



Course analysis

Course title: Applied Gene Technology and Large Scale Data Analysis	
Course code: CB2040	Points: 7,5hp
Course is part of program: Master's program in molecular techniques in life science	
Semester: 3	Period: 1
Course responsible: Patrik Ståhl	Examiner: Patrik Ståhl
Number of registered students: 35	Number of passed students to date: 34
Reply frequency to course evaluation (%): 94%	

1. Introduction and description of applied changes before this course offering

Background

The course is running its fifth year as a free-standing course in the SciLifeLab master's program in Molecular Techniques in Life Science. Patrik Ståhl is the course responsible and examiner for CB2040.

The course is composed of three main parts: the main theoretical lectures, the project work and the bioinformatics part with its own lectures and labs. This year the course has also incorporated an ethics in gene technology workshop.

For this year's course offering we set out to maintain some of the positive effects that we reached from updating the pedagogics in the bioinformatics part of the course, specifically we wanted to make sure that all students, regardless of background experience, were able to follow the course and execute the bioinformatics labs.

Course analysis 2023

The course was run in 2023 for 35 students. The course evaluation form was distributed in paper, and was answered anonymously. This year the course evaluation form was slightly updated.

Below is a summary of the course evaluation given to the students, showing their scores to the different statements, as their general comments about the course at the end. For the first two parts of the course "main lectures and project work" the "My comments" paragraphs are written by the teacher of this part of the course, Patrik Ståhl, and for the third part of the course "bioinformatics" the "Our comments" paragraphs are written by the teachers of the part of the course, Stefania Giacomello and Olof Emanuelsson, together with the course responsible, Patrik Ståhl.

At the end there is also a section titled "Final comments and conclusions, and further plans" where we summarize our analysis and reflect on the course development for future course offerings. These comments constitute our course analysis.



2. Summary of the students' course evaluations

Course Evaluation CB2040 (HT-23)

Evaluate different aspects of the course by using grade-scale 1-5, where 1 is the lowest and 5 is the highest.

My comments: We have received 29 completely filled in evaluation forms out of 31 students who attended the first exam where the forms were distributed. This is a response rate of 94%.

Presented below are the scores of the students to the different statements, at the end we have also collected the students' written general comments about the course.

Average score Q1-Q22: 4,6

Main lectures and project work (bioinformatics part follows on next page)

Average score Q1-Q13: 4,6

1. The course was interesting and I worked with interesting subjects Avg = 4,8
2. The course was challenging in a stimulating way Avg = 4,4

My comments to 1. and 2.: The students score on average 4,8 that they found the course interesting, and 4,4 that they found the course stimulating. I'm happy to see that the students liked the subjects and felt stimulated!

3. I explored parts of the subject on my own Avg = 4,3

My comments to 3.: The students score on average 4,3 that they explored the subject on their own. The course is focused on teaching key concepts and technologies from the field of gene technology to the students over a limited time period, this impacts the time for the students to explore on their own. The students were however allowed to wish which project, and focused subject, they would work in. This year the project groups were also allowed to freely choose one additional article to study and present.

4. The atmosphere in the course was open and inclusive Avg = 4,9

My comment to 4: Before the course I made a decision to try hard and make everyone feel like they were participating, creating a welcoming atmosphere that would open up for questions and a sentiment of inclusion. I also explicitly set up rules together with the students during the first lecture to how we will behave and respect each other in the class room. I'm happy to see that all the replying students' share my sentiment of an inclusive atmosphere. Mean score 4,9.

5. I understood what the teacher was talking about Avg = 4,8
6. What do you think about the teacher's pedagogic and scientific competence? Avg = 4,9
Student comments: "10"
7. I could learn from concrete examples that I was able to relate to Avg = 4,5
8. Understanding of key concepts was given high priority Avg = 4,8
9. The course activities helped me to learn efficiently Avg = 4,4

10. I understood what I was expected to learn Avg = 4,4



11. The teacher spent time to listen to my questions, answer them properly and comment my work

Avg = 4,9

12. The project activity helped me to learn more effectively Avg = 4,2

My comments to 5, 6, 7, 8, 9, 10, 11, 12: Mean scores 4,8; 4,9; 4,5; 4,8; 4,4; 4,4; 4,9; 4,2. I'm very happy to see the students' high remarks regarding the pedagogics of this part of the course. I have strived to be very clear in my explaining of theoretical concepts, while listening to the students' questions and remarks and trying to adapt to create a flexible learning environment. I have also tried to be clear on the requirements on students' regarding what they should learn. Project activity had a slightly lower score than previous years, without any major change. If this persists I will investigate further.

13. My background knowledge was sufficient to follow the course

1 2 3 4 5 17 Avg = 4,4

My comments to 14: Mean score 4,4. The SciLifeLab master's program attracts students with varying backgrounds where some are likely to have been more exposed to the subjects of the course in their previous studies than others. Yet the main lectures and project work part of the course is built so that the main lectures cover the essential topics, but with added depth compared to less advanced level courses, adding skills even for students with background knowledge in the subject area. And the project work covers state of the art technologies which most students in the master's program do not have any previous detailed knowledge about. In this way the course tries to allow for varying backgrounds without losing momentum and allowing for advanced level learning.

Bioinformatics part of the course

Average score Q14-Q22: 4,5

14. I worked with interesting subjects

1 2 3 4 5 17 Avg = 4,6

Our comments to 14: Mean score 4,6. We are happy to see that the students found the bioinformatics topics to be interesting!

15. The course was challenging in a stimulating way

1 2 3 4 5 13 Avg = 4,5

Our comments to 15: Mean score 4,5. We perceived that the background knowledge of the student group varied quite a bit. It is important to take measures to counteract this variation as it could otherwise lead to stress. This year we added a possibility for students to run R software through a cloud server. The goal is to adapt to the students' needs.

16. The atmosphere in the course was open and inclusive

1 2 3 4 5 18 Avg = 4,9

Our comments to 16: Mean score 4,9. This is a great improvement from four years ago (4,3), and consistent with the last two years (4,8; 4,7). The students perceive the climate as inclusive, however it is important that all students share this sentiment. To further underline the goal of inclusiveness and openness in this course we have clarified throughout the course our core values including an open and equal discussion climate in the course, and our openness to any concerns, questions or comments. To exemplify this we have stated on the first lecture and throughout the course that we are aware of the students' varying bioinformatics backgrounds and are happy to help out.

17. I understood what the teachers were talking about

1 2 3 4 5 9 Avg = 4,3



Our comments to 17: Mean score 4,3. This is a great improvement from four years ago (3,9), and consistent with the past two years (4,5; 4,3). It is of utmost importance that the key points in the course are conveyed adequately to the students. Given the varying bioinformatics backgrounds of the student group, for this year and the past two years we adjusted the information content. We need to make sure that all students are able to follow what is conveyed during and outside classes.

18. The teachers (and course assistants) spent time to listen to my questions, answer them properly and comment my work

1 2 3 1 4 7 5 15 Avg = 4,7

Our comments to 18: Mean score 4,7. This perfect score is a great improvement from four years ago (4,3), and consistent with the previous two years (4,8; 4,6). To improve on the pedagogics and efficiency of communication between teachers and students we have switched to doing the computer labs in a lecture room instead of a computer room, and also on Zoom. Almost all, if not all, students use their own laptops to follow the labs, and the lecture rooms and Zoom has allowed teachers and teaching assistants to use the blackboard or slides to convey pedagogical replies to questions to the whole class instead of answering common questions from the student group to each student individually (as is often the case when in a computer room). Everyone in the teaching staff also discussed how to improve the pedagogics of the bioinformatics part of the course.

19. My background knowledge was sufficient to follow the course

1 2 2 3 3 4 7 5 11 Avg = 4,0

Our comments to 19: Mean score 4,0. Because of the varying background of the students, it is crucial that we adapt the bioinformatics part of the course to meet the varying demands. To do this we have cut some content to free up time to go deeper into key topics. We have also added the possibility of letting the students run R software on cloud servers. In addition, the teachers and laboratory assistants have been aware of the varying backgrounds and have tried to help out as much as needed. Other means of being better prepared for the students' background is to coordinate with earlier courses in the master's program, as well as to make sure key topics are reiterated throughout the course. We also hope that the reformulation of the bioinformatics component of the TMILM master's program will help alleviate some of the sentiment by the students that they are not well prepared and instead make them feel well prepared for the course. This will be interesting to follow in the coming years.

20. The teaching approach was effective

1 2 3 2 4 12 5 9 Avg = 4,2

Our comments to 20: Mean score 4,2. To improve on the pedagogics we will use slides in addition to the blackboard. The slides will serve the purpose of background information, as well as a document for the students to refresh their memory throughout the course.

21. Computer labs covered practical examples of the bioinformatics aspects treated during the course

1 2 3 1 4 5 5 17 Avg = 4,8

Our comments to 21: Mean score 4,8. We are happy to see that the students found the labs relevant in relation to the rest of the course. We will make sure that the topics treated stay relevant.

22. Computer lab instructions were clear

1 2 3 4 6 5 17 Avg = 4,7

Our comments to 22: Mean score 4,7. The students find the instructions clear. Some of the instructions were updated for this year and the past two years, as a part of the overall pedagogics overhaul of the bioinformatics part of the course. We are happy to see that this is reflected in the positive feedback from the students.



Please, reflect your thoughts on positive/negative parts of the course. What can be done to improve the quality of the course?

Statements compiled from all evaluation forms (copied as is, including spelling etc.)

More guidance on the labs. Maybe two starter sessions would be more helpful. Or at the beginning with R introduction we could have teacher explain us the main logic of the language before having complex problems to solve. Since no prior knowledge of R required. Lectures and explanation of concepts were great.

The course was very interesting. Patrick's approach of enhancing memory is really clever. It's been a lot since I had an interesting course.

Maybe for the computer labs, Tas can set several examples of the topic (how to code, what tools should be used), instead of learning 100% by students themselves.

The examples are more easy to understand by seeing someone coding lively instead of everything is written on the file.

It is overall an excellent course. The only improvement could be that the first lectures of bioinformatics can be given in person instead of pre-recorded courses.

More time or more sessions with the TA for lab support. All teachers and TAs were great.

Labs could be coupled with lectures on the same week.

Great! Well organized and interesting topics. My favourite course in this Msc program!

Our comments:

The main themes of the general comments for the whole course are:

Pros:

- +The students seem to like the course, one student says it's the best course on the master's program
- +Several students say they find the teaching very good
- +Overall very good, really enjoyed the course



+R labs overall appreciated

Cons:

-Some more labs would be nice

-Some students found R labs difficult, some students found them easy

3. Reflections on the course execution and results and 4. Suggestions of changes for upcoming course offerings

Please see reflections related to the different questions in the course evaluation above, and our related actions in the summary below.

Final comments and conclusions, and further plans

We are of course very happy that many students express strongly that they like the course.

For this year's and the previous years' course offerings we set out to improve the pedagogics in the bioinformatics part of the course, specifically we wanted to make sure that all students, regardless of background experience, were able to follow the course and execute the bioinformatics labs. Four years ago some students found this part stressful.

Based on the student's comments this year and last year we seem to have achieved a lot of what we set out to do. The average score for the questions on the bioinformatics part of the course was improved from 4,1 three years ago to 4,5 this year. This is a great improvement due to a clearly directed effort involving all teachers and teaching assistants.

Specifically for the bioinformatics part we will continue to work on the pedagogics, and make sure the study material adheres well to the lecture and lab content. This year and last year we implemented a cloud server where the students could access R software without having to do a local installation. This saved a lot of effort compared to previous years.

Generally for the course we will continue to work especially hard on the inclusiveness and openness experience of the students in the course. This is key to having a positive learning experience. The varying background knowledge of the students, primarily in bioinformatics, needs to continuously be paid attention to in order to create a positive learning experience. We will also continue developing the ethics in gene technology part of the course. We will also consider making sustainability questions more explicitly visible throughout the course.

We are also looking forward to seeing how the reworking of the bioinformatics part of the TMTLM master's program will affect the students perception of how well prepared they are for this course's bioinformatics module. We have that it will be visible in the upcoming years (when all changes have taken full effect) that the student base feels more evenly prepared for this course.