

# Course analysis for Basic Quantum Mechanics, FYSB11 and ÄFYD03 HT 2020

**Course responsible:** Peter Samuelsson, Patrik Eden

**Other teachers:** Smita Chakraborty, Lila Chergui, Andrew Lifson, Athanasios Tsintzis, Pradheebha Surendiran, Kristi Adham, Ivan Unksöv.

**Number of students registered:** 82 (81 Ladok students, 1 student according to Canvas classification)

**Course representative:** Due to the circumstances with the pandemic, no course representative was elected (the course responsible did not remind the students to elect a course responsible.).

**Grades:** On the ordinary exam the results were U - 7, G – 22, VG - 19. The re-exam has not yet been corrected. This is statistically an average result.

## Analysis

### I. Summary of the course evaluations

Total number of responses: 28 out of 81, giving 35% responses.

*Short summary of the results:* Strongly affected by the Corona pandemic and the distance teaching, the conditions for the course was different from the standard situation and the results hard to compare to earlier years. Still, overall the students were satisfied (grade 4.8, roughly average a normal year and almost the same as in the spring).

The overall impressions of the lectures, the book, the experimental and computer labs and the exercises were positive. In contrast to earlier years but in agreement with the evaluation in the spring, the computer lab did not stand out in a negative way. This indicates that the revision of the lab instructions seems to have been successful. The course evaluation this semester contained a special section related to distance education. Here the students were overall reasonably positive, however the direct interaction with the teachers was given lower marks.

### II. Comments and reflections from the teachers

The teachers felt that giving the course for the second time based on distance teaching went reasonably well. Based on the experience from the first time with distance teaching, in the spring, the pre-recorded lectures, Zoom-based exercise and laboratory work, and an exam on Zoom, were modified and updated. In particular the experimental labs were reworked so that the students could control parts of the lab equipment on remote, giving more of a genuine lab experience. On the technology and software side no major problem occurred and the teaching platform Canvas worked reasonably well for full scale distance teaching. This overall assessment seems to be shared by the students, the course overall received good marks. One thing to note is that out of the 82 registered students only 48 did the ordinary exam. Then 15 more did the re-exam. If this is an effect by the pandemic, that more students have a hard time to follow the course, is not clear at the moment but should be kept in mind if the distance teaching continues for an extended period.

The teachers, just like the students, felt that it was hard to find well working substitutes to the personal meeting and discussions-at-the-blackboard that are the hallmarks of in-person teaching. Compared to the spring, the arrangements around the Zoom exam was not discussed much, the students are probably used to the format by now.

Concerning the course, similar to the spring some students pointed out that the more mathematical part of the course was difficult and sometimes hard to follow. This was however the last time the course was given in this format, the next time the students will have a more solid mathematical background and, in particular, study key mathematical tools needed, for example Fourier transformations, in a parallel course.

The assistants who commented on the student evaluations largely agreed with the overall comments of the students. For the exercises, the assistant felt that the response on Zoom exercise sessions were positive, but in some cases students arrived late to the exercises with a large number of questions, which complicated the task for the assistants. For the experimental labs, the assistant agreed that the lab sessions were not giving the same experience as in-person labs, but given the circumstances, the assistants did what they could in order to be helpful.

We note that the student groups taking the course in the spring semester and in the fall semester are partially different, both in amounts and background/character. In the spring, typically one third to one half of the group of the students participating actively are physics teacher students and most of the remaining students are international, exchange students. In the fall, typically there are twice as many students following the course, with the overwhelming majority Swedish physics students, not in a physics teacher program. When comparing course assessments it is therefore advisable to consider spring and fall semesters separately.

### **III. Evaluation of changes since last time the course was given**

Since last time the course was given, no major modifications have been performed, only minor ones to update the online material and the methods to interact with the students. The most important modification was that, in order to better meet the demands in the course plan, the experimental lab was modified so that the students could control some of the equipment themselves on remote.

### **IV. Suggestions for modifications and measures until the next time the course is given**

The next time the course is given it has a new course plan, a different course code FYSB22 and contains partly different material. Moreover, the course will run in parallel with the new course FYSB21, which we hope will provide the students with a more suitable mathematical background. We will try to closely follow the change in student learning and conceptual understanding under these new circumstances and try to adapt the new course accordingly.