Course analysis (course evaluation)

Course code	Course title	Credits
4BI109	Bioinformatics	7.5
Semester (VT/HT-yr)	**Dates**	
HT 2022	20221111-20221212	

Course Director	Examiner
Arne Lindqvist	Arne Lindqvist
Teachers in charge of different parts of the course	**Other participating teachers**
The teachers were assigned in teams. Each team had a joint responsibility for a section of the course. The teams mixed experienced teachers with PhD students/postdocs. The course director communicated with the teams as a group. Although no person was formally in charge of each team, experienced teachers had a special responsibility: Arne Lindqvist, Nico Dantuma, Anna Kouznetsova, Martin Hällberg, Rickard Sandberg, Lena Ström, Claudia Kutter, Benjamin Murrell.	Basic tools 1: Arne Lindqvist, Nico Dantuma, Niels Krämer Basic tools 2: Anna Kouznetsova, Martin Hällberg, Jan Grosser, Anais Julien Intro to R: Niels Krämer, Jan Grosser, Hao Yuan, Nil Campama Sanz TBL DNA seq: Arne Lindqvist, Hao Yuan, Nil Campama Sanz, Abishek Arora TBL RNA seq: Rickard Sandberg, Daniel Ramsköld, Cristoph Ziegenhain TBL CRISPR: Arne Lindqvist, Anna Kouznetsova, Martin Hällberg, Lena Ström Ethics: Arne Lindqvist, Lena Ström Genomics: Claudia Kutter, Benjamin Murrell Systems biology: Karen Akopyan, Jean Hausser

Number of registered students at the 3-week check	Number passed at final course day	Response frequency course valuation survey
45	41 after re-exam	26/45

Other methods for student influence (in addition to the final course valuation/survey)

-Evaluation discussions as part of feedback at end of each TBL.

-Canvas discussion forum open throughout course for feedback on course improvement. Was not used much.

-Course director encouraged feedback on course on several occasions, and had discussion with several students

Feedback reporting of the course evaluation results to the students
Through CANVAS

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.

1. Description of any changes implemented since the previous course occasion based on the views of former students

-The learning outcome "Apply and integrate bioinformatics resources and tools in a perspective of basic systems biology" was changed to "Apply and integrate bioinformatics resources and tools to answer a biomedical question".

-Streamlining the content to reduce workload. This was implemented in some sections, although not to a sufficient degree in all. Mainly the basic tools section was adapted, the number of compulsory exercises was reduced, and extra time were given to finish exercises. The genomics part was also reduced.

-The material for the intro to R was re-written.

-The TBL DNA seq was updated and refocused.

-Several schedule adjustments, including that the mystery DNA quest was moved earlier in the schedule.

-Ethics was lifted from TBL CRISPR to a separate section.

-Several small adaptations within each teacher team, such as who and how many teachers should be present at each step.

2. Brief summary of the students' evaluation of the course
(Based on the students' quantitative responses to the course valuation and key views from free text responses. Quantitative summary and any graphs are attached.)

The student's answers in the course evaluation were spread and mainly centered around an average rating. For many answers all five alternatives were selected, indicating a large distribution of opinions. Positive comments include the scope of the course and variable learning methods, including practicals and discussion with peers. There was also appreciation for TBLs, mystery DNA quest, and course organization. Among the many suggestions for changes there were some clear trends. A common theme was to reduce course content and have more clear goals/outcomes. Several comments suggested to keep the level more basic. Several persons also suggested to update certain sections. Another common suggestion was to move R to before or in biostatistics (although I suspect that this would have been mentioned more if I had not been clear from the beginning that this was a direction we're already pursuing).

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

-An introduction to bioinformatics involving both theoretical and practical approaches.

-The mix of learning activities.
-Interleaving with repetitions separate days.
-TBL structures. They were efficient for learning and allowed discussions between students of different levels.
-The mystery DNA quest, a practical assessment of the basic tools section that stimulated learning
-Feedback to students, both as separate aspects of each TBL and during practicals.
-Feedback from students, in particular in the structured form at end of TBLs allowed adaptation of the course while ongoing.
-The teams structure of teachers provided support and enabled discussions, feedback and coordination in planning and executing teaching. It was also very useful as a backup if one teacher could not make it.

Weaknesses of the course:

-The course is heavy, and some students found the content overwhelming and/or too advanced.
-Schedule is compact with little room for catching up if falling behind. More room for preparation would be practical after the first section of each TBL.
-Feedback for practicals was too late and not sufficient.
-Some materials provided could be clearer.
-The teaching location was not optimal.
-Uneven distribution among TBL groups for how well peer learning worked.

3. Other views

The adaptations that were implemented after last year were successful. In particular the basic tools section functioned better. Feedback to students in basic tools practical was not optimal though. The moving of the mystery DNA quest to earlier in the course solved the previous problem of assignments close to the exam. However, moving the mystery DNA quest also meant that it came before the CRISPR TBL, which formed a repetition and chance for peer-learning for aspects brought up in the mystery DNA quest. Despite identical instructions and similar material, the students this year found the mystery DNA quest much more difficult than students last year.

In my opinion, the largest challenge is the wide spread of background knowledge among the students. In this sense, the TBLs were successful in engaging discussions among students of different level. Whereas most teams for the TBLs functioned very well, there were room for improved balance among some teams. The composition of the teams is essential, and an extra focus of allocating group members is needed.

The spread of knowledge was also affecting how different parts were perceived. The two modules of the course engaging in more advanced aspects (TBL RNAseq and Genomics) were appreciated by a subset of students, but less appreciated by the students that were struggling.

4. Course Director's conclusions and any suggestions for changes
(If changes are suggested, state who is responsible for implementing them and provide a schedule.)

This was the second occasion of the course. In general, I believe the concept of the course is good, but adaptations are required. These adaptations are mainly aimed at making the course more

accessible for students with little previous experience of biology/bioinformatics. The changes made to the course to this year were successful, and more changes in the same direction will be applied.

Changes include:

- Move introduction to R to before or in Biostatistics course. Discussions are initiated with study director and course responsible for Biostatistics.

- Reduce/streamline content, and for certain sections, put a larger emphasis on the very basics. Course director is responsible. Implemented 2023.

- Adapt the reading material available for certain sections. Whereas some sections should be expanded, other need focusing. Course director is responsible. Implemented 2023.

- Adapt the feedback process of exercises in basic tools, such that rapid feedback is achieved. Course director is responsible. Implemented 2023.

- Move mystery DNA quest to after CRISPR TBL. Put CRISPR TBL before DNA seq and RNA seq TBL. Course director is responsible. Implemented 2023.

- Expand summary of basic tools by introducing a conceptual section on how to apply tools for an unknown DNA sequence to better prepare for the mystery DNA quest.

- Add self-study time between first (material) and second (quiz) section of each TBL. Course director is responsible. Implemented 2023.

- Restrict any movie segments shown during TBL in length. Replace with lecture. Course director is responsible. Implemented 2023.

- Assess and adapt written ethics assignment to comply with the advance of text generators based on AI. Course director is responsible. Implemented 2023.

- Have a different room structure with better ventilation and access to day light. Course director is responsible. Implemented 2023.

Appendices:

Course evaluation