Analysis of courses FCB3081-FCB3084, 2022, Higher Seminar in DNA/RNA Biology I-IV

Conducted according to the KTH's *General Course Analysis Template – 2019-04-15*

0. Author (Name, email)

Anniina Vihervaara (viher@kth.se)

1. Description of the course evaluation process

Describe the course evaluation process. Describe how all students have been given the possibility to give their op inions on the course. Describe how aspects regarding gender, and disabled students are investigated.

FCB3081-4 are PhD levels seminar courses organized at the department of Gene Technology (GTE), KTH. Beyond the course, the seminars serve as departmental platform for meeting with colleagues and sharing on-going research. This course evaluation was conducted using an online platform Socrative, which enables anonymous web-based course evaluation, and considering all the course participants (FCB3081-4) as a single group. The reason for choosing Socrative is that the single seminar series (called DNA club) consists of four separate courses (FCB3081-4), each administrated in two sets of student cohorts, those who started in spring, and those who started in the autumn. Hence, the 24 registered students in total at the end of 2022 were administered in eight groups. Several cohorts did not have the required minimum of three students to allow anonymous collection of evaluations *via* the KTH's standard LEQ format. After elaborative discussions with KTH admin, I reached the conclusion that the standard LEQ-format is impractical, if not impossible, in its current format. The questionnaire that I established in Socrative follows the KTH's guidelines and strategy but is adopted for the PhD level seminar course. Figure 1 below lists the questions asked and how they relate to KTH's LEQ questions, blended learning aspects of the course, and to the classification strategy of questions at KTH (https://intra.kth.se/polopoly_fs/1.933205.1600689782!/LEQ_v314_slutversion_en.pdf).

Q nr.	Question	Q type*	Scaled	
1	I am	KTH_LEQ_bg	M, F, Other, ND	
2	The course was challenging in a stimulative way	KTH_LEQ__c	KTH 5-1 (A-E)	KTH 5-1 (A-E) scaled:
3	My background knowledge was sufficient to follow the course	KTH_LEQ__f	KTH 5-1 (A-E)	
4	The atmosphere on the course was open and inclusive	KTH_LEQ__d	KTH 5-1 (A-E)	A = Totally agree = 5
5	I was able to learn by collaborating and discussing with others	KTH_LEQ__n	KTH 5-1 (A-E)	B = Partially agree = 4
6	On average, how many hours per week did your work with the course (including scheduled hours)	KTH_LEQ__bg		C = I don't know = 3
7	This course supported my PhD work	AV_e	KTH 5-1 (A-E)	D= Partially disagree = 2
8	I received relevant feed-back and suggestions to my projects	AV_j	KTH 5-1 (A-E)	E = Totally disagree = 1
9	I participated actively in the discussions	AV_m	KTH 5-1 (A-E)	
10	The course was organized in a hybrid format. How much of the seminars did you follow in the room versus Zoo	AV_hybridFormat	5-1 (A-E)	A-E indicated below
11	To me, the possibility to attend the course via Zoom is:	AV_hybridFormat	5-2 (A-D)	A-D indicated below
12	I find participating the seminars via Zoom (following the seminars, interactions, questions) to be:	AV_hybridFormat	5-1 (A-E)	A-E indicated below
13	What was the best aspect of the course?	KTH_LEQ	open-ended	
14	What would you suggest to improve?	KTH_LEQ	open-ended	
15	How could the zoom experience be improved?	AV_hybridFormat	open-ended	
16	Is there anything else that you would like to add?	KTH_LEQ	open-ended	

* bg = background, a-n explained in KTH questionnaire and its clarifications: https://intra.kth.se/polopoly_fs/1.933205.1600689782!/LEQ_v314_slutversion_en.pdf

Figure 1. Questions asked and their relation to KTH's LEQs and strategy.

In brief, the evaluation queried the experienced workload, learning experiences, student profile, atmosphere in the course, experiences with blended learning, best aspects, and suggestions for improvement. The evaluation was carried out on Dec 21st, 2022, as the last seminar of the year. Since the evaluation has been collected outside of KTH's systems, transparency was ensured by i) sharing the results openly for the course participants and the department, and ii) discussing the results during the first seminar of the following year 2023. The course evaluation results can be accessed with the following link (see sheet named "Dec2022"): **http://tinyurl.com/DNAclubCourseE**

In total, 17 students answered, which makes the response ratio (17/24*100%) = 71 % of the course participants. Since the course evaluation has been gathered and analysed collectively for courses FCB3081-4, a single course analysis was created.

2. Description of meetings with students

Describe which meetings that has been arranged with students during the course and after its completion. (The outcomes of these meetings should be reported under 7, below.)

Interactions with the students occurred once-a-week. During the course, students had the opportunity to interact with one another, the course teacher, and other seminar participants. In the course, we aim for open and inclusive atmosphere where everyone can feel safe to be who they are and get support in their unique stage of PhD studies. The main learning outcome of this seminar course is sharing and discussing science and learning to do so in a constructive and forward-looking manner. Feedback for students is given both on a peer-level and by the teacher, primarily *via* discussions after the presentations. After each talk, there is dedicated time for discussions, questions, and reflections to which all the participants are expected to constructively engage in.

3. Course design

Describe briefly the course design, the constructive alignment (intended learning objectives, learning activities, assessment, and how they interact), and the development that has been implemented since last course offering

Each course runs a full academic year and gives three credits. The student can be enrolled into the course early spring or early autumn. To gain credits, the PhD student needs to participate at least 80% of the seminars, and present twice; once in the spring, once in the autumn. After completed FCB3081, the student can enroll in FCB3082. Further on, after completing FCB3082, the student can enroll to FCB3083, and finally, to FCB3084. Hence, during four years of PhD studies, a student can participate a single (FCB3081) or up to four courses (until FCB3084). The seminar and course events for FCB3081-FCB3084 are the same (link for course schedule, see sheets for 2022: ***https://tinyurl.com/DNAclubHT24***). However, the seminar presentations, discussions, and the peer feedback is expected to mature and improve through the courses. The increase in expectations is reflected in the learning outcomes, where basic (FCB3081), broad and specialized (FCB3082), good (FCB3083), and substantial (FCB3084) knowledge, for the subject matters are expected.

3.1. Learning activities

The course comprises approximately 80 full-time study hours and takes the form of weekly science seminars. The seminars address current trends in research focusing on nucleic acids (DNA and RNA) where doctoral students' own results, plans and ideas are presented, critically reviewed, discussed and given feedback. The course literature follows current trends in large-scale DNA sequencing and adjacent fields such as genomics, transcriptomics and bioinformatics. The doctoral students present their own research and provide feedback on each other's presentations.

3.2.Intended learning objectives

After completion of the course the student should be able to:

FCB3081:

- Show basic knowledge, both broad and specialized, in the overall subject area of biotechnology.
- Show basic ability to present, critically examine and discuss scientific papers in the subjects of biotechnology with emphasis on the scientific subject area of the course.
- Show basic insights of academic authorship and the international scientific publishing landscape with relevance to the scientific subject area of the course.
- Demonstrate basic ability identify, discuss and reflect on ethics and sustainability aspects in the research that is discussed within the framework of the subject area of the course.

FCB3082:

- Show both broad and specialized knowledge in the overall subject area of biotechnology.
- Show the ability to present pedagogically, critically examine and discuss scientific papers in the subject of biotechnology with emphasis on the scientific subject area of the course.
- Show insight into, and basic ability to apply, academic authorship and the international scientific publishing landscape with relevance to the scientific subject area of the course.
- Show the ability to identify, discuss and reflect on ethics and sustainability aspects in the research that is discussed within the framework of the subject area of the course.

FCB3083:

- Show in-depth knowledge, both broad and specialized, in the overall subject area of biotechnology.
- Demonstrate good ability to present pedagogically, critically examine and discuss scientific papers in the subject of biotechnology with emphasis on the scientific subject area of the course.
- Demonstrate good insight into, and the ability to apply, academic authorship and the international scientific publishing landscape with relevance to the scientific subject area of the course.
- Show good ability to identify, discuss and reflect on ethics and sustainability aspects in the research that is discussed within the framework of the subject area of the course.

FCB3084:

- Show substantial in-depth knowledge, both broad and specialized, in the overall subject area of biotechnology.
- Demonstrate qualified ability to present pedagogically, critically examine and discuss scientific papers in the subject of biotechnology with emphasis on the scientific subject area of the course.

- Demonstrate deep insight into, and good ability to apply, academic authorship and the international scientific publishing landscape with relevance to the scientific subject area of the course.
- Demonstrate qualified ability to identify, discuss and reflect on ethics and sustainability aspects in the research that is discussed within the framework of the subject area of the course.

3.3. Assessment

Throughout the course, active learning is emphasized, and theoretical background combined with student-driven presentations and discussions.

REQUIREMENTS*:* To pass the course, ***students must attend 80% of the seminars and present their own research twice.*** Students are engaged into active learning *via* presentations, discussions, and seminars by visiting researchers.

3.4. The development implemented from the previous year

I started as the course responsible and examiner in January 2021, during which the course was entirely held on-line due to the on-going SARS-CoV-2 pandemics. At the end of 2021, no course evaluation was conducted, as I still was figuring out a format where all the FCB3081-4 students could evaluate the course as a single group. However, based on discussions during and beyond the course events, I decided to adopt blended-learning from Jan 2022. That means that the seminars were organized at site, but since pandemics was still present, each seminar participant was able to make their own choice on whether to attend on site or via zoom. Since this year 2022 was the first with room and zoom option, I dedicated four questions in the course evaluations to query the blended-learning experience.

4. Students' workload

Are the students working to the expected extent in relation to the course credits? If there is a significant difference from the expected, what can be the reason?

According to KTH (and EU), 1.5 ECTS corresponds to one week of fulltime studies, i.e. 40 hours of work per week (*https://www.kth.se/en/studies/exchange/general/courses/courses-for-exchange-students-1.455770*). Hence, a course of 3 ECTS is expected to require *80 h* of work.

Based on course participants' answers to the evaluation form, the experience of the workload was around expected. While the highest experience of the workload was 3 h per week (3 h* 40 weeks = 120), the lowest experience was only 0.5 hours (20 h). Since the lectures alone constitute of 33 hours (33 seminars, 1h for each), it is likely that some responders have considered the total year of 52 weeks, instead of the academic year (course runs Jan-May and Aug-Dec). The average of the answers was 1.8 h / week, which adds up to be very close to the 80 h per course expectation.

5. Students' results on the course

How have the students succeded in the course? If there is a significant difference compared to previous course of ferings, what can be the reason?

Overall, the students performed very well on the course. Most students follow the course scheme without delays. The activity and interest of the students remained high throughout the course, manifested by the answers to the course evaluation, as well as attendances beyond the required 80%. The quality of presentations is high and the discussions constructive and helpful.

6. Summary of students' opinions

Summarize the outcome of the questionnaire, as well as opinions emerging at meetings with students.

Overall, this course was evaluated very positively, as demonstrated with the 1-5 (low-high) scale of the LEQ6-mimicking questions. The scores obtained ranged between 4.4 and 5.0 (Figure 2). In this analysis, I did not separate the scores by gender. However, the good scores with low variation indicate similar answers across genders.

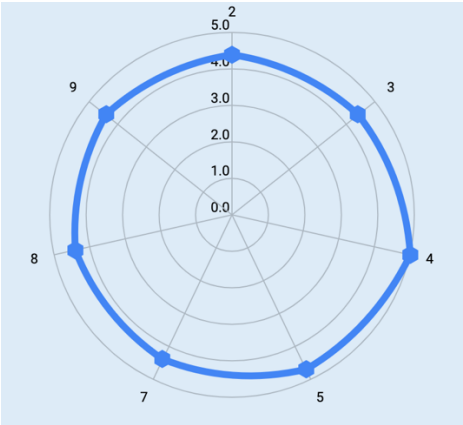

Figure 2. Distribution of the answers to the LEQ6 - mimicking questions. The answers are distributed to scale 1-5, where 1 means totally disagree, 3 is neutral, and 5 totally agree. The question number is shown on the outer rim, the score is on the vertical axis (from the origo to top). The questions are:

2. The course was challenging in a stimulative way
3. My background knowledge was sufficient to follow the course
4. The atmosphere on the course was open and inclusive
5. I was able to learn by collaborating and discussing with others
7. This course supported my PhD work
8. I received relevant feed-back and suggestions to my projects
9. I participated actively in the discussions

The students seemed to appreciate the open and inclusive atmosphere (score 5.0 from every single evaluator), ability to present and learn from others (score 4.7), and engagement into the discussion (4.5). Some example answers for "What was the best aspect of the course":

"The discussions and the instructive comments!"

"Discovering other research fields, learning from others how to carry out research and present results. Developping my presentation skills for "non-experts in my field"."

"Being introduced to new ideas and fields of research. Also see how others pose excellent questions."

"We are able to get in touch with many state of art technology and project at very begining stage, which is valuable."

7. Students' answers to open questions

What do students say in response to the open questions?

Overall, the answers were very positive, reflecting the scores in the spider-web chart (Figure 2). My assessment is that the positive responses reflect the open and inclusive atmosphere we have at the department and among the PhD students in general, extending beyond the courses evaluated here.

"The course was great, and the course manager was super organized, inclusive, and supportive."

"Thank you for a great semester! I think the course was very well-organized and interesting to follow."

"Great course! Anniina especially creates a warm, inclusive, and inviting atmosphere for discussion."

The suggested improvements were somewhat scattered, asking i) more time for discussions rather than presentation, ii) PIs to give short presentations of the background, iii) splitting the credits to 1.5 blocks (now 3.0), and iv) time of the seminar. Examples below:

"Present similar fields in the same month/week. Start each new field with a short presentation from a PI explaining basic concepts and the overall picture of the research field, particuarly explaining why it is important and where can be applied."

"It would have been nice if one could recieve 1.5 ECTS/term instead of 3.0 ECTS/year. But that might require too much administration?"

"More discussion rather than presenting results. Include discussion points as part of presentation"

Negative comments were virtually absent, even when prompted. We had already discussed during the course to introduce "PI-talks" to get the staff at the department to be more engaged. This gained support in several replies:

"The addition of PI speakers is something I'm genuinly looking forward to!"

"Recently the responsible of the course has added presentations from PIs starting from the next semester. I think that this can be a very good improvement. Also PIs participation to sessions when students are presenting would be helpful, as their comments and suggestions are usually very valuable."

8. Overall impression

Summarize the teachers' overall impressions of the course offering in relation to students' results and their evalu ation of the course, as well as in relation to the changes implemented since last course offering.

Overall, I am really happy on how the course has taken shape during the past two rounds. During my first year, 2021, all events were organized *via* zoom and I did not send out a course evaluation. It essentially took too long to figure out how to conduct a course evaluation for a seminar course administered in eight cohorts. Now, post pandemic, the course has stabilized to blended-learning (on-site and zoom) format. The goal of this course is to create a departmental platform for sharing science and creating connections across the research groups. The presentation in the course have been of high quality, which reflects the excellent science conducted at the department, and the students taking responsibility on their own performance. At this point, my aim is to continue providing a friendly, inclusive, and inspiring platform for the PhD students and staff to share the excitement and challenges of research.

9. Analysis

Is it possible to identify stronger and weaker areas in the learning environment based on the information you have gathered during the evaluation and analysis process? What can the reason for these be? Are there significa

nt difference in experience between: - students identifying as female and male? - international and national stu dents? - students with or without disabilities?

In this analysis, I did not split the query results based on the student background. After obtaining the evaluation results, I went them through and discussed every point with the students (first seminar of the following year 2023). These discussions confirmed that the students really enjoyed receiving constructive feedback and ideas on their project, and the opportunity to discuss their work.

As one aspect I queried related to the zoom experience, wanting to know how many participated the seminars via zoom, at site, or both. Intriguingly, all the students had used both opportunities (Figure 3). Based on the answers and follow-up discussions, the zoom was experienced as enabling and liberating. Many students travel during their PhD research or need to stay home when feeling ill. As a result, I maintained the opportunity for blended learning for the next course rounds. The participation via Zoom was considered feasible, and raising hands, chat functions, and just unmuting were frequently used to communication. After the years of pandemics, the usage of Zoom has been ingrained as a natural part of participation. The hybrid format worked surprisingly well and effortless and was aided by the excellent audio-video system in alfa3 seminar room Big.

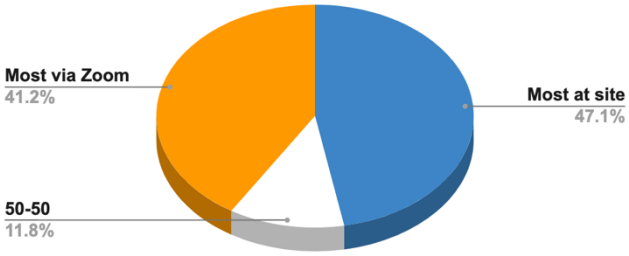

Figure 3. Attendance to the seminars in room (at Campus Solna) versus zoom. Students we asked the following question: "How much of the seminars did you follow in the room (at site) versus Zoom?" The options for answers were as follows: A) All at site, B) Most at site, C) 50-50, D) Most via Zoom, E) All via Zoom.

10. Prioritized course development

What aspects of the course should be developed primaily? How can these aspects be developed in short and long term?

For the following round of the course, starting from spring 2023, I will introduce PI talks, where group leaders from the GTE are invited to give 30 min forward-looking talks on their group's work, followed by 30 min time for discussions. Based on the good experineces and positive feedback, the hybrid format will be maintained.