



## SD2125 HT23 – Course analysis

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- 1. Description of the course evaluation process:** Two course-committee meetings (*kursnämndsmöte*) took place with two student representatives, one midway through the course and another after the final exam. The LEQ questionnaire was also sent to the course participants. The LEQ results were used to investigate the aspects of gender and disabilities in the course. It should be noted that only 8 out of 102 participants responded to the LEQ questionnaire (ca. 8% answering rate), so conclusions drawn from it shall be taken with caution.
- 2. Description of meetings with students:** The meetings were used to discuss the different learning blocks of the course with the student representatives and how the course participants experienced them. These included lectures, preparatory quizzes, computer exercises, seminars, laboratories, written tests, and the final exam. Other aspects, such as language of instruction, time scheduling, and course development, were also discussed.
- 3. Course design:** This course is designed for students of Bachelor and Master programs to learn the fundamentals of signal analysis in time- and frequency-domains, Fourier and z-transforms, and digital filtering. There are four lectures (L1-L4) that overview the abovementioned course contents (supplemented with snippet recordings in Canvas of the entire course material); four hands-on computer tutorials with Matlab (the first/second pair covering the first/second half of the course contents), which are then evaluated with four compulsory seminars (LAB1 moment); one laboratory session that encompasses both theoretical aspects and computer implementations (LAB2 moment); and two written tests (WT1 and WT2) each covering roughly half the course contents. The final exam (TEN1 moment) can be taken by students who still need to pass the written tests and/or want to improve their grades. There is also a guest lecture (L5) on signal analysis applications in industry and academia, which is of voluntary attendance. Course developments for the HT23 offering include preparatory quizzes with bonus points for the written tests and adjusting the content of Lectures 1 and 2 so that the former deals with time-domain signal analysis and the latter with frequency-domain analysis. The course responsible and examiner also changed from Karl Bolin to Elias Zea.
- 4. Students' workload:** The mean workload perceived by the students in the LEQ was 9-14 hours/week. Considering a seven-week study period, plus ca. three weeks of self-study, this gives approximately 90-140 hours. The deviation from the expected 160 hours (40 hours / 1.5 credits) could be attributed to technical background differences between local and international students. The student representatives also mentioned in the final course committee meeting that the study pace of the course was perceived to have a relatively 'easy tempo,' suggesting potential additions to the course content and activities.
- 5. Students' results on the course:** The statistical distribution is centered around grades B, C, and D, with 28, 17, and 23 students passing, respectively. Seven students obtained a passing grade of A, while 14 received a grade of E. The statistics are relatively similar to previous course offerings.
- 6. Students' answers to open questions:** The student responses in the LEQ indicate that the course contents were interesting and valuable and that the timeframe of the learning activities and assessments was deemed suitable overall. One participant suggested splitting the computer exercises from four to eight. Another participant remarked on a need for more



structured lectures and more precise material for self-study. Students also gave positive feedback about the teachers and teaching assistants. Although students were notified in advance in Canvas and the material was available for self-study, there was a negative remark about including a question in WT2 on the guest lecture L5.

- 7. Summary of students' opinions:** Most participants in the LEQ considered the course interesting and stimulating in a challenging way and that the assessment was fair and honest. Similarly, most students felt able to practice and receive feedback and collaborate and discuss with others. The flexibility of using both English and Swedish languages for instruction was appreciated. Besides a tight timeframe between the 3<sup>rd</sup> and 4<sup>th</sup> computer assignments, the course committee claimed that the schedule was good and that students could take written tests and/or the final exam. Both the LEQ and the course committee meetings revealed that the structure of the lectures should be clearer. It was also not evident to all students that the computer tutorials were (optional) occasions to ask questions on the home assignments. This was also confirmed in the spread of answers to "I was able to get support if needed" in the LEQ.
- 8. Overall impression:** Despite the low answering rate in the LEQ, the statistics of passing students and the course evaluation confirm that the course offering was, in a broad sense, well implemented. It was observed that the change implemented with preparatory quizzes and bonus points has positively impacted the students' results. The changes in the contents of L1 and L2 were not highlighted as positive or negative, but, as remarked in the previous points, their structure can be further improved.
- 9. Analysis:** Strong points obtained in the course evaluation include (i) fewer lectures and more time for seminars, hands-on laboratory work, and discussions, (ii) language flexibility, (iii) preparatory quizzes, and (iv) flexibility in choosing to take written tests and/or final exams. It can be argued that these points strengthen the potential of active learning, particularly with project-based learning and collaborative work, ultimately positively impacting the students' learning. Weak points identified in the evaluation include (i) a lack of clarity in the structure of the lectures and the study material and (ii) a lack of emphasis on support during computer tutorials. Most students are male, yet no indication of gender bias was identified in the course evaluation and subsequent analysis. It was perceived that international students (e.g., exchange students) came with varied technical backgrounds compared to national students, suggesting differences in their capacity and understanding of the topics before the course. This aspect is quite challenging to address, as it changes yearly. No indication of bias toward students with disabilities was identified.
- 10. Prioritized course development:** The following course offering shall focus on three development tasks. *First*, both in the short and long term, the structure of the lectures, computer tutorials, and study materials should be more clearly emphasized. This will involve carefully highlighting the course structure from day 1 of the offering, including additional information regarding support and assistance in Canvas and improving the time plan between computer tutorials and seminars (already implemented in the scheduling for HT24). *Second*, re-formulating the home assignments with Matlab live scripts, making the format more precise and homogeneous. This action is already under development for HT24 and is a win-win for both students (on the implementation end) and teachers (on the correction end). *Third*, and mainly in the longer run, continue developing the learning outcomes, activities, and assessments to ensure the material is more up-to-date (e.g., establishing a closer link to neighboring topics such as multi-scale signal analysis, machine learning, and numerical optimization).