

COURSE ANALYSIS, postgraduate course

Third cycle courses, EECS School, KTH

An asterix (*) denotes non-compulsory data.

Text in green does not change from one course round to the next.

Course data

Course name	KINETIC PLASMA THEORY
Course ID	JD3300
Credits	6 hp
Time period for course	HT2021
Teachers	Jan Scheffel (jans@kth.se)
Classroom hours	4 x 2
Nr of registered students	3 (but only 2 had the intention to be examined)
Examination rate, in %	100 (of the 2)

Goals

Global course goals	<p>When completing the course, the student should be able to</p> <ul style="list-style-type: none">• Derive the basic plasma kinetic equation from first principles• Discuss applications and validity of the Vlasov and Boltzmann equations• Describe and explain Landau damping and the two-stream instability• Describe basic kinetic properties of hot magnetised plasmas• Derive and explain the Fokker-Planck equation• Describe basic relaxation processes and collision times• Distinguish between fully kinetic, drift kinetic, hybrid and gyrofluid models
How the course design helps to fulfill these goals	<p>The course is given as a set of four <i>discussion meetings</i>. Each student should beforehand study the corresponding sections of the course and prepare five questions to discuss jointly at the meetings.</p> <p>The course design stimulates the students to continual studies. Also, at the course meetings, subject understanding can be achieved through discussions of topics and concepts that the student finds difficult. At these meetings, the teacher furthermore helps the students towards a global understanding of the subject.</p> <p><i>A comprehensive set of course problems should be solved at home and defended at a brief oral examination at the end of the course.</i></p>

Pedagogical development - I

Changes made since previous time course was given	The course is relatively new; it builds partly though on courses in this topic that were given previously. Some changes were made that still requires some
---	--

tweaking:

- Introductory presentations for the beginning of each course meeting.
- Schedule the meetings with at least two weeks in between, preferably three weeks.
- Better encourage the students to carefully prepare five questions before each discussion meeting.

I have now asked the students to send me the five prepared questions for the discussion meetings one day in advance. This avoids the problem that the students may not actually produce five questions, which has happened in my other doctoral courses.

The literature has now been more streamlined to the course.

Course evaluation; comments from students

Based on the questionnaire used at the Division.

If the course has less than 10 students, the questionnaire can be replaced informal discussions.

Evaluation response rate*	100 % The questions were: 1) Was the course relevant with respect to your expectations and the course goals? 2) Was the course in level with your pre-knowledge? 3) What do you think of the course design / teaching / learning? 4) What is your opinion of the course literature? 5) What do you think of examination in the form of log book /home assignment + oral presentation? 6) Any positive viewpoints? 7) Any negative viewpoints? 8) Would you like to change anything in the course?
Overall student view*	Positive response to all four first questions.
Positive comments	<ul style="list-style-type: none">• "Jag tycker att kursen var bra, och att jag lärde mig mycket."• "I think the structure of this course is excellent! I thoroughly enjoy the seminars and also doing the exercise questions as they both help me learn very effectively."
Negative comments	<ul style="list-style-type: none">• "Jag hade gärna sett lite fler "ledande" frågor under seminarierna. Ibland när man ska komma på frågor kan det vara svårt att förstå vad som är riktigt relevant. Jag tror att man kan lära sig ännu mer om kursledaren ser till att vi behandlar alla viktiga delar av kursen under seminarierna."• "The course feel like it could be developed a bit more. Some exercise questions are answerable in only a sentence while others require several pages."• "In the literature there were also some subjects that weren't as well covered as others."
Pre-knowledge, comments*	<ul style="list-style-type: none">• "For some parts it was possible to simply study up on a technique that was used which I was unfamiliar with and at other times you could get by great without understanding the exact mathematical technique that was used because the results were explained in a pedagogical way."

Course design, comments*	<ul style="list-style-type: none"> • ”I really like the structure in this course. Compared to FED3230 it felt like the course could be developed a bit more which is not strange as this is a newer course.”
Literature, comments	<ul style="list-style-type: none"> • ”It’s comprehensive and covers multiple aspects of the topic.” • ”Jag uppskattar att man förklarar saker på olika sätt och olika detaljerat i olika böcker.”
Examination, comments	<p>Everybody thought it was fine.</p> <ul style="list-style-type: none"> • ”I enjoy this kind of examination. Just like in FED3230 the exercise questions seem to be developed to promote learning and understanding which I thoroughly enjoy. Doing the exercises therefore feel less like a chore and more as an opportunity to learn more.”
Particularly interesting* comments	<ul style="list-style-type: none"> • ”I think this is an excellent course and the only thing I wish is that it will be further developed and given!” • “The format of us preparing questions on the readings and discussing them in class is nice. But sometimes the discussion on a certain point would take a significant amount of time that we don’t get to discuss all of the material assigned for the session. So a suggestion would be that the session would be divided into two parts. First part with you explaining the key points of each of the readings that you want the students to know, and the second part would be the students discussing their questions.” • “Mötet med kursledaren i slutet av kursen är också bra, eftersom man kan ta ett lite större helhetsperspektiv och en tillbakablick på det man gjorde tidigare i kursen.”

Course teacher’s impressions from the evaluation

Comments Very good and helpful comments from all three students.

Course teacher’s summary

Overall view	Good students that performed well in a course with a fairly good structure.
Positive comments	Continual learning works fine, also here.
Negative comments	The students could have devoted more care in preparing their questions for the meetings.
View on pre-knowledge*	OK. The mathematics in complex analysis is somewhat demanding, but the students could read up sufficiently on it.
View on course design*	Continual discussion meetings work really well in small groups (up to 10 participants).
View on course material	Does the trick now.
View on examination	Worked fine.

Pedagogical development - II

Outcome of course changes Worked pretty well apart from that the students still have

made since last time course was given

difficulties in preparing five adequate questions to be discussed before each meeting.

Changes to be made before next time course is given

- Prepare a "warm-up" introductory presentation for the beginning of each course meeting, or as a latter part of the meeting.
- Better show and encourage the students to carefully prepare five questions before each discussion meeting.
- Prepare a few questions for each meeting that may be used when the students do not cover essential parts of the topics for the particular meeting.

Other

Comments*