

### 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, 2022</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>	18 students; two did not finish the course
<b>Performance indicator, after 1 examination offering, %</b>	
<b>Examination rate, after 1st examination offering, %</b>	72 % (13 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)	The course is again given fully physically. But the students now have access to movies of all the lectures on the course home page.
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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 design has been well developed during a number of years and assessed in surveys, so we do not consider a course committee to be needed.  Important instruments for course development are * two written formative questionnaires (100 % response) * informal discussions with the students
<b>Results of formative middle course survey</b>	Not employed.
<b>Results of course committee meetings</b>	Not employed. Mandatory course evaluations (weeks 2 and 6) provide helpful information, discussed with the group.

## Course evaluation; student viewpoints

### Period, when the course questionnaire was available

The **mandatory** course evaluations were open course weeks 2 and 6.  
*Typically all the students favour mandatory course evaluations.*

### Questions in the questionnaire

New questions were introduced in 2019.  
(The previous questionnaire was used essentially unchanged since the start of the course in 1995.)  
There are both **multiple choice questions** (4 grades: ++, +, -, --) and **free text questions**.

#### Questions 2019-2021:

Most questions are the same in survey 1 and survey 2.  
This gives a good picture of the course's progress.

**Greenmarked: 1st course survey only**

**Brownmarked: 2nd course survey only**

#### *Compulsory*

- Is there a good match between your pre-knowledge and the course content?
- Does the course content match your expectations?
- Do the intended learning outcomes help you understand what you should learn in the course?
- Is the course literature adequate?
- Are the most central topics for fusion energy given sufficiently high priority, you think?
- **What do you find most important in this part of the course? ( 5 options given )**
- **Looking at the first two weeks of the course, what would you primarily like to learn more about? ( 5 options given )**
- **What, in your view, is the major reason that we do not have commercial fusion energy today? ( 5 options given )**
- **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 )**
- Is the course design well adjusted for your learning in fusion physics?
- This is the second time the course is given as an online course. Do you think that the transformation to an online course is well designed?
- Is it clear what you are supposed to learn, and to what level, for passing the course?

#### *Optional*

- Are lectures and learning activities planned for a good pace in the course?
- Do you like the mix of learning activities (lectures, home assignments, exercise classes, mini group works)?
- Is there an including, friendly atmosphere in this course?
- Do you receive sufficient feedback to see your progress?
- Is the assessment well designed and fair?
- Is it a good idea to integrate this survey into the course?
- Is there anything you would like to change in the course?
- Any additional comment, on the first 10 questions above for example?
- I am a woman/man/other

<b>Response frequency</b>	<b>100 %</b>
<b>Changes since previous course round</b>	-
<b>Overall impression</b>	Very good. The course is well established.
<b>Positive viewpoints</b>	<ul style="list-style-type: none"> <li>- I really like the blackboard based lectures!</li> <li>- I think it is good so far!</li> <li>- Överlag är det är ett väldigt intressant ämne och en rolig kurs!</li> <li>- I really liked the design of the course!</li> <li>- Overall very exciting course!!</li> </ul> <p><i>About integrated course survey:</i></p> <ul style="list-style-type: none"> <li>- Yes! It is always a good idea to have a continous dialouge between students and teachers to see what is working good and if there is anything that can be improved!</li> <li>- I think it's a very smart move too get sufficient feedback from students who might have been reluctant too answer otherwise.</li> <li>- Yes, good to be able to be part of the course planning in the course I found it hard to answer some of the questions since there has only been one week of lectures but at the same time it is a good opportunity to think about the course at the same time as it is running.</li> <li>- Ja det tycker jag, speciellt med tanke på att vi inte har någon kursnämnd, det gör att du får möjlighet att ta till dig våra åsikter.</li> </ul>
<b>Negative viewpoints</b>	<ul style="list-style-type: none"> <li>- It would be nice if it was a bit more clear on how technical the course is. I expected a brief overview on the state of fusion with some theory on the limitations and modeling of fusion reactions. It is nice that the course goes just in enough depth but would prefer it was more clearly laid out.</li> <li>- I would really appreciate a short summary (doesn't have to be more than four or five sentences) after every lecture so that if you miss a lecture or want to look back it is very easy to find which lecture you need.</li> <li>- Jag tycker att det ibland har känts lite oklart vad som förväntas att vi ska ta med oss. Onsdagens lektion gick fort och det var mycket att ta in och ganska komplext. Det hade varit bra att till och börja med prata om vad en plasma är och hur den ser ut.</li> <li>- Overall I am satisfied with the course. However I do have a couple nitpicks. <ul style="list-style-type: none"> <li>1) It would be beneficial to possibly stress more important aspects of the course. (specifically during the lecture)</li> <li>2) Posting a homework/group work answer sheet after they have been graded would be helpful in learning from mistakes</li> </ul> </li> <li>- In the end, in my personal opinion i think that, maybe, a good option would to focus on less topics in order to dedicate more time to the most important ones.</li> <li>- Just a comment on the course material that there is sometimes really hard to find the useful relations to solve the home-assignment in the course book. A good way to asses this would be to have solved examples in the course-book that are similar to the home-assignments that the students can check when one get stuck.</li> <li>- The lectures are very much one sided and with such a small group i think there is a oportunity to make it more interactive</li> </ul>
<b>Was the course relevant wrt the learning outcomes?</b>	Essentially all students responded that the learning outcomes helped them to understand what they should learn in the course.

<b>Views on preknowledge</b>	About 75 % of the students thought that their preknowledge was sufficient. This is a tricky topic since we include some mathematical details in order to demonstrate the role of theory. The student can pass the course without going very far into these details, however.
<b>Views on course design</b>	The course design was appreciated by nearly all this year. This could be an effect of that it was given physically, and is also originally designed to be given physically.
<b>Views on course material</b>	Course literature was appreciated, typically 90 % thought so (as in earlier evaluations).
<b>Views on examination</b>	Nearly all students believed that the assessment was well designed and fair (53 % gave top score).
<b>Particularly interesting comment</b>	<ul style="list-style-type: none"> <li>• The students thought that it was a good idea to integrate the survey into the course. As many as 80 % gave top score.</li> <li>• The question whether there is an including, friendly atmosphere was given a 100 % positive answer, which differs a lot from last year's (digital) course, where only 64 % subscribed to this.</li> <li>• One student suggested: "Also an appendix with constants and entities so that it is easier to understand what letter stands for what entity in the formulas."</li> </ul>
<b>Relevant web-links</b>	

## Course evaluation; teacher interpretation

<b>Comments</b>	The course round 2022 worked great, with largely engaged and curious students. However, we think that there were some quite unnecessary "FX" (3) – the students should preferably keep better track of their achievements in the course to avoid extra examination for "P" grade.
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## Comments from other teachers

<b>What worked well</b>	-
<b>What did not work well</b>	-
<b>Suggestions for changes</b>	-

## Course committee meetings; summary

<b>Student summary</b>	-
<b>Suggestions for changes</b>	-
<b>Link to meeting minutes</b>	-

## Final course meeting

<b>Summary</b>	We completely forgot about this. Fortunately, the course round had worked very well.
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## Course responsible, summarising comments

<b>Overall impression</b>	The course is well developed, and since we listen to all students already in course week 2 (via the course survey) we can make suitable adjustments in the course round.
<b>Positive viewpoints</b>	Well functioning course with merely happy students.

<b>Negative viewpoints</b>	There could be more interactive exercise sessions.
<b>Views on preknowledge</b>	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 truly appreciate the course design with its mix of lectures, home assignments, exercise sessions and mini group works.
<b>Views on course material</b>	The book, written by us, is appreciated. There are, however, suggestions to add solved problems + appendix with symbols and formulas.
<b>Views on examination</b>	Continual examination is highly appreciated. This also means that we teachers meet well informed students in class. We now grade home assignments directly in Canvas, using SpeedGrader. This is appreciated, and works well. But it is harder to detect plagiarism w r t the paper copies that we received in earlier course rounds. Plagiarism is something that we continually should keep an eye on.

## Pedagogical development II

<b>How the changes for this course round worked out</b>	<ul style="list-style-type: none"> <li>• When given physically, there is much better opportunity for the students to have questions answered and to relate to what is expected in the course.</li> </ul>
<b>Changes to be made for next course round</b>	<ul style="list-style-type: none"> <li>• We should be clearer and explain early on in the course that there are indeed technical details that require some preknowledge that does not come naturally for students not in engineering physics nor electrical engineering, but that this introductory course can be examined without going very far into these.</li> <li>• A list of acronyms and common variables used in the course could be integrated into the course book.</li> <li>• We did not find any instances of plagiarism this year, but it is worthwhile to consider how to detect and reduce it generally.</li> </ul>

## Other

### Comments