

Course analysis (course evaluation)

Course code 5MT009	Course title Genetics	Credits 5
Semester (VT/HT-yr) HT-22	Dates 2022-08-29 – 2022-10-14	

Course Director Fulya Taylan	Examiner Anna Lindstrand
Teachers in charge of different parts of the course Fulya Taylan	Other participating teachers Jesper Eisfeldt, Isabel Tapia Paez, Sofia Frisk, Andrea Bieder

Number of registered students at the 3-week check 36	Number passed at final course day 36	Response frequency course valuation survey 31/36 (86.11%)
Other methods for student influence (in addition to the final course valuation/survey) None		
Feedback reporting of the course evaluation results to the students Sent on 2022-11-14		

Note that:

The analysis should (together with a summarising quantitative summary of the students' course evaluation) be communicated to the education committee at the department responsible for the course and for programme courses also to the programme coordinating committee.

The analysis was communicated to the education committee on the following date: 2022-11-14
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1. Description of any changes implemented since the previous course occasion based on the views of former students

- Course content such as reading materials, video lectures, conference talks, weekly reflections were updated as planned and the most recent articles and important scientific talks were provided.
- Previous year's exam questions were used in the group discussions to familiarize the students to the exam questions at the end of the course, as planned.
- The content and workload in the first week of the course was minimized to give more free time for the students in their first week at KI.
- Canvas was reorganized based on the dates of lectures, activities and assignments.
- A more detailed introduction session was given to the students in the first encounter. How to use Canvas and TimeEdit as well as how to navigate at KI were explained on the first day of the course.

2. Brief summary of the students' evaluation of the course

(Based on the students' quantitative responses to the course evaluation and key views from free text responses. Quantitative summary and graphs are attached.) (Max=5, Min=0)

- Majority of the students believe that they have developed valuable expertise/skills during the course (mean=4.1, median=4.0 and standard deviation=0.6).
- Majority of the students think they have achieved the intended learning outcomes of the course to a large extent (mean=3.9, median=4.0 and standard deviation=0.7).
- Almost all the students think there was a common theme running throughout the course – from learning outcomes to examinations to a large extent (mean=4.5, median=4.0 and standard deviation=0.5).
- Almost all the students think the course has promoted a scientific way of thinking and reasoning to a large extent (mean=4.4, median=4.0 and standard deviation=0.6)
- Almost all the students think the teachers have been open to ideas and opinions about the course's structure and content to a very large extent (mean=4.6, median=5.0 and standard deviation=0.6).
- Majority of the students feel that the workload during the course was NOT reasonable in relation to the extent of the course/number of credits awarded (mean=2.8, median=3.0 and standard deviation=1.1).
- Almost all the students think the course structure and methods used (e.g. lectures, exercises, seminars, assignments etc.) were relevant in relation to the learning outcomes to a large extent (mean=4.4, median=5.0 and standard deviation=0.7).
- Majority of the students think the examination was relevant in relation to the learning outcomes to a large extent (mean=4.4, median=5.0 and standard deviation=0.7).
- Majority of the students think they took responsibility for their own learning during this course to a very large extent (mean=4.4, median=5.0 and standard deviation=0.7)
- Majority of the students felt that he/she could turn to the teacher for guidance when/if he/she had questions or problems with the course content to a very large extent (mean=4.5, median=5.0 and standard deviation=0.7).
- The students appreciated the feedback they have received and some of them found it important for their development and learning (mean=3.6, median=4.0 and standard deviation=1.0).
- Majority of the students think this is a very good course (mean=4.5, median=5.0 and standard deviation=0.6)

In Figure 1, a comparison of student responses to 12 standard questions that are surveyed to evaluate the quality of the course between 2019-2022 is presented. The plots show the mean value with the standard deviation for each survey question in each year. Four-year evaluation of the course shows a consistent high-quality delivery of the 5MT009 Genetics course to the MTLs students. Compared to the previous years, in 2022, the mean score of for the question about the workload during the course was lower (mean 2.8 while it was 3.8 in 2021, marked in the figure).

Additionally, the mean score (i.e. 3.6) of the question about the importance of the feedback for their development was lower compared to the previous years as seen in the Figure 1.

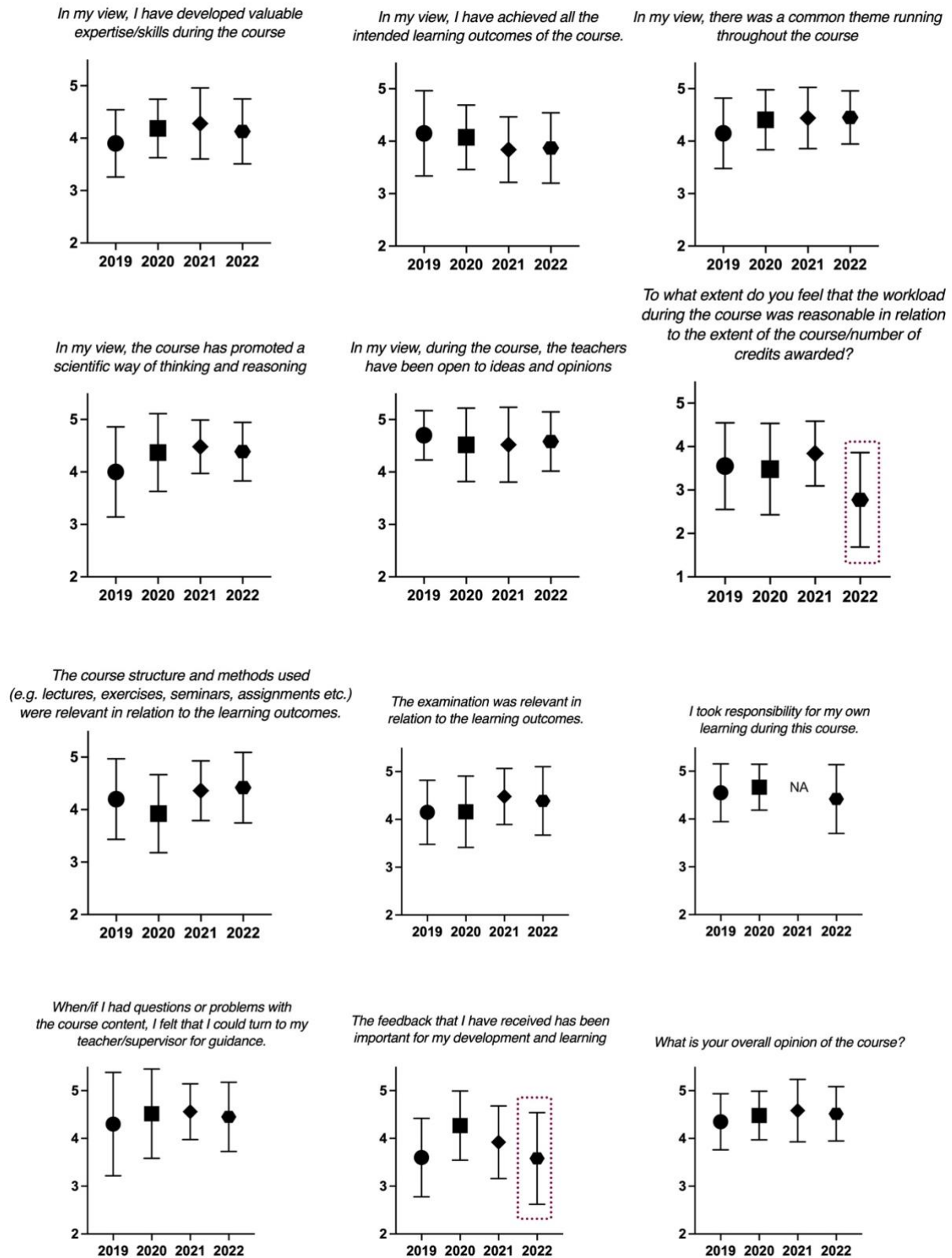


Figure 1. Student responses to twelve questions that are surveyed to measure the quality of the 5MT009 Genetics course between 2019-2022. The plots show the mean value with standard deviation.

Course specific questions:

This year, we surveyed course specific questions and we specifically asked about each ILO in the 5MT009 course in order to understand how each ILO contributed to the students' development of knowledge and skills. This was an interesting experiment for us as teachers to understand how relevant each ILO is from student perspective.

ILOs of the 5MT009 Genetics course:

ILO1: describe and explain the human genome organization, regulation and expression.

ILO2: explain how genetic variation occurs and its impact on health.

ILO3: determine different modes of inheritance of genes and traits

ILO4: identify suitable approaches to disease gene identification and disease mechanisms in the research field of human genetics

ILO5: discuss pros and cons of large sequencing projects and precision medicine as well as evaluate them from global health and United Nation's Sustainable Developmental Goals (SDGs) perspective.

ILO6: critically review relevant scientific literature and discuss the results and conclusions

ILO7: search for, collect, evaluate, interpret and discuss (in writing and orally) research data in relation to topics within the course

ILO8: extract genomic data from publicly available databases

ILO9: evaluate candidate variants and genes using publicly available databases and tools

ILO10: reflect on ethical aspects of research involving human and animal material

ILO11: take responsibility for his/her own learning

Seven out of eleven ILOs got a mean score of 4 or above and the remaining four ILOs had a mean score a little below of 4 as seen in Figure 2. ILO8 and ILO9 got relatively lower scores. The students have one dedicated session and two assignments regarding these ILOs.

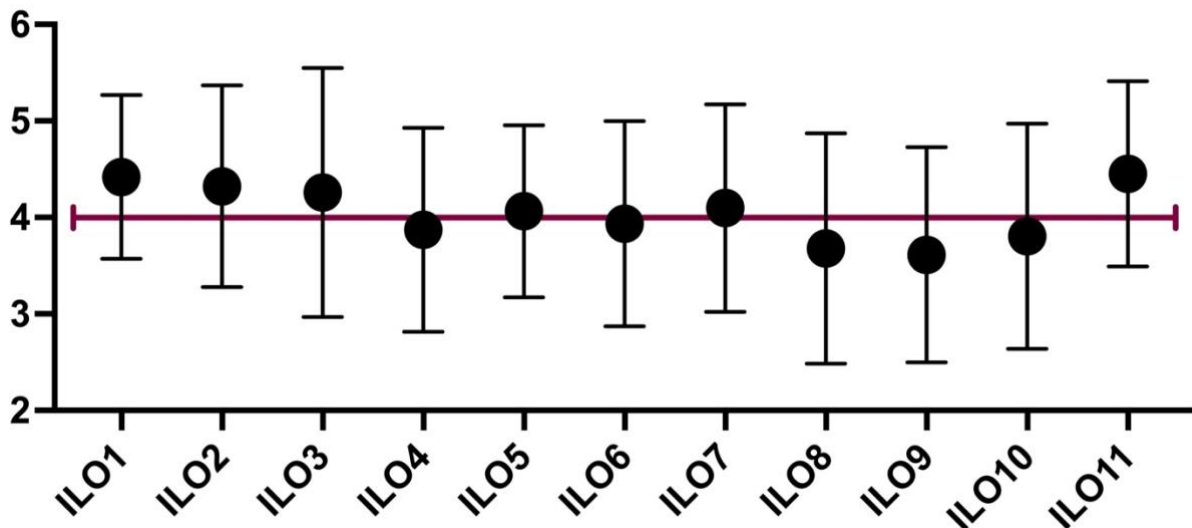


Figure 2. Student responses to 11 ILOs in the 5MT009 Genetics course. In the survey, the students were asked how each ILO contributed to their development of knowledge and skills. The plots show the mean value with standard deviation.

The other course specific questions were as follow:

- Twenty-four out of 31 responding students responded as “to a very large extent” that they could easily find the information they were looking for in Canvas. They also commented that this was one of the best/well organized Canvas in a course. (*mean=4.7, median=5.0 and standard deviation=0.8*)
- Twenty-eight out of 31 responding students responded as “to a large extent /to a very large extent” that the distant open-book digital examination was an opportunity for learning. In the free-text answers, they specifically showed their appreciation of this type of examination. (*mean=4.3, median=4.0 and standard deviation=0.9*)
- Fifteen of 31 responding students responded that there was a good balance between classroom time and individual study time. The students who needed more individual study time or more classroom time stated that they found the workload was high and too much preparation time. Complaints around time management will be further investigated and specific and clear instructions should be provided to the students for better time management.

Key views from free text responses:

Strengths of the course:

Overall, the course was well-appreciated by the students. Many of them were happy about the course content, structure, teachers, flipped classroom format, Canvas layout, activities that are promoting critical thinking, balance between time in the classroom and time to study individually, classroom discussions, examination format, use of different types of pedagogical approaches, assignments, computer workshops, journal clubs and peer-review. They brought up different parts of the course as strengths and highly appreciated the course and the teachers' efforts.

Some representative answers:

The course was interesting, fun, and engaging. It followed a clear structure from beginning to end. In just a month, we have experienced many ways of learning and practiced many important skills. Fantastic teachers, their engagement and passion for the topics were really inspiring. Classroom discussions were also very useful to me, to increase my understanding of certain topics. The open exam really fitted this course, as it was another chance of learning and did not require separate preparation, which was beneficial for such a short course.

The flipped classroom format was a strength, as it allowed me to understand the concepts in my own time and then to apply them to the case studies in class. It strongly promotes critical thinking with the discussions in class, the peer-reviewing activities, the journal clubs, and the article presentations. It combines both the basics of molecular biology as well as the recent research discoveries in the field, which allows students to get a bigger picture and put their learning in a larger context. The activities on Canvas really help to revise and to check that you understood all the concepts.

The course effectively introduces several topics that are organized into different themes. Small quizzes and group discussion questions were useful in developing the scientific reasoning and enhance the previous knowledge. All teachers are helpful and at eye-to-eye level when teaching. I was able to significantly improve my skills in understanding different scientific articles and extracting the relevant information. Another strength of the course is the tightly scheduled group work.

Suggestions for improvement of the course:

More time for different activities in the course, inconsistent grading by the teaching assistants, more instructions to the teaching assistants for the journal clubs, more instructions for the exam and different parts of the course, more minilectures (these are 4-minute video lectures), more course credit, more lectures, less research presentations, more activities/lectures on the first week, less introduction to the course, more feedback sessions, more and clear instructions about mandatory readings and changes in the peer-review assignment were lifted up as suggestions for improvement and brought up several times by different students.

Some representative answers:

More consensus about grading, too much workload relative to credits.

More time for the computer exercise. It was both very fun and I learned a lot, but it was a bit stressful. Media gallery videos for all chapters we covered. More time for peer-reviewing of the essay. Also, it would be a good thing to get a few canvas points for performing a constructive peer-review.

Journal clubs could be improved with clearer instructions to the TAs on what should be covered during the meetings.

Schedule one full day for the computer exercises and workshop. Be more specific with the requirements of the written assignment, otherwise some people will write about very broad topics while some choose a very niched topic so it's harder to judge. Schedule a mandatory session for peer review.

I would like there to be "minilectures" for all the important subjects, not just Fulya's lectures.

More credits and more time.

Increase correction of cases discussed in class. Give more time for studying or less workload. Provide more explanatory videos on databases. Consistent grading from all examiners is needed. TAs need to be more uniform with grading and giving feedback, students should get the incentive to provide good-quality peer reviews on assignments.

More of the free text comments is available on the course evaluation report.

3. The Course Director's reflections on the implementation and results of the course

Strengths of the course:

The 5MT009 genetics course has several strengths. The course has highly skilled and engaged teachers who are experts in their field and all of them have active ongoing research. The teachers are motivated and ready to help the students in their learning.

In the beginning of the COVID-19 pandemic, I created several 4-minutes long “mini” video lectures, and they are still in use and as seen in the course evaluation, the students really appreciate these videos, and they even want to have more of these videos which is doable with KI's new infrastructure to record videos and a small funding for education.

Flipped classroom is a new way of learning for many of the students but it is always appreciated. The course provides rich and high-quality resources such as conference talks from leading scientists in the genetics field and several review articles from high impact journals as well as recently published high-impact articles for journal clubs. As usual, the textbook is highly appreciated, and the students think we should have it for this course.

The course provides flexibility to students to choose how deep they want to learn a certain topic while the classroom lectures and video lectures provide a basis for the minimum expected learning. Moreover, different pedagogical approaches such as peer-learning, student-centered teaching, and flipped classroom were used and the learning experience of the students was supported by various activities such as group discussions, writing assignments, peer-review activities, practical exercises, journal club discussions and oral presentations.

Creating an open-book digital distant examination was extremely difficult at first and took long time to prepare. However, in general this exam format was well-appreciated by the students as it does not require an additional preparation time and gives students enough time to learn and write their answers while developing their critical thinking. Even though evaluation part was even harder than the preparation, the teachers performed their best to evaluate the examination on time. The teachers had different view on certain aspects such as use of references, length of the text and the level of feedback that should be written. These aspects were discussed during the evaluation but we, all teachers, realized that we should revise the rubric to further clarify the feedback and how the assessment is done. Revision of rubric will bring a standardization of feedback and evaluation.

The students are always a strength of this course. They are highly competitive, ambitious and smart students. They want the best possible education, and from teachers' perspective, it is very easy to deliver lectures to this group of students. Even though they come from different educational and cultural backgrounds and this course is their first course at KI as well as they are

new to flipped classroom and peer learning, they perform excellent. They are always highly motivated and engaged in the course and search for more content. Basically, engaged students and engaged teachers create a positive feedback loop. Moreover, the high response rate and their free text responses clearly demonstrate that they care about this course and want to contribute to the improvement of the course.

Weaknesses of the course:

The course evaluation report of the student feedback showed that I should provide a guideline or set of instructions to teaching assistants so that they can give a standard feedback to different level of performances and motivate them to use mainly rubrics and write less. Every year we have different teaching assistants, and each teaching assistant has his/her own style and personality when it comes to giving feedback as well as other conditions. It is not likely to have same teaching assistants for several years. As a result, the teaching assistants themselves are also new to the course and the assignments which may affect their feedback. This can be improved by involving the second-year students or post-docs but most of the time they are busy with their own studies and don't want to be involved in the course.

Relating to the previous point, even though this year there was more feedback sessions, and more feedback was given to each student in different forms, the mean score of the question about the importance of the feedback for their development was lower compared to the previous years. This can be related to the quality of the feedback which was mentioned in the previous paragraph, or the students felt that they need more feedback. This situation should be investigated further.

Standardization of feedback has been done by implementing the rubrics for all the activities, assignments, written and oral examinations. It seems, as I understand from the course evaluation report, that this was not clear to the students, and they thought the feedback that they have received was not standard. Next year, we should emphasize the rubrics as a feedback tool. The rubrics used for the written examination can be further improved and adjusted better to evaluate different levels of performance and specify use of references, text length, etc.

The students thought the workload was heavy for the credit they earn which came as a weakness of the course this year even though the course content was less compared to previous years. It is not an option to increase the course credit or more weeks to the course. Therefore, the best solution is to remove some of the content and assignments or activities. This can be done by removing suggested review articles and Canvas quizzes. More strict word limits can be introduced to force the students to write as short as possible. Additionally, how the students perceived the course workload has to be investigated further. Some of the reasons can be a post-pandemic situation where the students have less time to study due to other social activities and commitments which were almost completely disappeared during the pandemic and students had more time to study. Naturally, over the years the profile of the students has been changed and this might influence how they perceive the course workload. The course workload can be revised based the changing student profile and their needs.

Regarding the evaluation of each ILO in the course specific questions showed that the ILO8 and ILO9 got relatively lower scores. These are the ILOs relating to extract information from various

genomic databases and evaluate genomic information using different publicly available tools. The students have one dedicated session and two assignments regarding these ILOs and many of them unfamiliar about the publicly available genomic databases and tools. The students might have thought they needed more time and more activities relating to these ILOs to be able to achieve them. We should also keep in mind that this is the first course in the program, and they will excel these skills throughout the entire master's program.

4. Other views

The students are very engaged and competitive and even though they found the workload heavy, they delivered high-quality work beyond the expectations on time which also suggests that the students try to do more than what is expected from them and this can be clearly communicated with them at the beginning of the course and reminded whenever needed throughout the course as their mental health is more important than the assignments. Overall, they have a positive view on the course.

5. Course Director's conclusions and any suggestions for changes

(If changes are suggested, state who is responsible for implementing them and provide a schedule.)

Area of improvement	Suggestion for change	Responsible person	Time plan
Course content	Some of the course content such as reading materials, video lectures or conference talks as well as some of the tasks (written assignments, group presentations, quizzes, weekly reflections, etc) can be reviewed and removed from the course content or replaced. <i>This can be done together with the students who completed this course.</i>	Fulya Taylan, course leader	HT23
Example answers for different level of performance	The students need to understand what is expected and level of performances. The answers for different performance levels can be provided to the students from this year's examination and assignments. They can be provided at the beginning of the course on Canvas.	Fulya Taylan, course leader	HT23
Instructions to the teaching assistants	A detailed instruction on how to give feedback to students on different assignments and activities can be given to the teaching assistants.	Fulya Taylan, course leader	HT23
Instructions to the teachers	More consistent feedback on the written examination to the students. The teachers	Fulya Taylan, course leader	HT23

	can meet one week before the written examination and discuss feedback for different performances, and they can create a template for feedback. They should remind students to check the rubric as feedback for their performances. The teachers improve the rubrics so that the students don't need to write extra as feedback.		
Teachers' lectures	Teachers involved in the course will be suggested to lecture more on the genetics and the topics and mention less about their own research.	Fulya Taylan, course leader	HT23
Reading materials	Suggested reading materials will be minimized and mandatory readings will be specifically marked on Canvas. Textbook is highly appreciated but the pages that should be read further specified.	Fulya Taylan, course leader	HT23
Written assignment	This activity can be completely removed or shortened to 150 words with max 3 references and known/assigned peer-reviewing can be done in a scheduled time point in a classroom environment under the supervision of a teacher or a few teaching assistants.	Fulya Taylan, course leader	HT23
Computer exercise video or classroom time	For actual computer exercise either a video can be recorded to show students how each database works or a 1-hour lecture time can be scheduled before the computer exercise and computer exercise can be done in the second week or the beginning of the third week. A new teacher should be assigned to this lecture.	Fulya Taylan, course leader	HT23

Appendices:

1. 5MT009-HT22 Genetics course evaluation report (short) without free text answers (pdf)
2. 5MT009-HT22 Genetics course evaluation report (long) with free text answers (pdf)

Link to course survey report without free text answers:

<https://survey.ki.se/Report/5bcGDk9y42L>