

Emnerapport 2020 haust

Emnekode: KJEM221

Faglærers vurdering av gjennomføring

Praktisk gjennomføring

The course introduced the students to basic quantum mechanics. It started by introducing the fundamental axioms of quantum mechanics, before moving on to linear motion and different types of barriers. The complexity of the investigated systems is then gradually increased by introducing circular motion and angular momentum. The last two chapters were dedicated to mathematical methods for obtaining approximate descriptions of quantum mechanical systems, and to exploit symmetry of molecules to solve quantum mechanical problems.

The course consisted of lectures (4 hours per week) and colloquiums (2 hours per week). For each colloquium, a set of exercises (typically calculation-oriented problems) were given to the students one week prior, and they were to hand in their solutions for control and approval by the teaching assistant at the end of each colloquium. Out of the total 13 exercise sets, 6 had to be approved, and minimum 3 had to be from the final 6 sets.

Due to the Corona virus situation the course had to undergo many changes during the semester. In the beginning the lectures and colloquium were only physical with lectures using blackboard and PowerPoint. However, with the increasing numbers of cases at UiB, a hybrid solution was implemented by using an iPad and the whiteboard functionality in Zoom. This allowed students to follow the lectures from home as well as locally at UiB. It was also allowed for the students to hand in their solutions to the colloquium digitally. The schedule was also rearranged for a few weeks to take advantage of the facilities available at Campus (see below). However, when the Campus closed completely during the autumn the lectures and colloquies became only digital using Zoom and the original schedule was reinstated. The lectures were recorded and uploaded on MittUib.

In November it was decided by UiB that all exams were to be held digitally, which meant that KJEM220, which originally was scheduled as written school exam, had to change the form of the exam. Due to the course being heavily based on calculations and having an appropriate number of students, it was decided to instead have an oral examination to prevent cheating and to keep the type of questions as similar as possible.

Strykprosent og frafall

A large amount of the students had the compulsory parts of the course approved in a previous semester and did not participate in any of the lectures or the colloquies. It was also evident that after the lectures turned digital many students did not show up. A possibility is that the students only watched the recorded lectures, but the questionnaire given to the students does

not point in this direction. Out of the original 18 students registered for the course, 15 showed up to the exam which is an okay percentage. However, the number of failed students (6) is too many. Some of the students admitted that they had not prepared for the exam and was planning to retake it in the spring, and most of the failed candidates were students that had not been present during the lectures. A reason for the large number of failed candidates may also stem from the change in exam form from written to oral, however, of the active students that were present in majority of the lectures, most passed with good grades.

Karakterfordeling

Grade	#	%
A	1	6,7%
B	4	26,7%
C	2	13,3%
D	1	6,7%
E	1	6,7%
Failed	6	40%

The average grade was C.

Studieinformasjon og dokumentasjon

A tentative reading plan was uploaded at the start of the course where the relevant chapters for each week was documented. The lectures did mainly follow this plan precisely. All the slides and exercises (with solutions after the colloquium) were uploaded to MittUib, as well as the recordings of the lectures via Zoom. The textbook used was P. W. Atkins. "Molecular quantum mechanics", Oxford, 2011, 5th edition.

Tilgang til relevant litteratur

The book was to the best of my knowledge available at Akademika when the course started.

Faglærers vurdering av rammevilkårene

Lokaler og undervisningsutstyr

The course was assigned the room "Tripletten" for the lectures on Tuesdays and Wednesdays and Auditorium 4 for the colloquies on Fridays. Tripletten was originally too small (max. 15 people due to Corona restrictions) for the number of students that had registered for the course (18). At the first lecture 15 people showed up, but for the following lectures this was not a problem. However, Tripletten does not have the required equipment to stream lectures (Videonotat), which meant that when the University made it compulsory to provide digital lectures the facility to do so was not present. Due to the nature of the course (focus on calculations and manipulation of equations) a blackboard or whiteboard is practically essential to teach the curriculum. Auditorium 4 does have the required equipment to stream blackboard lectures, and the schedule was rearranged to swap the colloquium and one of the lectures to take advantage of this. However, this would only cover two of the four hours of lectures. The university could also not provide any equipment (i.e., tablets) for alternative means of teaching.

The problem was only solved because the head of the chemistry department owned a private iPad 2 which could be borrowed and used for whiteboard lectures on Zoom, and this became the standard for the rest of the semester. While this method worked, an improvement would be to have a larger and more modern tablet to improve the functionality of the lecturing (easier swapping between presentation and whiteboard, a more precise pen would make the writing clearer, etc.).

Andre forhold

In general, the Corona situation made teaching the course very challenging. Originally the information given by the University was that the courses should be taught physically, and this is what was prepared for. Then with the new outbreaks the method had to be changed on short notice.

This was especially the case when the exam form had to change about a month before the planned written school exam. A new form and the grading system had to be selected, and while it is understandable that the lecturer has the most insight into what is appropriate for each course, very little guidance was provided by the University. The change in exam form was something the students understandably was very displeased with, which also was expressed in the student evaluation.

Faglærers kommentar til student-evalueringen(e)

Metode – gjennomføring

Of the 18 registered students, 7 answered the questionnaire. There were some new questions added to especially address the new situation with digital lectures and colloquies.

Oppsummering av innspill

In general, it is clear from the questionnaire that the digital lectures were a limited success. The students reports that the digital lectures are more unclear than the physical equivalent and the learning outcome is diminished, also since it is easier for the students to lose focus. Many were also frustrated about the fact that the exam changed from written to oral on such a short notice, especially since the colloquies are mostly calculations. However, most of the students believe that the learning outcome of the colloquies was good. Few of the students watched the recordings of the lectures, which further questions the benefit of this type of lecturing.

It is also clear that many feels that the course is quite work heavy and complicated, which is understandable since it is a 200-level course coming quite early in most of the students' degrees. Some also report that the book used in the course is not ideal and should be replaced.

Ev. underveistiltak

Due to the change from physical to digital colloquies, the students could hand in the exercises online for approval. This removed the original intention that the teaching assistant, which

had responsibility for the colloquies, should ask the students questions about their solutions and control that they had understood the method they were using. After the online implementation, some students only handed in their solutions online without showing up in the colloquies, meaning that they may have only copied someone else's work.

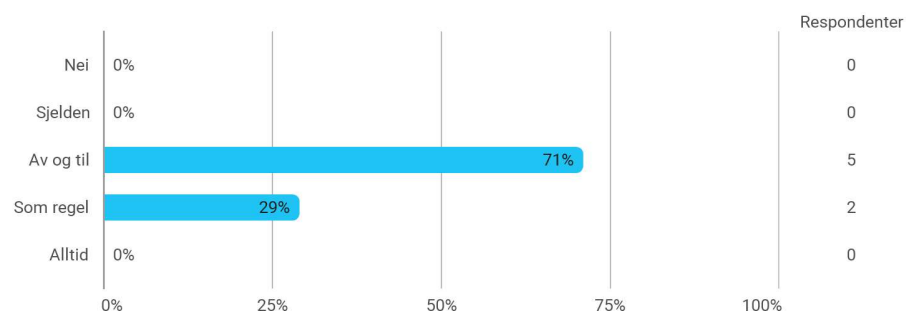
Faglærers samlede vurdering, inkl. forslag til forbedringstiltak

To sum it up, both the lecturer and the students have found KJEM221 to be challenging this semester. The change from physical to digital education made it difficult for the students to concentrate and the set up was not ideal for me, the lecturer, as well. Talking to black screens on Zoom lectures made it difficult to gauge whether the student was following the lecture or not, and usually very little feedback was given from the students during lectures.

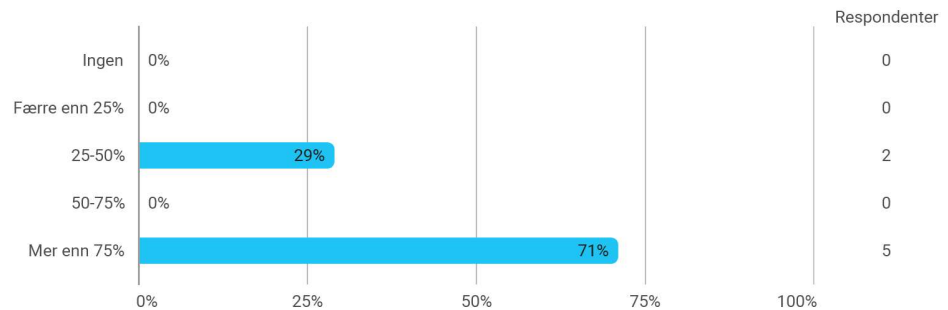
The change from written to oral exam so late in the semester also made many of the students agitated, and many felt that the colloquies, which was mainly calculation based, were not useful as preparation for this type of exam. However, from my experience, the students that did work with the exercises this semester, overall did much better than those who already had the colloquies approved from previous semesters. In general, the students mainly answered that they had a good learning outcome from the colloquies, and I believe this is a practice that should be continued. Hopefully in a normal situation, the students will feel that the exercises are more relevant for the exam and it will be possible for the student assistant (or the lecturer) to better control that the students are understanding what they are doing.

If the situation is similar next time the course is taught, the choice regarding digital lectures and examination form should be made at a much earlier point of the semester. This would make it easier for the lecturer and students to prepare for a course that is already quite difficult for many of the students. Other areas of improvement in a more normal situation, is to change to a different book and try to include more examples in the lectures to tie them together with the exercises. From time to time, it may also be a good idea to refresh the students what the different formalism used means, i.e Dirac notation vs integral etc.

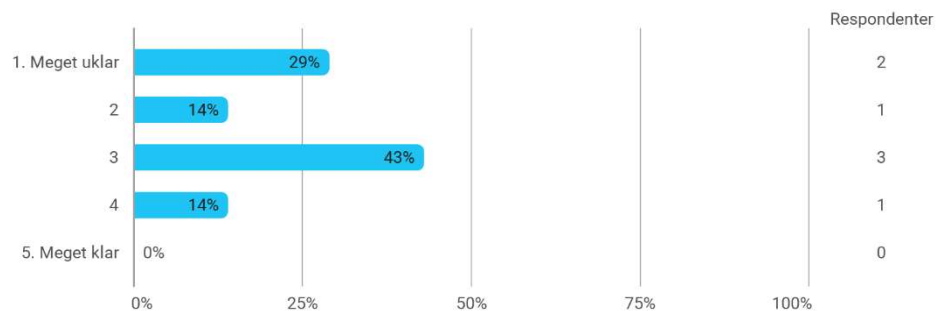
Har du forberedt deg til forelesningene?



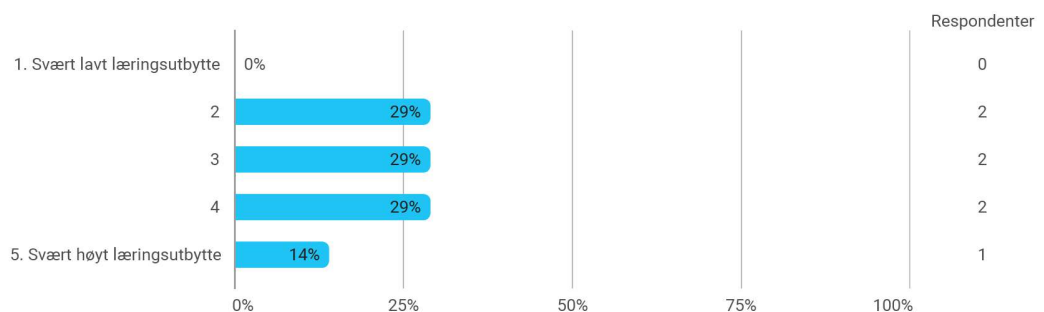
På hvor stor andel av de fysiske forelesningene var du tilstede?



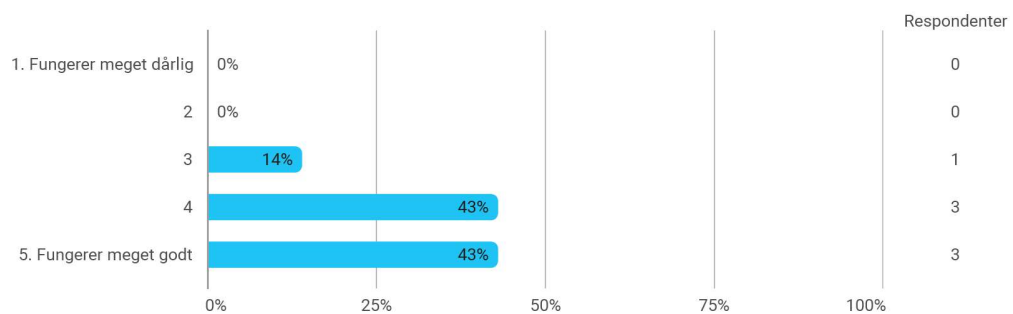
Klarhet i forelesers fremstilling av stoffet på de fysiske forelesningene. 1 til 5, der 1 er meget uklar og 5 er meget klar.



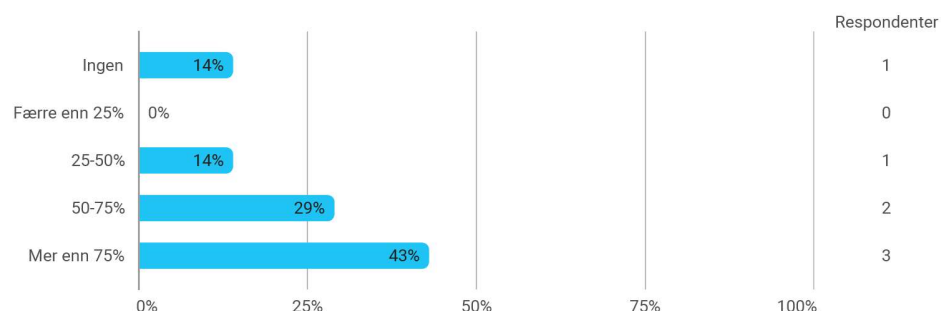
Hvordan har læringsutbyttet av de fysiske forelesningene vært? 1 til 5, der 1 er svært lavt læringsutbytte og 5 er svært høyt læringsutbytte.



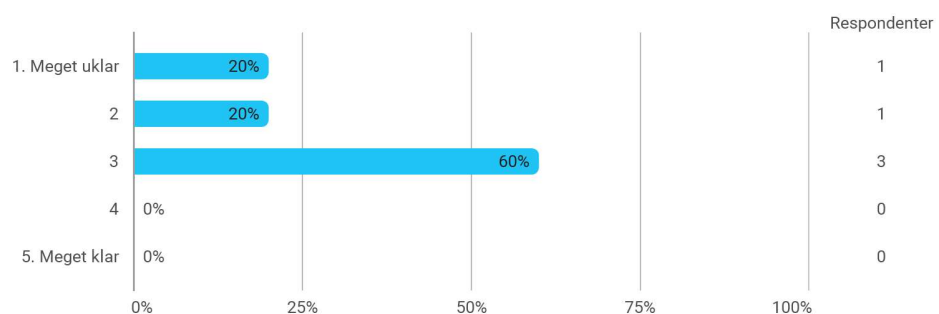
Hva synes du om bruk av tavle som hjelpemiddel på de fysiske forelesningene? 1 til 5, der 1 er "Fungerer meget dårlig" og 5 er "Fungerer meget godt".



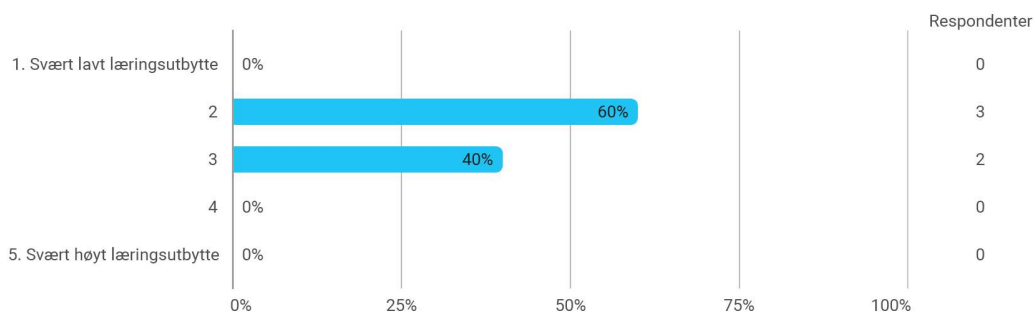
Hvor stor andel av de digitale forelesningene har du fulgt i sanntid?



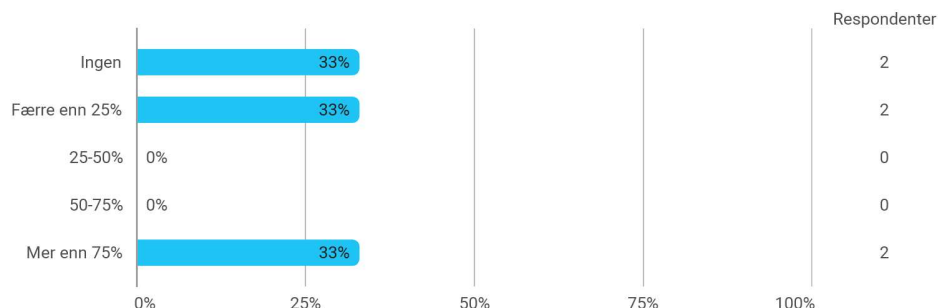
Klarhet i forelesers fremstilling av stoffet på de digitale forelesningene i sanntid. 1 til 5, der 1 er meget uklar og 5 er meget klar.



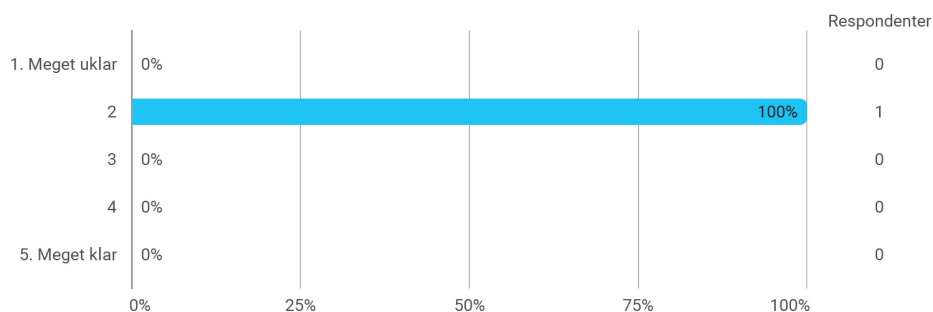
Hvordan har læringsutbyttet av de digitale forelesningene i sanntid vært? 1 til 5, der 1 er svært lavt læringsutbytte og 5 er svært høyt læringsutbytte.



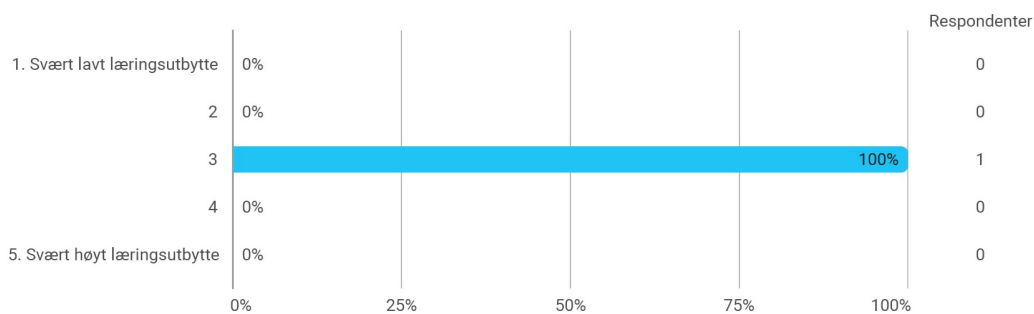
Hvor stor andel av de digitale forelesningene du fulgte var opptak?



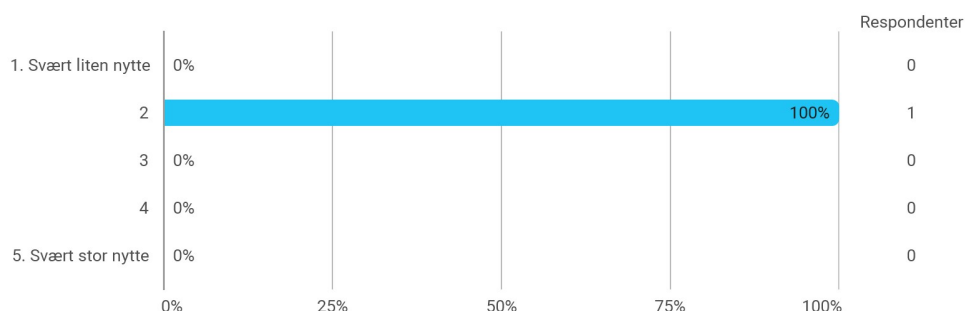
Klarhet i forelesers fremstilling av stoffet på de digitale forelesningene i opptak. 1 til 5, der 1 er meget uklar og 5 er meget klar.



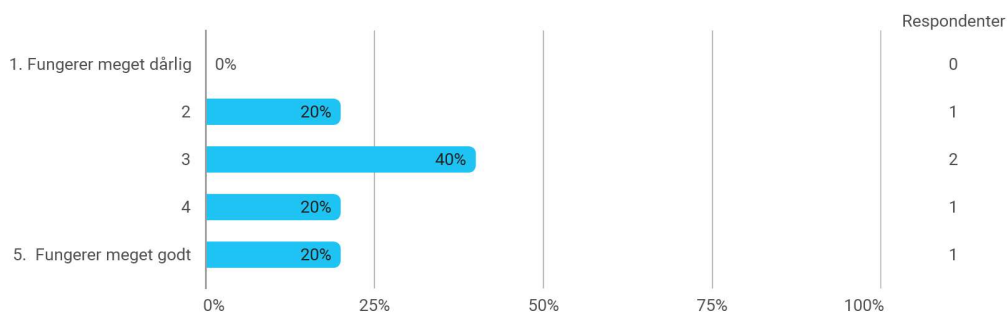
Hvordan har læringsutbyttet av de digitale forelesningene i opptak? 1 til 5, der 1 er svært lavt læringsutbytte og 5 er svært høyt læringsutbytte.



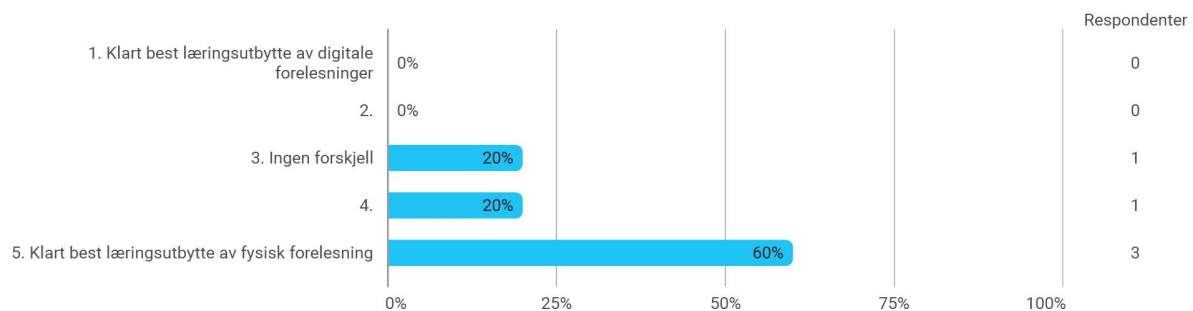
Hvordan har nytten av videoopptak av forelesningene vært for deg?



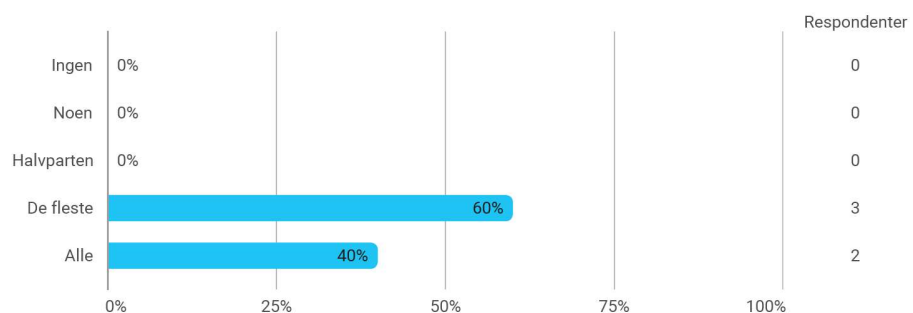
Hva synes du om bruk av digital tavle (whiteboard) som hjelpemiddel i dette emnet? 1 til 5, der 1 er "Fungerer meget dårlig" og 5 er "Fungerer meget godt".



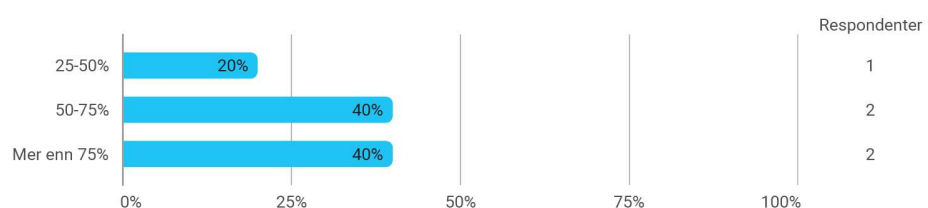
Hvis du har deltatt på både fysiske og digitale forelesninger. Hvordan har forholdet i læringsutbyttet av de ulike forelesningstypene vært? 1 til 5, der 1 er mest læringsutbytte av digital forelesning og 5 er mest læringsutbytte av fysisk forelesning.



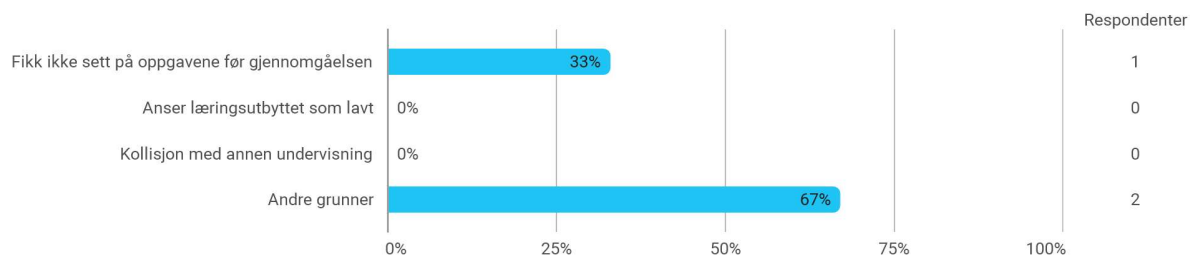
Hvor stor andel av regneoppgavene (kollokvieoppgavene) har du gått gjennom på egenhånd?



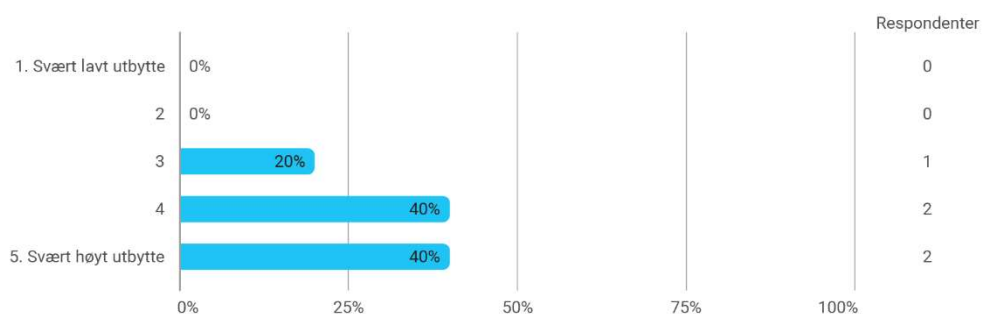
Hvor stor andel av regneøvelsene (kollokviene) har du deltatt i?



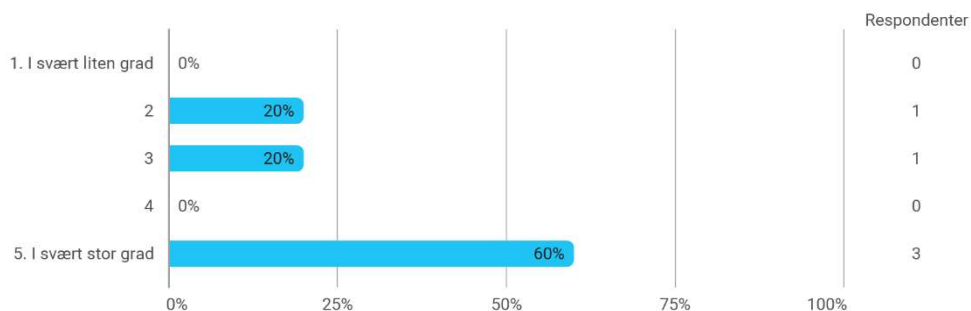
Hva var hovedårsaken til at du ikke deltok på (flere) regneøvelser (kollokvier)?



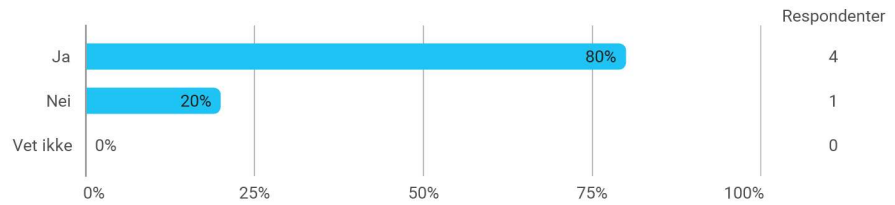
Hvordan har læringsutbyttet av regneøvelsene (kollokviene) vært? 1 til 5, der 1 er svært lavt og 5 er svært høyt læringsutbytte.



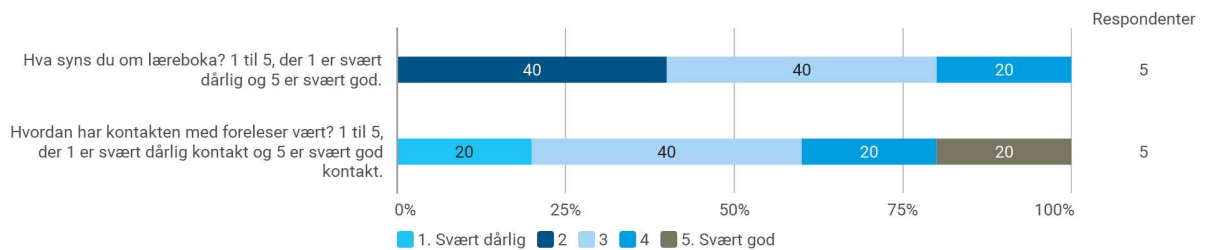
I hvor stor grad lærte du av andre studenter som deltok i regneøvelsene (kollokviene)?



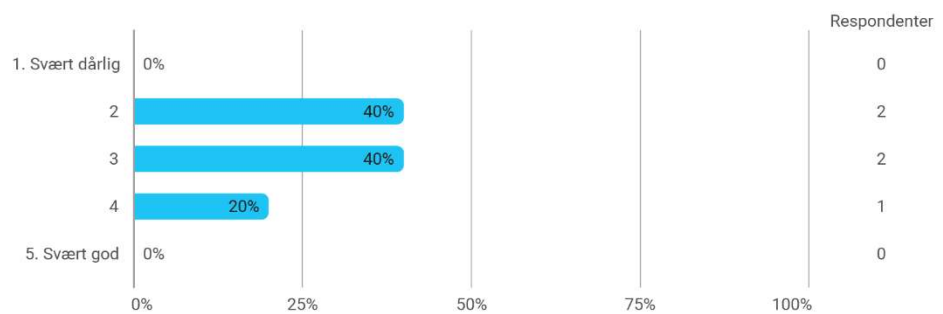
Vi har hatt obligatorisk besvarelse av minst 6 kollokvieoppgavesett i løpet av kurset. Er et slikt obligatorisk element nyttig for læreprosessen?



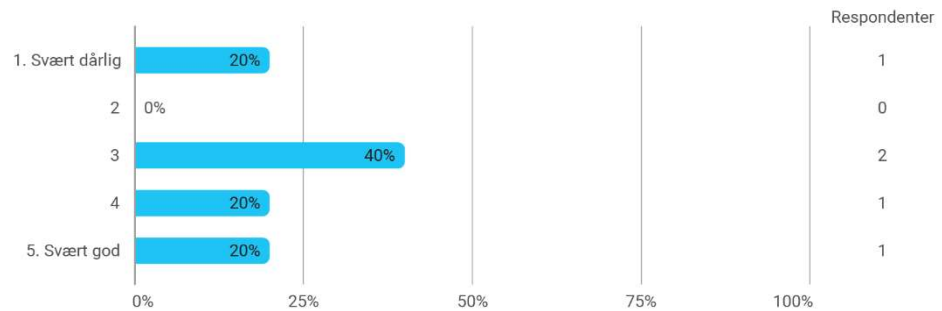
Andre kommentarer angående regneøvelsene og / eller de digitale kollokviene?



Hva syns du om læreboka? 1 til 5, der 1 er svært dårlig og 5 er svært god.



Hvordan har kontakten med foreleser vært? 1 til 5, der 1 er svært dårlig kontakt og 5 er svært god kontakt.



10 studiepoeng skal i snitt tilsvare ca. 13 timer arbeid (organisert undervisning + egenaktivitet) pr. uke. Hvor mange studiepoeng mener du emnet KJEM221 tilsvare?

