

Evaluation report Solar Energy – 2014/2015

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The evaluation committee has evaluated the course Solar Energy by sending an online questionnaire to 41 students. 14 students filled in the questionnaire, which gives a response of 34%.

The overall appreciation of this course is graded with a 3.3, which is insufficient for a master course. Students regard the learning outcome of this course as relevant and find the contents of the course very interesting. The information about the course is considered adequate and the availability of the teacher for questions is graded just sufficiently. Students think that the organization of the lectures was good, but aren't happy with the way the lectures made the subject clearer. The use of the whiteboard and/or sheets was good, as well as the coverage and quality of the study material. Unfortunately, the last two aspects score insufficiently: according to the respondents the requirements for the exam were not very clear and neither was it well related to the major subjects in the course.

The majority of the students following the course were doing a SET-program, the remainder were master students in physics or mechanical engineering. Almost all students think the scheduled time for the course was good. A couple of remarks are given on the course. Students mention there was no book or reader available for this course and the provided PowerPoint sheets were not well structured for studying. Students had to refer to other sources to understand the mentioned subjects, for example on the p-n junction part. Also, one student mentions that the students were discouraged to ask questions during lectures. Students mention that the examination of the material was different from what they expected, or that they couldn't prepare well as they didn't know what to expect. An old open book exam was provided, but because the real exam was without book, students were unsure to what extent they had to know the material. A final remark is given on the coverage in physical properties. One student thinks it is too much in depth for students not coming from an applied physics bachelor.

These are the main conclusions of the evaluation. The interpretation is based on the remarks of the respondents. For an overview of the results, see the graph at the end of this report.

Recommendations of previous evaluation

The last evaluation was in 2012/2013

- Reduce the number of slides and the information per slide. This makes the lectures more interesting to attend.
- Take a look at the assignments. Some students think those are not relevant, show relevancy or change the assignments

Recommendations by the committee

The quality of the course can be improved. Based on the results of the questionnaire, some recommendations for improvement are provided. The most important recommendations are:

- Provide a consistent set of study materials, like a book or a reader.

- Give students the opportunity to ask questions during and around lectures.
- Prepare the students better for the exam by providing clear information about what and what not to study.

Lecturers response

- About the response percentage:
 - This is the number of registered users at blackboard: 2 of the users are a testaccount and a kijkaccount, another two (real) users never attended the course. So the number of questionnaires doesn't represent the original number of participants of the course which was 37. This makes the real response rate 37%.
 - Remark from the Evaluation Committee: the test- and kijkaccounts have already been omitted from the list of participating students. The correct amount should then be 39.
- About the unclear requirements for the exam:
 - The requirement for the exam was the content of the course. This was mentioned several times, as well as discussed with the group and agreed upon with the students.
- About the relation of the exam requirements to the major subjects in the course:
 - That's an interesting remark because the exam represented major subjects of the course namely
 - PV modules and their performance
 - PN junctions
 - Light management in PV cells
 - A comparison of different PV technologies being part of the course subjects
- About the lack of a book or reader for the course:
 - It was explained several times to the students that the course lecturer didn't want to bother them with a very expensive book (at 200 Euros) or an insufficient or outdated book. For this reason each topic in the course – as indicated in the time table with lectures – was supported by written material, readers, papers or websites that covered the content to the right level.
 - The course lecturer also mentioned several times that due to the lack of a good book on PV solar energy for students in engineering studies, she is editing a book which is contracted yet by Wiley&Sons and will be published in the forthcoming year. The title is Photovoltaic Solar Energy From Fundamentals to Applications.
- About the necessity to refer to other sources to understand the mentioned subjects:
 - That is a surprising remark: namely to the Course Lecturer's understanding the PN junction was offered in two lectures and supported by several chapters from a reader
- About the difference in expected examination and the real examination
 - The test exam as provided to the students was given the topics for 50% similar to the exam of this course. Therefore it was very suitable for practising for the exam.
- About the uncertainty by students to what extent the material had to be studied:
 - It was explained two, maybe three times that the exam would cover all course material and would be offered with a formula sheet, Only short equations (like F_i Snellius law etc) were supposed to be known basic knowledge.
- About the difficulties for students not coming from an applied physics bachelor:
 - That's correct! The physics – as was mentioned many times during the course- had to be adapted to the experience and background of students of mechanical engineering and to bachelor students. The course lecturer has a completed MSc in Material Physics as such she also has to adapt, just like this student.

- It is a general issue in the field of solar energy education at the moment that students with a non-physics background are confronted with an originally physics domain. Not only the course lecturer experiences this but also other teachers at other universities who offer courses on solar energy to engineering students. For this reason the book mentioned is being written.
- About the previous recommendation that there are too many slides with too much information:
 - The slides have to be replaced – partially – by a book, as such they form an important knowledge base. Many people in the field of PV have borrowed the slides of the course lecturer because they think they are very useful
- About the previous recommendation that the assignments should be improved:
 - The relevance of the assignments is in connection to the core topics of the course:
 1. Irradiance and PV systems
 2. Light management in PV cells
 3. IV curves of x-Si solar cells
 4. Functioning of other non x-Si solar cells
 5. A comparison of various PV cell technologies
- About the current recommendation to provide a consistent set of study materials:
 - Indeed, fully agree, the course lecturer mentioned several times during the course that due to the lack of a good affordable book on PV solar energy for students in engineering studies, she is editing a book which is contracted yet by Wiley&Sons and will be published in the forthcoming year. The title is Photovoltaic Solar Energy From Fundamentals to Applications. It is a general issue in the field of solar energy education at the moment that students with a non-physics background are confronted with a physics-based body of knowledge. Not only the Course Lecturer experiences this but also other teachers at other universities who offer courses on solar energy to engineering students. For this reason the book mentioned above is being written as well.
 - During the course it was also explained several times to the students that the course lecturer didn't want to bother them with a very expensive book (at 200 Euros) or an insufficient or outdated book. For this reason each topic in the course – as indicated in the time table with lectures – was supported by written material, readers, papers or websites that covered the content at the right level for this group of students.
 - That the level was appropriate or not can't be judged by the students, because they don't work in Solar Energy, but it can be evaluated by the peers of the Course Lecturer. The Course Lecturer used a lot of written materials of her peers – for the time being that the book is not available yet – and she is surprised that the students don't see the quality of review papers by for instance Michael Graetzel and the website PVCDRom by Stuart Bowden and Chris Honsberg. Moreover the reader about PN-junctions by Ronald van Zolingen is considered a standard in PV education in the Netherlands.
- About the current recommendation to ask questions during lectures:
 - Indeed, fully agree, each lecture student was actually invited by the course lecturer to ask questions during the lectures, and looking back at the e-mail communication it is clear that almost each e-mail got a response from the Course Lecturer within 24 hours, unless the Course Lecturer didn't have e-mail access during travel, which was at a certain point the case for 4 days.
 - The Course Lecturer was of course not available for questions during the set-up of her presentations just before the lectures, then she indicated that students had to wait a bit till her presentation was running. The Course Lecturer therefore sincerely apologizes for the inconvenience for the students to let them wait a few minutes.

- Moreover the students were explicitly invited to contact the Course Lecturer to ask questions about the results of the assignments – which were all corrected within 2 weeks – however the response by the students was very low. Students could also contact the lecturer to see their exam, so far only two students used this opportunity.
- About the current recommendation to prepare students better for the exam:
 - The information about the exam was given in the lectures and all five assignments representing the core topics of the course were meant to prepare for the exam. The test exam represented for almost 50% the contents of the exam made for this course, which was given with a formula sheet.
 - Finally 33 student have attended the exam and about 2/3 of this group passed, as such the exam was assumingly at the right level for this group of students.
 - To the understanding of the Course Lecturer the exam was not very difficult an at a level of bachelor students, but maybe next year the level has to go up significantly
 - It was interesting to notice during the exam that students came to the Course Lecturer to inform her that the equations on the formula sheet were supposedly not correct, while they were actually totally correct. Also the group was that restless that on the basis of consultations with other supervisors in the Sporthal, where four other exams took place at the same time, it was decided to inform the students in public that they shouldn't come forward the whole time to talk about the exam.

Overview

- All marks are given on a Likert-scale from 1-5. For master courses, a mark of 3.5 or higher is sufficient.
- The height of the bars in the graph represents the mark. The thin line at the top of the bars gives the standard deviation.

Explanation of marks

- Total 'first impression rating' is the mark given to the question: Overall appreciation.
- Ability to study is the average point of the marks given to the part of study material.
- Relevancy is the mark given to the question: Relevancy of the course.
- Quality of education is the average point of the marks given to the parts "lectures" and "practices".
- Coordination / Planning is the average point of the marks of "Adequate Information on Blackboard" and "Teacher available for questions".
- Examination / Assignments is the average point of the marks given to the Examination /Final Assignment part.
- Average is the mean of all given marks.

Marks	
First impression rating	3,1
Ability to study	3,3
Relevance	3,9
Quality of education	3,2
Coordination / planning	3,4
Examination / Assignments	2,7
Average	3,3

