BIO 241 General behavioural ecology - Course evaluation spring 2018

Course leader: Sigrunn Eliassen (responsible for course planning, class sessions, lab and assessment)

Assistant: Shad K Mahlum Shad (leading statistics workshop (1 class session), assistant on lab/poster projects. 10-12 hours total)

Course planning, teaching methods and assessment

BIO241 has traditionally been thought in the fall, but from 2018 course semester was changed to spring to be able to take students to the nest box site at Arboretet, to study bird breeding ecology. For this year that meant teaching the course both fall'17 and spring'18, with the result that there were half the number of student signing up for the course compared to the previous semester.

Based on the evaluation for fall 2017, I decided to kept the main curriculum and textbook (Davies, Krebs, West; 2012. *An Introduction to Behavioural Ecology*, 4th Edition), and tweak some of the learning projects based on the feedback and experience with new teaching methods implemented in 2017. The large restructuring of the course in 2017 involved a lot of planning and thinking in terms of which content, perspective and activities to focus on. The new structure is based on team-based learning (TBL) which involves active student discussions, problem solving and research projects in teams. I have reduced lecturing to a minimum, spending most of the class time on project work and discussions in groups. For this year I decided to pay more attention to the dynamics in the group and that was also my motivation for changing some of the team project,- to try make them really need to work as a team and not only discuss content.

This will be a continuing process, as finding suitable, engaging and challenge projects for the teams is difficult. Every group has a different dynamic, and with only two groups in the 2018 class, it was a bit challenging to foster an open class discussions. In my opinion if works better in a larger class where you can rely on "more opinions".

As part of the team-based approach, I have focused on what students should be able *to do*, when they had met the learning outcomes. The aim is that students should be able to:

1) **Think as a behavioural ecologist**. Explain how animal behaviour can be understood in an evolutionary context.

2) **Make hypothesis and predictions.** Use theoretical approaches to investigate research questions and make predictions.

3) **Design experiments**. Test predictions on empirical systems, analyse and interpret the results.

Teaching modules and TBL workflow: As in 2017, the course content was divided in 6 modules each corresponding to approx. 2 chapters in the textbook:

Module 1: Economic decisions and optimality models
Module 2: Avoiding predators
Module 3: Resource competition
Module 4: Sexual selection

Module 5: Parental Care
Module 6: Kinship and cooperation

Each module started with a readiness assessment test (RAT) for which students prepared by reading assigned material in the textbook as well as additional papers, videos etc. The test was a multiple-choice quiz aimed, partially based on the 2017 quiz, but with a few extensions and changes. Most students participated on these class sessions, and asked to get the test home if they were not able to attend. The focus of the quiz is on central concepts, applications and understanding instead of detailed content knowledge. My impression was that they used the questions to structure their reading and understand what were the main concepts and topics to focus on.

The RAT consisted of approx. 12 questions and each student first answered individually and then worked in teams on the same question using the IF-AT cards to mark their answers. The groups were a bit faster to finish the quiz this year compared to the previous, but spent about 1 hour finishing the individual test and discussing the problems in groups. After team discussions, we addressed topics, concepts and theories that came up and were still unclear to the students.

For rest of the class time, students worked with applications activities that included reading and discussing research papers, solving questions, designing and performing experiments, coding and working with theoretical models (see 2017 report for TBL work flow)

Class sessions were organised around different activities (see semester plan, attached):

1) Readiness assurance process (**RAP**). Students read preparation material. Individual and team test in class. (6 class sessions)
2) Application activities (**AA**); practical exercises and problems solving in teams. (12 class sessions)
3) Lab experiments and research activities, including poster presentation (5 class session + extra lab work in teams)
4) Lecture and class discussions (4 class sessions)

Assigning students to teams: Students were assigned to teams on the first class meeting, according to different criteria (MSc/Bsc student, exchange student etc.). Each team were 5-6 students, and adjustments were made to ensure diversity and approximate gender equality. Approximately half the student in the class were exchange students so all teams had English as their common language.

There were some conflicts with overlap between class time for different courses, e.g. BIO301 and BIO210. Several students were not able to attend all group discussions and this was a bit challenging in terms of team projects.

Student-active research projects:

A major part of the course I working in the lab and field with inquiry based projects and observational studies in the field. The main motivation for moving the course to the spring semester was to better be able to use the nest box study in the teaching (see description below):

1. I have continued the Bean beetle lab, and for 2018 focused the small research project only on foraging ecology and reproduction of the beetle. *Callosobruchus maculatus* is a model organism that is ideal for studying basic questions in evolutionary ecological, including mate choice, reproductive investments and resource utilization. The beetles have a relatively simple life cycle, they can be held in simple container (e.g. petri dishes) and only require supply of fresh beans. The generation time is 4-6 weeks, which is optimal for the student projects. Within some limits, students were free to propose their own research questions and design experiments to test these. They were responsible for planning, setting up and performing the lab experiment, and based on the data they collected they analysed the results and ran statistical tests in R. Each group presented their result in a poster presentation for the whole class. In line with the suggestions from the 2017 group, I scheduled the project and poster session earlier in the semester,- just after Easter.

2. Nest box study - Arboretet, Milde. In spring 2017, 32 nest boxes were placed in the forest around the arboretum and Botanical garden at Milde. During spring, we monitored the breeding phenology, clutch size, success and development of blue tit, great tit and pied flycatcher nests. This year the students were able to monitor the development of eggs and chicks in the nests. The field trips were not mandatory both most students attended at least one. The students were quite enthusiastic about the "hands-on" experience with the chicks, but for most part, this was mainly monitoring/observational. For next year, we plan a small experiment that can be followed up from one field trip to the nest.

My goal with engaging the students more actively in these research projects is give students experiences with scientific methods and train general skills; making hypothesis, design experiments to test these, collect data, analyse and present results. For many students it is challenging to sort out the practical side of experimental designs, as well as how results should be analysed using statistical tests. We had a mini-stats seminar and a poster design session looking at different ways of presenting scientific result in a poster format. Each group made a poster that they presented on a class poster session followed by evaluation from all the other groups.

Forms of assessment: Student assessments were based on individual and team performance on the RAT tests, presentation of and contribution to the research project of the team, and an individual oral exam. The point weight given to each part is:

- 25% **Project work and presentations**; RAT (6 in total), research project and poster presentation with peer evaluation

- 75% **Oral exam** – topics and concepts focusing on the 6 modules

For the team research project, each team evaluated the posters of the others and this was taken into account in my final evaluation of each poster project. In addition, each team member evacuated their own and the other team members' contribution to the different parts of the research project (e.g. designing the experiment, performing lab work, doing statistical analysis, writing and designing posters). I used this peer evaluation to adjust the individual score from the poster project (team average) according to the student's contribution.

Course statistics, attendance and exam results

13 students signed up and met on the first class session, and of those 10 students finished the course including the oral exam. Class attendance were generally high although some groups struggled with variable team member attendance, partially due to the overlap between BIO241 and BIO301 and BIO210. The course components were not mandatory and for the research project, students could organize their work and access the lab when needed. Some students took on more responsibility for the team projects, which was partially compensated for by the peer evaluation at the end of the project (see assessment).

Due to the number of students in the class, I am not giving a distribution plot, but there were generally a high performance with more than half the students getting a B.

Teaching rooms and assistance: For the lab work, we used Lille kurssal A. Students could use the lab at other times outside the ordinary class meetings depending on their workflow with the beetle project. For class discussion and other activities, we used K3/K4, which was suitable in terms of size, but not optimal, as we have to shuffle around the tables to organize groups both before and after class.
The TA organized a stats mini session and helped with the group project both in the lab and for stats assistance.

Student evaluations

7 of the 10 students that took the exam responded to the course evaluation. The full evaluation report is attached below. Here, I highlight a few comments and address some core issues:

Team based learning: As last semester, I found that the students were actively participating and very engaged in the team discussions. In particular, the quiz and the team discussion with the IF-ATs cards were attended by most students and the discussions were generally very good. Most team members were actively participating, whereas class discussions were more dominated by a few students. This this was a small class I had a lot of time to discuss with each team and had a good overview of what each student where struggling with.

Students commented that:

> *"I found that the course content was interesting and well structured."*
>
> *"Team member attendance was largely based on team communication, sometimes a challenge but mostly solved through good communication in the team"*

In the course evaluation, students reported that they found the modules and team projects well structured (86% strongly agreed, 14% agreed) and that they would not like more lectures (86%, with 14% neutral). All students agreed or strongly agreed that they learned a lot from discussing concepts/topics with their team. 86% agreed or strongly agreed that the RATs for each module helped their learning. One student noted that: «*Det var tydelig at foreleser var vel strukturert og forberedt, men jeg syntes likevel det kunne vært flere assistenter på labeksperimentet og felt. Billeprosjektet kunne hatt en assistent som tok seg hånd om billene slik at det ble lettere å gjennomføre. Siden foreleser var stort sett alene om dette ble labarbeidet i billelabben vel uforutsigbart og en del fleksibilitet måtte til for å gjennomføre, både fra student og foreleser.»*

They generally enjoyed working on the lab project, although for some found it a bit time consuming.

Variable team member attendance is still an issue. Next semester I will wait until the 2 or 3 session to establish the teams as many students withdraw the first two weeks. There was a problem with other courses were scheduled at the same time. As noted by some students "*Maybe thinking with other teacher to see if there is a way to not put 2 courses, like BIO 210 and BIO 241, at the same time, so we wouldn't have to choose between one of them and we could go at all the classes that we're register"*

There were generally high attendance on the RAT session, partly because it counted towards their grade. Many student expresses that the quizzes were helpful to focus their attention on key concepts and topics, and that they learned a lot form discussing with their peers (see Course evaluation). As last year, teams generally outperformed individuals on the RAT tests (Fig 1).

Figure 1: Distribution of individual (iRAT) and team (tRAT) test scores on the readiness assessment tests (RAT). Teams typically outperformed individuals on all quizzes (6 in total).

Overall, most students gave positive feedback on the course (100% reported that the overall impression was very good). As last year, they expressed a positive attitude/experience with working in teams, but also some issues with getting teams to function optimally. Students highlighted different aspects when asked what the best part of the course was:

> *"Det beste med kurset var at det var godt lagt opp".*
>
> *"the field class and the lectures"*
>
> *"There are lots of interactive discussion between students and teacher, and also among students."*
>
> *"Forelesers engasjement og kompetanse sammen med god oppfølging og kommunikasjon, gjorde at jeg lærte ekstremt effektivt og ga meg muligheten til å forstå modulene bedre. Dette skjedde ofte gjennom dialog med foreleser i diskusjonsdelene av kurset. Foreleser gav god og grundig oppfølging av både spørsmål og svar, det ble satt av god tid av foreleser som gjorde seg tilgjengelig selv etter forelesning til å oppklare vanskelige temaer. Dette gjorde at jeg fikk en økt trygghet rundt kunnskapen jeg tok til meg og forberedte meg godt til eksamen."*

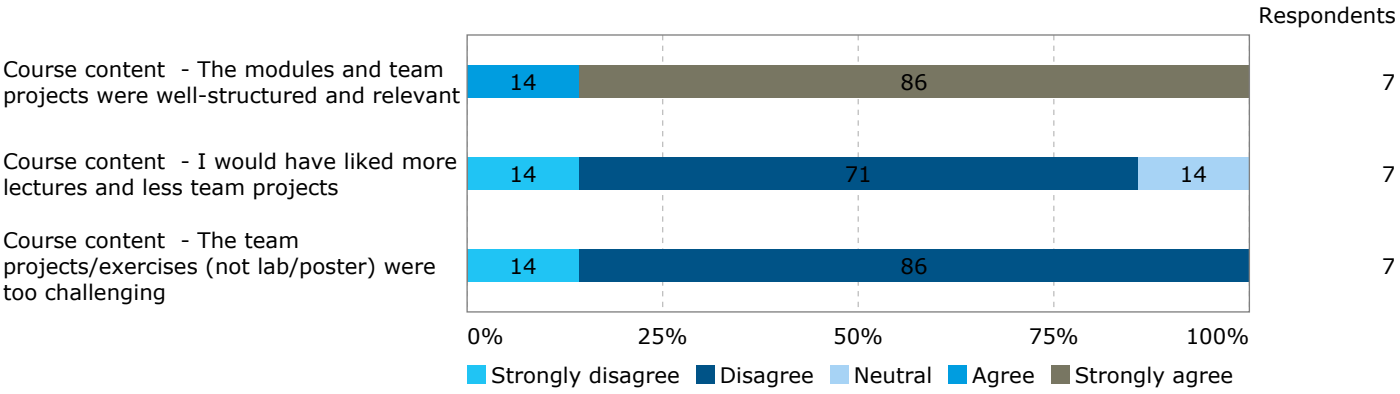
"It was very interesting and the group work and learning assessments made it easier to keep up with the course work"

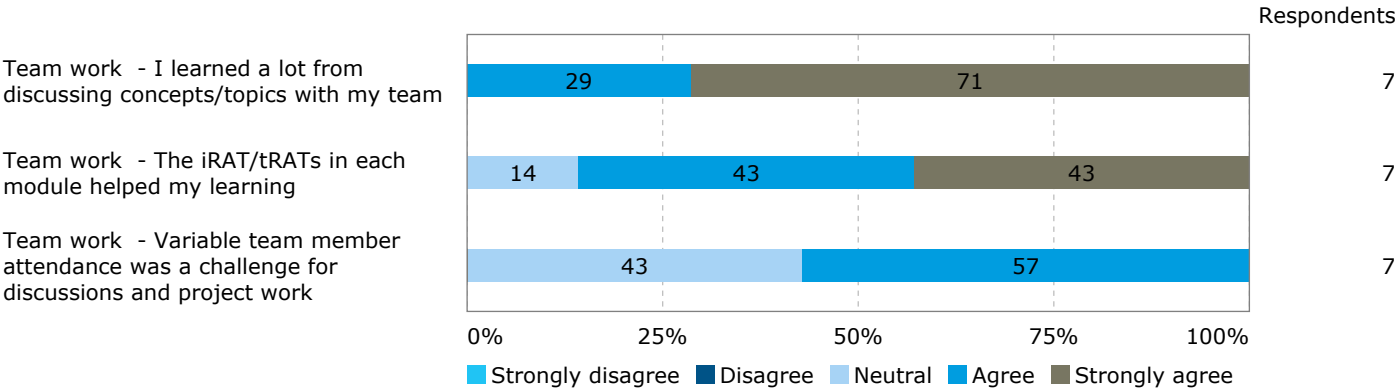
Challenges and plans for changes

As was my experience from the 2017 course, the TBL structure of the course worked really well. Students were active and I had more time to discuss with students, but with a small class, it was often a bit difficult to pitch a class discussion. It is still challenging to make good problem solving exercises, RAT questions and interesting projects for the full curriculum. Focusing the poster project only on the beetle project worked out quite well, and both groups presented interesting findings. Based on the student evaluations and own experience I will make some adjustments for next year:

1. My general impression and feedback in class was that most teams worked fairly well, - more focus on the group interactions with discussions on how to share responsibility etc. seemed to work. Without any mandatory class time/lab or fieldwork, it is however, challenging to get all students equally engaged, in particular when it comes to the research projects. A few take a larger responsibility, while others leave to other to organize and perform lab work, stats test etc. I still have a way to go in terms of addressing issues and discussion pros/cons of teamwork with students.
2. I changed some of the group project from last semester and tried to engage students more as a team in the project. This worked out well on some projects, but I fell that the team spirit is higher in the team-RAT than when working with some of the group projects e.g. the modelling exercises. Next year, I plan to restructure the theoretical modelling exercises to include less description and more of step-wise level based on inquiry to the final model. Students will have to figure out, in teams, how to code the model (inspired by gamification techniques).
3. For this semester, I focused on the bean beetle projects for the poster presentations, as the data from the nest box studies are more difficult to analyse. Students have "ownership" to the beetle project since, but might need more feedback on the analysis/poster before the final presentation of their project.

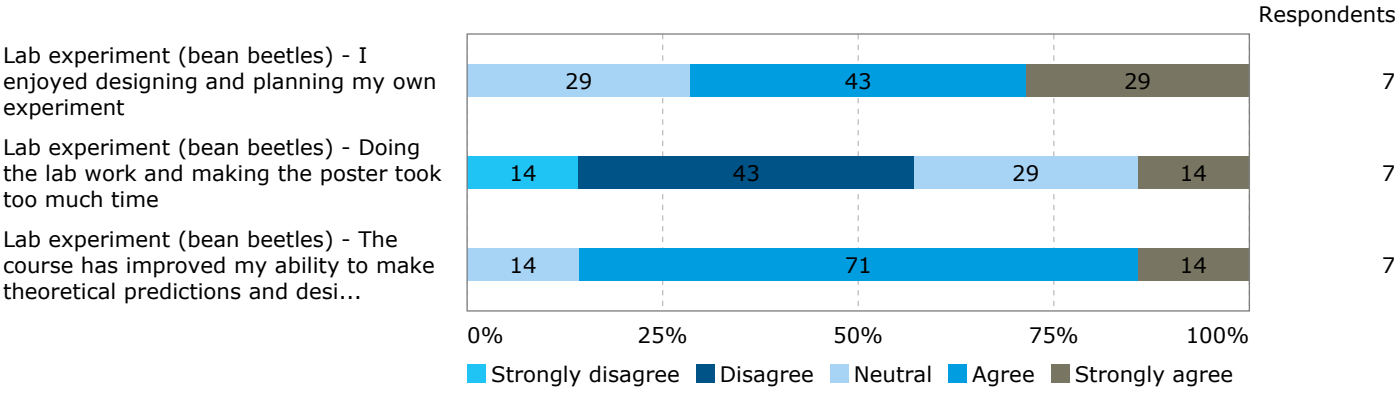
4. Next semester, I plan to finish the theory part earlier and spend more time in the field working on the nest box study at Arboretet. In addition, we will start a mini project/experiment most likely on predation (larva on plants) in the same field location. This will allow for a combination of methods – both observational and experimental.





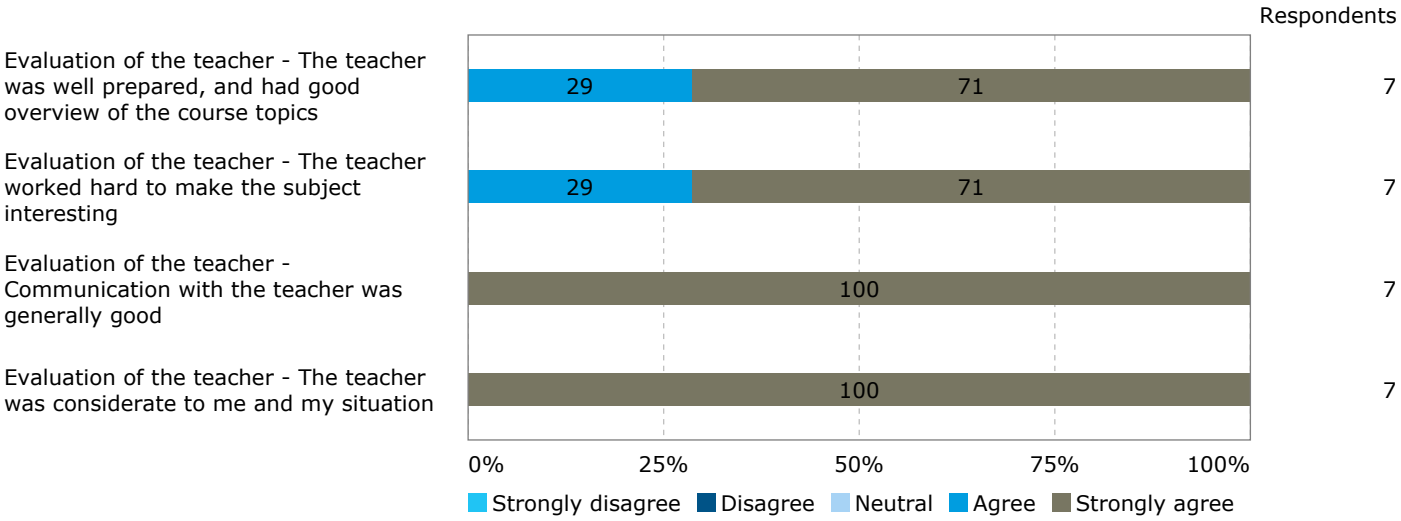
Comments to course content and team work

- I found that the course content was interesting and well structured.
- Team member attendance was largely based on team communication, sometimes a challange but mostly solved through good communication in the team



Other comments (lab work, stats workshop, team project, poster presentation, text book...)

- Labarbeidet hadde ikke tatt for mye tid, om alle hadde bidratt like mye.
- Billelabben kunne være noe uforutsigbar, om det hadde vært en som tok seg av billene gjennom året så kunne planleggingen og strukturen rundt labbarbeidet vært mer flytende.



Other comments

- Sigrunn Eliassen er kanskje en av de beste foreleserne jeg har hatt på UiB.
  Hennes interesse, engasjement, kompetanse og arbeidsinnsats overgår det meste av det jeg har opplevd så langt.

  oppbyggingen av forelesningene med undervisning, diskusjon og tester gjorde enhver forelesning interessant og utfordrende. Foreleser var flink til å planlegge tid til diskusjon og forklaring av temaene, hun var engasjert i diskusjonene, fulgte alltid med og var villig til å ha en dialog (i motsetning til en monolog) med studentene for å finne ut hva de har forstått eller ikke forstått og hjalp studentene med å utvikle selvstendige resonnement.

  Sigrunn gav god oppfølging av spørsmål etter forelesningene, var rask til å svare på spørsmål på epost og viste interesse i min personlige progresjon i emnet. Dette gav også økt motivasjon til å lære mer.

  Kompetansen til foreleser var tydelig svært god. Dette kom godt frem i diskusjoner og stoff fra forelesning. Tempoet var godt, forklaring og modeller var vel gjennomført, og punktene i forelesning var svært relevante, likevel brede og dekkende for temaet.

  Engasjementet var svært høyt i både pensum, studentene og prosjektene våre. Ofte følte det som om foreleser var villig til å løp hele dagen for at vi studenter skulle få en god opplevelse i kurset. spesielt under våre selvstendige prosjekter var hun villig til å dukke opp i tide og utide for å hjelpe til. Dette kunne absolutt vært avlastet med et hjelp fra assistent, da foreleser var villig til å ta seg tid utover undervisningen til å løpe rundt å åpne dører på lab'er og lignende. Dette kunne absolutt vært avlastet med assistent.

  Jeg unner alle studenter å ha vært borti en slik foreleser.

What was the best thing about this course?

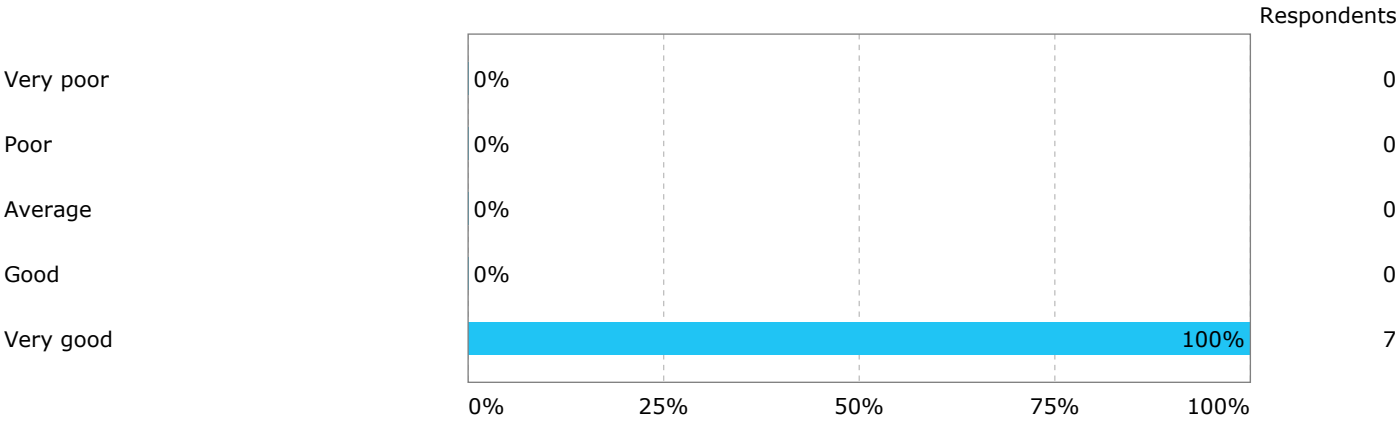
- Det beste med kurset var at det var godt lagt opp.
- the field class and the lectures
- There are lots of interactive discussion between students and teacher, and also among students.
- Forelesers engasjement og kompetanse sammen med god oppfølging og kommunikasjon, gjorde at jeg lærte ekstremt effektivt og ga meg muligheten til å forstå modulene bedre. Dette skjedde ofte gjennom dialog med foreleser i diskusjonsdelene av kurset. Foreleser gav god og grundig oppfølging av både spørsmål og svar, det ble satt av god tid av foreleser som gjorde seg tilgjengelig selv etter forelesning til å oppklare vanskelige temaer. Dette gjorde at jeg fikk en økt trygghet rundt kunnskapen jeg tok til meg og forberedte meg godt til eksamen.
- It was very interesting and the group work and learning assessments made it easier to keep up with the course work

What do you think is most in need of improvement?

- Maybe thinking with other teacher to see if there is a way to not put 2 courses, like BIO 210 and BIO 241, at the same time, so we wouldn't have to choose between one of them and we could go at all the classes that we're register

- variable class attendance is a challenge.
- Det var tydelig at foreleser var vel strukturert og forberedt, men jeg syntes likevel det kunne vært flere assistenter på labeksperimentet og felt. Billeprosjektet kunne hatt en assistent som tok seg hånd om billene slik at det ble lettere å gjennomføre. Siden foreleser var stort sett alene om dette ble labarbeidet i billelabben vel uforutsigbart og en del fleksibilitet måtte til for å gjennomføre, både fra student og foreleser.
- This was one of my favorite classes and I really can't think of anything that needs major improvements

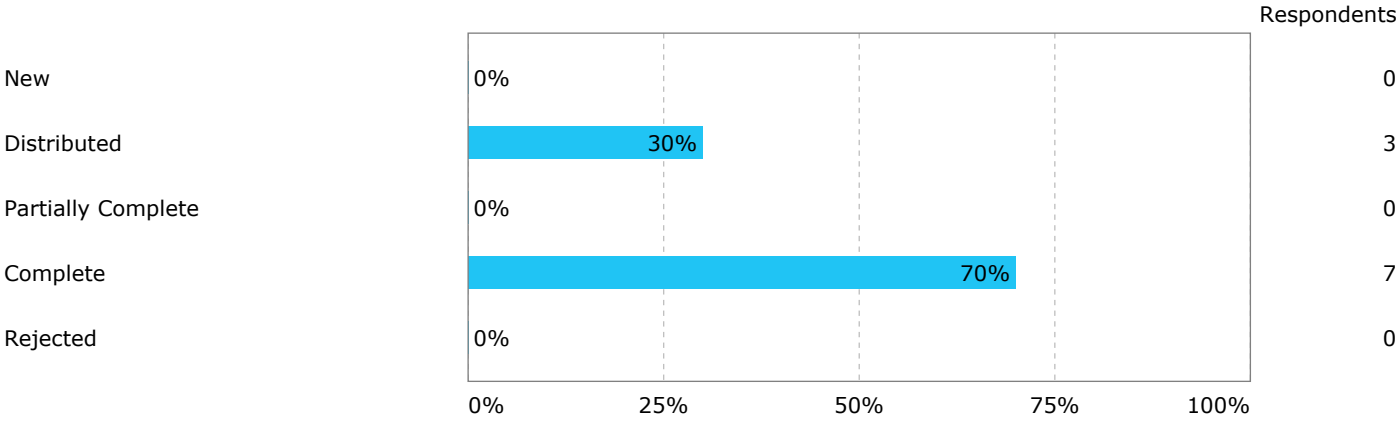
What is your overall impression with the course?



Further comments?

- Veldig godt gjennomført fag!
- Sigrunn is a really good teacher. She is very patient and provides many guidance along the class discussion.
- Foreleserprisen

Overall Status



BIO241 General Behavioural Ecology - 2018

Course leader: Sigrunn Eliassen Sigrunn.eliassen@uib.no
Assistant: Shad K Mahlum Shad.Mahlum@uib.no

Note: This is a preliminary plan and changes may occur during the semester. We will be working with living organisms and the exact timing of lab work needs to be scheduled according to ongoing experiments.

Week	Thursday 10:15-12:00	Friday 10:15-12:00
3	18/1: **Introduction to behavioural ecology** Chapter 1	19/1: **Testing hypothesis** Chapter 2
4	25/1: **Module 1: Economic decisions and optimality models** RAP; Chapter 3	26/1: **Module 1: Economic decisions and optimality models** AA; Chapter 3
5	1/2: **Module 1: Economic decisions and optimality models** AA; Chapter 3	2/2:
6	8/2: **Module 1: Bean beetle experiment #1 preparations**	9/2: **Module 1: Bean beetle experiment # 1 – lab work**
7	15/2: **Module 2: Avoiding predators** RAP; Chapter 4, 6	16/2: **Module 2: Avoiding predators** Chapter 4,6
8	22/2: **Module 3: Resource competition** RAP, Chapter 5	23/2: **Module 3: Resource competition** AA; Chapter 5
9	Winter break	
10	8/3: **Module 3: Resource competition** AA; Chapter 5	9/3: **Bean beetle project & poster workshop**
11	15/3: **Bean beetle project & poster workshop**	16/3: **Module 4: Sexual selection** RAP; Chapter 7
12	22/3: **Module 4: Sexual selection** AA; Chapter 7	23/3: **Poster workshop**
13	Easter break	
14	5/4: **Module 5: Parental Care** RAP; Chapter 8	6/4: **Poster presentation**
15	12/4: **Module 5: Parental care and mating systems** AA; Chapter 8, 9	13/4: **Module 5: Parental care and mating systems** Bird data

Week	Thursday 10:15-12:00	Friday 10:15-12:00
16	19/4: **Sex allocation** Chapter 10	20/4: **Module 6: Kinship and cooperation** RAP; Chapter 11, 12 (13)
17	26/4: **Module 6: Kinship and cooperation** AA; Chapter 11, 12 (13)	27/4: **Module 6: Kinship and cooperation** AA; Chapter 11, 12 (13)
18	3/5 **Module 6: Kinship and cooperation** RAP; Chapter 11, 12 (13)	4/5: **Field work**
19	10/5: (Public holiday)	11/5: **Communication and signals** Chapter 14
20	17/5: (Public holiday)	18/5: **Field work**
21	24/5: **Field work**	25/5: **Summary and conclusion** Chapter 15
22	31/5: **Oral exam** – first group (sign up on MittUIB)	
23	4/6: **Oral exam** – second group (sign up on MittUIB)	

Learning activities and preparation

Readiness assurance process (**RAP**); Read preparation material and prepare for individual and team test in class. Room: K3, B-block, BIO

Application activities (**AA**); practical exercises and problems solving in teams.
Bring your laptop. Room: K3

Lab experiments, field work and research activities.
Room: Lille kurssal, A-block, BIO

Lecture and class discussions
Room: K3