

## Course Analysis Optical Physics HT2018

Marijn Versteegh, December 2018

Course responsables: Marijn Versteegh and Val Zwiller

Examiner: Val Zwiller

Teachers:

Val Zwiller: 7 lectures

Marijn Versteegh: 7 lectures, Michelson interferometer lab, Polarization and 3D imaging lab

Lily Yang: 8 exercise sessions

Ying Fu: Microscope lab

Teaching assistants:

Katharina Zeuner and Lucas Schweickert: Fourier optics lab, Quantum entanglement lab

This year 16 students were registered for the course, including 2 doctoral students. All 16 students passed all 5 labs. 14 students took the written exam in October, of whom 12 passed directly and 1 student passed after completing an FX task. The exam in December was taken by 3 students, of whom 2 students passed.

With respect to last year we made the following changes:

- We have two new labs: 1. A new Michelson interferometer lab, which replaces the old Michelson lab. The new setup is much more stable and therefore allows for counting the fringes. This enables several applications of the Michelson interferometer, which are included in the new lab, such as measurement of thermal expansion of an aluminium rod, measurement of the index of refraction of plexiglass, and measurement of the coherence length of several light sources. 2. The Polarization and 3D imaging lab. Here the students explore properties of polarizers and wave plates, they study optical activity in a sugar solution and they setup op 3D imaging using three different techniques: one technique using coloured glasses, one technique using linear polarization and one technique using circular polarization. In total we have now 5 labs, one more than in previous years.
- The students had to hand in a short lab report (one report per group) at the end of each of the five labs, which was evaluated immediately by the lab teacher. The reason for asking the lab reports is that by writing down the students learn the physics better and they are forced to show, to themselves and to the teacher, whether they understand the topic or not.
- We cancelled the numerical simulation homework exercises that we had last year.
- One extra lecture, devoted to propagation of wave packets, phase velocity and group velocity.
- Lily took over the exercise class from Katharina. Some of the exercises from Göran Manneberg's old exams were replaced by problems from the book and questions from our exams of last year. The reason for this change was to better connect the exercises with the content of the lectures.

- We allowed the book at this year's exam.

We asked the students to participate in the course evaluation, for which we used LEQ. From the answers from the students we conclude that the students:

- Found that they worked with interesting issues (score 6.7).
- Found the course challenging in a stimulating way (score 5.6)
- Found the assessment on the course fair and honest (score 6.3).
- Were able to learn by collaborating and discussing with others (score 6.0).
- Were able to get support if they needed it (score 5.8).
- Were able to practice and receive feedback without being graded (score 4.5).

Overall the scores are better than the scores of last year. The students are generally satisfied with the course. The lower score on the question about practicing and receiving feedback without being graded can be related to the introduction of lab reports this year. We intend to keep the lab report since they, in our view, contribute significantly to the learning of the students.

The students enjoyed the labs and the lectures, including the demonstrations during the lectures. However, the exercise sessions must be improved. This is clear from our own experience, and it has been confirmed by the students' answers to the open questions of the LEQ. The connection between lecture content and exercises was still too weak. The exercise sessions are intended as an occasion where the students practice themselves with topics that were explained at the lectures and learn to apply the knowledge they obtained at the lectures. Therefore the connection between lecture content and exercises should be strong. The exercise sessions should also prepare the students for the written exam. Because of the different kinds of exercises (from the book, from Göran Manneberg's old exams, and from our exams of HT2017), the students felt unsure what type of questions to expect at the exam. Therefore they felt unsure about what they should do to prepare for the exam.

We have the following plans to improve the exercise sessions:

- Careful selection of exercises and good preparation of the exercise teacher.
- Better communication between the lecturers and the exercise teacher to strengthen the connection between lectures and exercises.
- Use exercises from our old exams (from HT 2017 and HT 2018, four exams in total) because the connection between our lecture content and the exam questions is strong and practicing questions from our old exams gives the students the best idea of what type/style of questions to expect at the exam. We have also worked-out solutions to these exams.