Course analysis SH2314 Autumn term 2024
DESCRIPTION OF THE COURSE EVALUATION PROCESS Describe the course evaluation process. Describe how all students have been given the possibility to give their opinions on the course. Describe how aspects regarding gender, and disabled students are investigated.

After the course, the course participants were encouraged (by e-mail) to fill in a learning experience questionnaire (LEQ) with 12 questions answered with numerical values and a number of free-response questions. Four course participants out of 12 (33%) answered the LEQ. Due to the small number of respondents to the LEQ, it was not possible analyze differences based on gender and disability in the answer to the LEQ. However, inclusiveness was discussed in the course evaluation meeting (see below).

DESCRIPTION OF MEETINGS WITH STUDENTS Describe which meetings that has been arranged with students during the course and after its completion. (The outcomes of these meetings should be reported under 7, below.)

There were no course evaluation meetings during the course. After the completion of the LEQ, a course evaluation meeting was held (2024-12-06) where the course responsible, one SH2314 course participant, one participant for the corresponding PhD level course FSH3220 and the track responsible for the subatomic physics track within the TTFYM MSc program took part.

COURSE DESIGN Briefly describe the course design (learning activities, examinations) and any changes that have been implemented since the last course offering.
SH2314 Medical Imaging Signals and systems (7.5 credits)
This course consists of three lectures, one exercise class, five four-hour workshops and three labs. The lectures and exercise class are held as a combination of slide shows and blackboard derivations, with some different active learning exercises mixed in, in particular during the exercise class. These active learning exercises can be anonymous quiz questions, which are subsequently discussed in class. On one occasion the students performed a small computer lab (on MRI) in class.

Before each workshop, the students were assigned reading materials and video lectures, consisting of recordings from last year's lectures. The workshops consisted of either one four-hour session or two two-hour sessions on the same day with a break in between. Each workshop started with a quiz that was solved by the students individually. Following that, the students were allowed to sit together in groups and solve the same quiz problems together. After the students had handed in these, the teacher went through the solutions in a full-class discussion. Then, the students were given a second problem set that they solved in groups during the second half of the workshop. The workshop ended with a full-class discussion of the group problems. The individual quiz, group quiz and group problem set all gave bonus points for the exam. To supplement the topics covered in the workshops, two sets of optional hand-in problems were given throughout the course, giving bonus points on the exam. The course was co-taught with a PhD-level course FSH3220 and with another MSc course, CM2020 Ionizing Radiation imaging, with largely overlapping course content. There were two teachers present in most of the workshops.

The lab part of the course consisted of three labs: "Photon-counting, SNR and the Rose model", "X-ray computed tomography", and one lab on nuclear medicine (students could sign up for either "Positron Emission Tomography" or "Single-photon Emission Computed Tomography"). These exercises required numerical programming to analyze the data and were examined with a lab report.
The course was given in person at Albanova (except two labs given in Flemingsberg). The students were given the opportunity to interact with the course responsible over Zoom during weekly office hours, but few students took the opportunity to do this.

There were no major changes compared to last year. However, some changes were implemented based on the conclusions in last year's course analysis: the video lectures were updated and re-recorded, and the labs were scheduled earlier, to avoid overlap with the exam period. The ambition from last year to reduce the lab groups' size was not fully realized. Some of the lab groups in lab 1 and 3 were large, up to 7 students, but lab reports were done in smaller groups of 2-4 students.

THE STUDENTS' WORKLOAD Does the students' workload correspond to the expected level (40 hours/1.5 credits)? If these is a significant deviation from the expected, what can be the reason?

Since this is a 7.5 credit (five full time weeks) course running during nine weeks the expected number of work hours per week is 5*40/9=22. The students' responses suggest that they work between 9 and 17 h per week, but from the discussion in the course meeting it is probable that many students did not include studying for the exam in these numbers. The time spent therefore seems to be reasonable and there is no need to adjust the workload.

THE STUDENTS' RESULTS How well have the students succeeded on the course? If there are significant differences compared to previous course offerings, what can be the reason?

All the 12 registered students took the first exam and of these 12, 10 (83%) passed the exam. Of the passing grades, the grade distribution was 2 A, 2 B, 1 C, 3 D and 2 E. These are fairly typical grades compared to previous course rounds. At the time of writing, nine students have completed the lab part of the course. Considering both the exam and the lab part of the course, 8 out of 12 students (67%) have passed at the time of writing.

STUDENTS´ANSWERS TO OPEN QUESTIONS What does students say in response to the open questions?

- "What was the best aspect of the course" – answers mention "The workshops" and "The flipped classroom methodology"
- "What would you suggest to improve"? – One commenter mentioned giving suggested problems for self-study beforehand and devote class time to going through these before the workshops.
- "What advice would you like to give to future participants?" – "Go to the workshops" and "start studying early".
- "What did you think about the "flipped-classroom" format? Would you prefer normal lectures instead of workshops?" – Out of three comments, two prefer the flipped-classroom approach and would prefer normal classes.
- "What did you think of the labs?" – Some positive comments "They were very interesting and we received all the help we needed." and some negative: "Need less people per lab because we were confusing each other and most people never understood what was happening."
- "Did you think the course climate was inclusive towards you and others?" Two comments, both affirmative: "Absolutely!" and "Yes".

SUMMARY OF STUDENTS' OPINIONS Summarize the outcome of the questionnaire, as well as opinions emerging at meetings with students.
The students' answers to the numeric questions were generally good (= high numbers). On the scale from 1 to 7, all scores were 5.5 or higher except three:

- 11. Understanding of key concepts had high priority (5.0)

According to the student feedback in the course meeting, the problems were in some cases focused on remembering a particular formula or solving an advanced problem, but not so much on key concepts.

- 12. The course activities helped me to achieve the intended learning outcomes efficiently (5.2)
  Here, one student commented “I would have felt more comfortable if we had some recommended exercises to practice on our own before the workshop sessions”

- 15. I was able to practice and receive feedback without being graded (4.8)
  According to the feedback given in the course meeting, it would be good with some recommended exercises to study before the workshops.

In the course meeting the student representatives of SH2314 and FSH3220 brought up the following, in addition to what was mentioned above:

- It takes some time for the student to understand the workshop format, so it would be good to inform more about how the students are expected to do and what to study (problems vs. theory etc.). It would also be good to explain the grading system at the start of the course and clarify how the bonus points relate to the requirements for passing the course.
- Regarding the labs, the instructions were confusing in some cases. In lab 1 (Rose model) the lab instructions did not agree with the instructions given by the teacher, and in the PET lab there was some missing information. In lab 2 it’s good to explain to the students that there are multiple ways to solve the problem of measuring iodine concentrations. Furthermore, the lab groups were too large and it was quite crowded in the lab.
- It would be good to be clearer in the video lectures about how different efficiencies (intrinsic, geometric etc.) are calculated in practice and what parameters should play a role.
- When the teachers discuss the problems at the end of the workshop sessions it can get a bit too abstract, and the teachers could be better synchronized with each other.
- The flipped-classroom course design is good and should be kept. The video lectures could be made more engaging by introducing some videos or animations.

OVERALL IMPRESSION Summarize the teachers’ overall impressions of the course offering in relation to students’ results and their evaluation of the course, as well as in relation to the changes implemented since last course offering.

This course transitioned from normal lectures to flipped-classroom format one year ago and the change appears to have been successful, as the feedback is positive overall, even though not all students like this way of teaching the course. There were no major issues identified, but it is clear from the feedback that there are several opportunities for improvement, such as better organization of the labs, clarifying some things in the video lectures, providing recommended problems to study for the workshops and giving the students more information about the workshop structure at the start of the course.

ANALYSIS Is it possible to identify stronger and weaker areas in the learning environment based on the information you have gathered during the evaluation and analysis process? What can the reason for these be? Are there significant difference in experience between:- students identifying as female and male?- international and national students?- students with or without disabilities?
The number of respondents to the LEQ is too small to distinguish between different groups of students. It seems that the course climate was perceived as inclusive, although it should be kept in mind that students who feel excluded may not necessarily indicate this in the LEQ. In general, this course design seems to be conducive to creating a good learning environment for different groups of students, as long as problems identified in the course evaluation process are addressed continuously. It is advisable to keep looking for ways to support students who may have an easier time learning from live lectures than video lectures.

PRIORITIZED COURSE DEVELOPMENT What aspects of the course should be developed primarily? How can these aspects be developed in short and long term?
The flipped-classroom format appears to be successful and should be preferred while minor changes are made to address the problems identified in this analysis. The most important task for next year is to organize the labs better, decrease the number of students per lab session and make sure that the lab instructions are complete and aligned with the lab exercise. In addition, it should be made clear for the students early on in the course how the workshops are organized, how they are expected to study for them and how the workshops contribute to the grade. Better synchronization between the teachers in the workshops is also important, as well as improvements to the video lectures.