to hearing from you!

Should you have any questions or concerns, please feel free to contact us.

Use our homepage www.pv-master.com to get further information or contact us by e-mail at info@pv-master.com. You can count on us to respond rapidly to your enquiry. We are looking forward to hearing from you!

Master Online Photovoltaics
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Georges-Koehler-Allee 010
79110 Freiburg
Germany

www.pv-master.com
info@pv-master.com

The *Master Online Photovoltaics* is offered by the University of Freiburg in cooperation with the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg.



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Alexandra Lutz-Buob
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