Course Analysis *Division of Fusion Plasma Physics*

Course data

Course name	**ENERGY AND FUSION RESEARCH**
Course number	ED2200
Course credits (total) and credits for each module	6 hp Hand in assignments (4.5 hp) + mini group works (1.5 hp)
Time for course offering	**Period 4, 2020**
Course responsible and other teachers	Jan Scheffel and Per Brunsell Division of Fusion Plasma Physics
Teaching hours, distributed on F, Ö, R, L, S	26 F + 12 Ö (Notation: F – lecture, Ö – exercise session, R – ”räknestuga”, L – lab session, S – seminar)
Registered students, number	29 students; all followed the course
Performance indicator, after 1st examination offering, %	
Examination rate, after 1st examination offering, %	86 % (25 students)

Course goals

Specify the overall goals for the course	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.
Specify how the course is designed to meet the goals	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

Describe the changes that have been made since the last course round. (Tell the students at the start of the course)	• The first lecture was physical, whereas all remaining teaching and examination was carried out digitally • Lectures were video recorded and posted on home page • Since last year, two electronic course questionnaires were integrated into the course (at course weeks 2 and 6, 100 % response rate).

Student contact

Students in this year's course committee; name and email	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 * two written formative questionnaires to everyone * informal discussions with the students
Results of formative middle course survey	Not employed.
Results of course committee meetings	

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

New questions were introduced in 2019.
(The previous questionnaire had been 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:
Most questions are the same in both surveys.
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 yo 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 first 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

Response frequency	100 %
Changes since previous course round	The question regarding that this is the first time the course is given as an online course is new.
Overall impression	Very good. The course is well established.
Positive viewpoints	- A very good idea, espacially integrating it at an early stage! Generally, it is very beneficial to evaluate the students opinions about a course in order to improve it later on (on having a course survey early in the course). - I usually don't do the surveys and now I am doing it, so it seems work! If it's usually difficult to get feedbacks from students, yes (on having a course survey early in the course). - yesYesyesYes I strongly believe that this survey is good in this part of the course (on having a course survey early in the course). - It is also very unusual that you are forced to think about your ow learning progress and interests this early during the course, and I find it helpful to find motivation (on having a course survey early in the course). - I like the innovative design. I would not ask for any change this far. - I am impressed by and thankful for how well the course has been transformed into digital format. - Think everything is good. - I really like the course design. I have been motivated to study through the whole course.
Negative viewpoints	- The assignment and group work questions need to be clearer. We spend most of the time trying to understand what exactly is the question asking for because they're so vague. Moreover, for someone with zero fusion background, it is hard to keep up when different terms for the same concept are used with no one clarifying that they all mean the same thing e.g. inertial fusion is the same as inertial confinement fusion. - I think it could be useful to use the Canvas function for groups for the mini group works. It is much more comfortable to be able to see all your assignments on your own canvas page. Then, if my partner in the group work hands in our assignment I can see that it has been handed in on my page as well, which would be nice. - It is easier to understand the feedback when it's written in the pdf, rather than in the comments on canvas. The comment section can't handle indices and the feedback was a little bit difficult to read and understand. Otherwise good feedback! - Nothing I would like to change really. I think the feedback has been good enough, comments (or underlinings) on the hand-ins have been enough to check my answers if there is something I had misunderstood. I did like the comments better than the underlinings though. - It would be nice to have the part where the exercise teacher shows how to solve problems recorded so we can follow the process more clearly
Was the course relevant wrt the learning outcomes?	About 90 % of the students responded that the learning outcomes helped them to understand what they should learn in the course.
Views on preknowledge	A few students responded negatively here. Only about a fourth of the students thought that there were no problems.

Views on course design	Some 83 % (both surveys) believed that the course design was well adjusted for learning in fusion physics. In the first survey, 93 % thought the course was well adapted as an online course. This figure was reduced to 83 % in the second survey. The course content matched the students' expectations. The most central topics, according to the students, was given high priority.
Views on course material	Course literature was appreciated, 93 % were positive in survey 1, and 90 % in survey 2.
Views on examination	The students believed that the assessment was well designed and fair (65 and 75 % were positive); interestingly top score increased survey 2 to 54 % from 17 % in survey 1.
Particularly interesting comment	• All responding students except one (one student did not respond; optional question) thought that it was a good idea to integrate the survey into the course! As many as 75 % gave top score. • The question whether there is an including, friendly atmosphere in the course was found difficult to answer. • The mix of learning activities was appreciated by nearly all responding students.
Relevant web-links	

Course evaluation; teacher interpretation

Comments	Using the two surveys (course weeks 2 and 6) we teachers conveniently received feedback from 100 % of the students for alterations. The two surveys show that the course works very well, in spite of the transition to a digital 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	Due to the circumstances with the pandemic it was found too awkward to organize a final course meeting.

Course responsible, summarising comments

Overall impression	The course works fine.
Positive viewpoints	Nice to have many students. And that the digital design plus the integrated course surveys were so well received.

Negative viewpoints	Two groups of two students were plagiarizing home assignments. They were warned and their home assignments were nulled. Fully digital examination has the drawback to tempt students into cheating, unfortunately.
Views on preknowledge	Usually sufficient but some students have problems with electromagnetic theory and vector analysis.
Views on course design	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.
Views on course material	The book is appreciated, but we should consider adding side material.
Views on examination	Continual examination is highly appreciated. This also means that we teachers meet well informed students in class.

Pedagogical development II

How the changes for this course round worked out	• This was the first time the course was given digitally. We are glad that it worked out well (83 % positive in course survey 2).
Changes to be made for next course round	Some students indicate in the course surveys that they have somewhat missing pre-knowledge. Thus: • Provide web links on vector analysis. • Consider adding complementary course literature on electromagnetic theory and vector analysis. Furthermore, if this course is given digitally again: • Some further measures for avoiding plagiarism should be found.

Other

Comments