

### Course data

<b>Course name</b>	<b>ENERGY AND FUSION RESEARCH</b>
<b>Course number</b>	ED2200
<b>Course credits (total) and credits for each module</b>	6 hp Hand in assignments (4.5 hp) + mini group works (1.5 hp)
<b>Time for course offering</b>	<b>Period 4, 2019</b>
<b>Course responsible and other teachers</b>	Jan Scheffel and Per Brunsell Division of Fusion Plasma Physics
<b>Teaching hours, distributed on F, Ö, R, L, S</b>	26 F + 12 Ö (Notation: F – lecture, Ö – exercise session, R – "räknestuga", L – lab session, S – seminar)
<b>Registered students, number</b>	25 students; all followed the course
<b>Performance indicator, after 1st examination offering, %</b>	
<b>Examination rate, after 1st examination offering, %</b>	88 % (22 students)

### Course goals

<b>Specify the overall goals for the course</b>	The course should provide insight into how and why fusion energy will be a part of the energy future, as well as give understanding for the basic plasma and reactor physics in current and future fusion power plants.
<b>Specify how the course is designed to meet the goals</b>	The lectures are goal-oriented and they focus on topics relating to the course goals and content. The course requires continual work and is examined on a continual basis from home assignments and participation in mini-group work. Grading: P/F. No final exam is given.

### Pedagogical development I

<b>Describe the changes that have been made since the last course round.</b> (Tell the students at the start of the course)	<ul style="list-style-type: none"><li>• Two electronic course questionnaires were integrated into the course (now 100 % response frequency).</li><li>• The course book is now printed with a subject index.</li><li>• The course home page was improved and made more attractive.</li><li>• Some more graphical material was added to the lectures.</li></ul>
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### Student contact

<b>Students in this year's course committee; name and email</b>	We do not employ course committees. The course concept is well discussed with previous course committees and assessed in surveys, so we do not consider a course committee to be needed. Important instruments for course development are <ul style="list-style-type: none"><li>* written formative questionnaires to everyone</li><li>* informal discussions with the students</li></ul>
<b>Results of formative middle course survey</b>	Not employed.
<b>Results of course committee meetings</b>	

## Course evaluation; student viewpoints

Period, when the course questionnaire was available	The questionnaire was open one week each time (course week 2 and course week 6). This course analysis is available on the course web page.
Questions in the questionnaire	<p>Completely new questions are introduced in 2019. (The previous questionnaire had been used essentially unchanged since the start of the course in 1995.) There are both <b>multiple choice questions</b> (4 grades: ++, +, -, --) and <b>free text questions</b>.</p> <p><b>Questions 2019:</b> Most questions are the same in both surveys. This gives a good picture of the course's progress. <b>Greenmarked: 1st course survey only</b> <b>Brownmarked: 2nd course survey only</b></p> <p><b>Compulsory</b></p> <ul style="list-style-type: none"><li>• Is there a good match between your pre-knowledge and the course content?</li><li>• Does the course content match your expectations?</li><li>• Do the intended learning outcomes help you understand what you should learn in the course?</li><li>• Is the course literature adequate?</li><li>• Are the most central topics for fusion energy given sufficiently high priority, you think?</li><li>• <b>What do you find most important in this part of the course? ( 5 options given )</b></li><li>• <b>Looking at the first two weeks of the course, what would you primarily like to learn more about? ( 5 options given )</b></li><li>• <b>What, in your view, is the major reason that we do not have commercial fusion energy today? ( 5 options given )</b></li><li>• <b>Looking back at the course, what would you like to have learned more about? (In the last course week we will study alternative fusion schemes, design of a fusion power station, safety and environment as well as costs for fusion). ( 5 options given )</b></li><li>• Is the course design well adjusted for your learning in fusion physics?</li><li>• Is it helpful for your learning to cooperate with peers in mini group works?</li><li>• Is it clear what you are supposed to learn, and to what level, for passing the course?</li></ul> <p><b>Optional</b></p> <ul style="list-style-type: none"><li>• Are lectures and learning activities planned for a good pace in the course?</li><li>• Do you like the mix of learning activities (lectures, home assignments, exercise classes, mini group works)?</li><li>• Is there an including, friendly atmosphere in this course?</li><li>• Do you receive sufficient feedback to see your progress?</li><li>• Is the assessment well designed and fair?</li><li>• Is it a good idea to integrate this survey into the course?</li><li>• Is there anything you would like to change in the course?</li><li>• Any additional comment, on the first 10 questions above for example?</li><li>• I am a woman/man/other</li></ul>
Response frequency	100 %

<b>Changes since previous course round</b>	The questions of the two surveys are new.
<b>Overall impression</b>	Very good. The course is well established.
<b>Positive viewpoints</b>	<ul style="list-style-type: none"> <li>- Yes, thank you for considering students thoughts and ideas regarding the course (on having a course survey early in the course).</li> <li>- Yes of course, it helps to correct the course quickly if an issue is occuring. Great that it's early in the course (on having a course survey early in the course).</li> <li>- Think everything is good.</li> </ul>
<b>Negative viewpoints</b>	<ul style="list-style-type: none"> <li>- Since the Home assignments is a big part of the examination it would be great to recive comments.</li> <li>- It would be nice to have a clear, official correction of the assignements.</li> <li>- It would be great to provide more learning material in addition to the course book. the course book is great but sometimes it doesn't go that much into dept and/ or starts at very high standards.</li> <li>- The graded exercise session is a good thing but it has revealed itself to be a treasure hunt in the book and exercise book two times, especially the exercise on plasma diagnostics. We did not have time to learn about it during an exercise session so we just kind of copied what we could find in the book Only flaw I saw in this course. Maybe doing an exercise more related to what we've discussed in class (we did not really talk about plasma diagnostics).</li> </ul>
<b>Was the course relevant wrt the learning outcomes?</b>	Over 90 % of the students responded that the learning outcomes helped them to understand what they should learn in the course.
<b>Views on preknowledge</b>	Only a few students responded negatively here. Only about a third of the students thought that there were no problems, however.
<b>Views on course design</b>	As many as 96 % (both surveys) believed that the course design was well adjusted for learning in fusion physics. The course content matched the students' expectations. The most central topics, according to the students, was given high priority. About 90 % appreciated the mini group work sessions.
<b>Views on course material</b>	Course literature was appreciated, but whereas top score was received from 52 % in survey 1, only 32 % gave top score in survey 2.
<b>Views on examination</b>	Some 80 % believed that the assessment was well designed and fair (10 % did not respond; optional question).
<b>Particularly interesting comment</b>	<ul style="list-style-type: none"> <li>- It would be very useful if we could get the summary of lectures after.</li> <li>- For those students who choose the course from other programs than physics or similar it would be helpful if there was a chapter in the book providing the basic knowledge on plasma, magenetism etc. Maybe just a hint to helpful literature would already help a lot.</li> </ul>

#### Relevant web-links

- All responding students (8 % did not respond; optional question) thought that it was a good idea to integrate the survey into the course! As many as 76 % gave top score.
- All students except one (survey 2) thought that there is an including, friendly atmosphere in the course. Top score was received by 52 %.
- The mix of learning activities was appreciated by all responding students (10 % did not respond; optional question).

## Course evaluation; teacher interpretation

#### Comments

This was the first time that course evaluations, performed in Canvas on the course home page, were integrated into the course. The two surveys (in course weeks 2 and 6) were made compulsory on the grounds that they contained mandatory questions directly related to the learning in the course. Questions more relating to pedagogics were optional but were answered by a majority of the students. The students were very positive to this chance for formatively having an influence on the course. We teachers conveniently received feedback from 100 % of the students for alterations during the course.

The two surveys show that the course works very well.

It should be evaluated why the students appreciation of the course literature declined during the course.

## Comments from other teachers

What worked well -

What did not work well -

Suggestions for changes -

## Course committee meetings; summary

Student summary -

Suggestions for changes -

Link to meeting minutes -

## Final course meeting

Summary

We forgot to arrange a final course meeting.

## Course responsible, summarising comments

Overall impression

The course works fine.

Positive viewpoints

Nice to have as many as 25 students this course round. And that the integrated course surveys were so well received.

Negative viewpoints

Two students were found to plagiarize each other. Sadly, they found it hard to realize that they had done something wrong, which is remarkable at master level. The students had to undertake complementary, individual oral exams.

Views on preknowledge

Usually sufficient but some students have problems with electromagnetic theory and vector analysis.

<b>Views on course design</b>	As can be seen from the survey results above, the students appreciate the course design with its mix of lectures, home assignments, exercise sessions and mini group works. The visit to the fusion experiment Extrap is an important part of the course design.
<b>Views on course material</b>	The book is appreciated, but we should consider adding side material.
<b>Views on examination</b>	Continual examination is highly appreciated. This also means that we teachers meet well informed students in class.

## Pedagogical development II

<b>How the changes for this course round worked out</b>	<ul style="list-style-type: none"> <li>• The pilot test of integrated course surveys went very well. We will thus continue using this concept.</li> <li>• Although the course book was printed in a practical, compact format only 6 books were purchased by the 25 students. The students were happy with the electronic pdf version of the book only, being available on the course home page.</li> <li>• This is the first time the course analysis is written in English. Should be well received by the students.</li> </ul>
<b>Changes to be made for next course round</b>	<ul style="list-style-type: none"> <li>• Provide web links on vector analysis.</li> <li>• Consider adding complementary course literature on electromagnetic theory and vector analysis.</li> </ul>

## Other

**Comments**