Emneevaluering av NANOemner

NANO161 – Faglæreres evaluering vår 2014

- Kommenter den praktiske gjennomføringen av kurset og hvilke planer du har for forandring før neste gjennomføring.
    - *Opplegget som vi brukte med forelesninger tilpasset lab-øvelser fungerte utmerket. Alle studenter hadde god innsikt før lab og innsikten virket til å øke enda mer etter end lab-øvelse. Noe mer bruk av tavle ved neste gjennomføring.*
- Kommenter strykprosent, frafall og karakterfordeling.
    - *Strykprosenten var null, og det var ingen som ikke møtte til eksamen. En student fikk forlenget frist på innlevering av rapporter. Karakterfordeling var i øvre halvdel av skalaen. Dette gjenspeiler studenter som møtte til nesten hver eneste forelesning og generelt var engasjerte i faget.*
- Ønsker du å forandre kursbeskrivelse eller studieinformasjon før neste gjennomføring?
    - *Det er i overkant krevende å ha full forelesning og full lab med karakter på rapporter for både studenter og underviser. Jeg foreslår bestått ikke bestått med minimumskarakter på C for bestått på rapporter.*
- Er det forhold ved undervisningslokalene eller –utstyret som begrenser kvaliteten på undervisningen eller kurset?
    - *Ikke som jeg har merket*.
- Hva er den sterkeste kritikken som studentene har reist (jfr. Studentevalueringen) til årets undervisning i NANO161 og hva planlegger du å gjøre for å møte den kritikken?
    - *Det kommer tilbake til tavlebruken. De ønsket mer bruk av tavle, og dette kan lett forbedres.*

Emnerapport 2014 høst
NANO244 – Materials- and Nanochemistry

Emneansvarlig: Pascal D. C. Dietzel

Faglærers vurdering av gjennomføring

Praktisk gjennomføring

The course starts with foundations in solid state chemistry and materials science which are important background knowledge to understand the nanochemistry which is presented subsequently. Two textbooks specialized on each of these two focus areas were used to give a solid introduction to the subject. The accompanying lectures encompassed 21 double hour lectures. In addition to the lectures and pensum literature, the students have to perform and write reports for three exercises in the laboratory and which introduce them to synthesis and characterization of nanomaterials. Each exercise is accompanied by a double hour introductory lecture.

The course was taught for the first time in this form. It can be considered a merger of the content of KJEM244 with the practical exercises which were performed previously at the Department of Chemistry as part of NANO200. The lab exercises take the place of the seminar presentation which was part of KJEM244. In this way a more holistic introduction to the subject can be given than was previously the case for NANO200.

Strykprosent og frafall

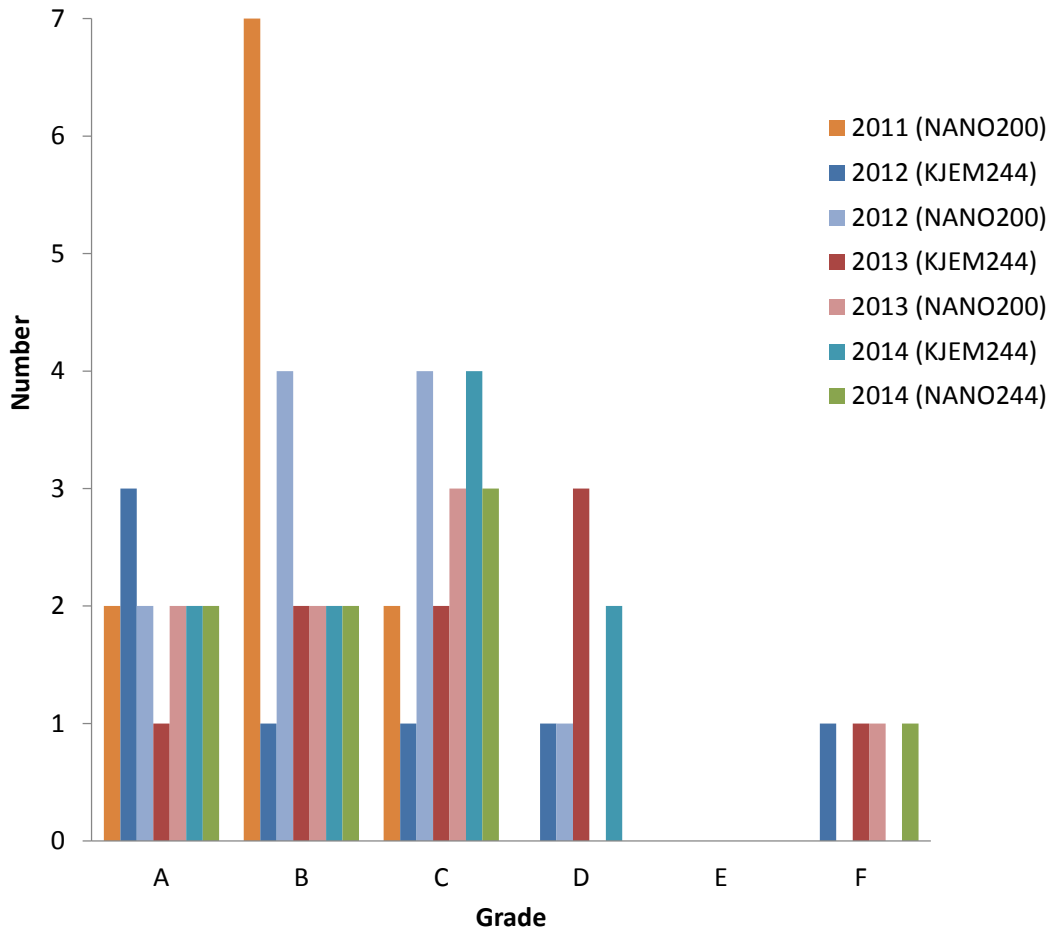
There were eight students who signed up originally for the class and were in attention for the complete semester with varying degrees of regularity. All of these were bachelor students from the nanotechnology program. Of these eight, seven took the exam, all of which passed. The eighth student decided not to take the exam, but this was so late that it had to count as “ikke møtt”. Two students who had a fulfilled master’s degree asked for and were allowed to participate in the course after it had started, but they signed off quickly thereafter.

Karakterfordeling

The grade for the course is an aggregate of the final exam at the end of the semester (70%) and the laboratory excercises (30%). The final exam was in the form of an oral examination. The same experienced and well qualified external censor who did the job for KJEM244, for which the content of the lectures have a large degree of overlap, was invited for the exam. Evaluation conditions therefore were very similar and comparable.

The average grade for the course was between B and B-, with 2 As, 2 Bs, and 3 Cs awarded. Overall, results were similar to those of the NANO200 and KJEM244 courses. There were no D or worse awarded at the final exam. The outcome was thus significantly more homogeneous than in KJEM244, which usually had not only bachelor, but also masters and PhD students attending. Based on the latter one might have expected the reverse, but I take these results to reflect the high quality of the nanotechnology students.

The figure below shows the grade distribution in comparison with the classes that NANO244 is related to:



Studieinformasjon og dokumentasjon

Mi-side was used to make slides from the lectures available to students and hold contact during the semester.

Faglærers vurdering av rammevilkårene

Lokaler og undervisningsutstyr

Two different rooms were used to give the class. In auditorium 3, the screen in the auditorium on which the slides are displayed is not well positioned in respect to the computer used to control the presentation. This necessitates that the lecturer either has to stand by the side of the computer and then is in a bad position to point at specific items on screen or he has to move substantial distances back and forth to be better able to do so – which is not always easily incorporated into the flow of the presentation. It also hinders transition between content on the screen and the black board, much to the regret of this particular lecturer who enjoys drawing on the black board, which, even worse, provides all too little space for the ardent drawers and necessitates frequent interruptions erasing the board. In room 3069, the situation is even worse in that very little black board space is available when the projector and screen are in use, too.

Andre forhold

Before the code change from KJEM to NANO, the audience attending KJEM244 consisted predominantly of chemistry students. KJEM244 had been particularly popular with exchange students. It came as a shock that only students from the nanotechnology program signed up for NANO244. The effort to announce that the course is also available for chemistry students apparently has not succeeded. Having a double KJEM/NANO code would remove this problem by identifying the course easily to the students. The issue has been taken up with the faculty, but the faculty appears unwilling to permit this. If that is so, one might have to consider switching back to KJEM code for the course to make it more visible for the chemistry students. The course is obligatory for the nanotechnology students and the labelling of the code therefore not quite as important to draw their attention to it.

Faglærers kommentar til student-evalueringen(e)

Metode – gjennomføring

The poll was adjusted to reflect some of the special characteristics of how the course was implemented. I was especially interested to get feedback on the use of the two textbooks written using rather different concepts and style, how the intermittent questions posed by the lecturer were received by the students, and the lab exercises. I am especially happy about the high (100% of the core attendees) number of participants in the questionnaire and the detailed comments provided in the free text fields provided. It reflects my impression that this was an active and interested class.

Oppsummering av innspill

Many of the students have used the opportunity to give additional comments. These individual comments are often more useful than simple grading on a scale, and I wish to thank for the constructive feedback. It is too exhaustive to respond to in detail here, but the most pertinent points are mentioned below. For the rest, I refer to the appendix which contains the compilation of the responses.

The students who have responded to the questionnaire give generally positive feedback regarding content, clarity of presentation, learning outcome of the lecture, contact with the teaching staff, and relevance of the course for their further studies.

The main points of criticism voiced by the students appear to concern the lab exercises. Issues included that the lectures introducing the exercises were grouped together, that too much time passed until the later exercises were performed, that the exercises were scheduled too close to each other, and that it took too long until they received feedback on their lab reports.

The students considered the course to be more demanding than other classes.

Ev. underveistiltak

Not necessary or possible.

Faglærers samlede vurdering, inkl. forslag til forbedringstiltak

I put a strong emphasis on posing questions to the audience intermittently during the lectures with the intent of re-activating background knowledge from previous classes or to aid in the process of dissemination of the course content. On one hand, this approach keeps the audience attentive and helps in assimilation of the presented content. In addition, the approach intends to prepare the students in a mild manner for the oral exam and the line of questioning they will encounter there.

As I have observed before, there are only few students who actively participate in the exchange. This may have multiple causes. One might be that the participants are not used to this type of activity and that they are therefore a bit hesitant to actively engage in the exercise. A colloquium might be an alternative form to engage in a scientific discussion with the students in a setting where they are more comfortable doing so, but there are unfortunately not enough resources available to include colloquia in the course. In any case, the student evaluation shows the interactive approach was positively viewed by the students, and it will be used in the future again.

Integration of the lab exercises into the course progression does pose some challenges, particularly in respect to scheduling. The content of the exercises requires that they are scheduled relatively late in the semester. However, one would like to be done with the exercise and lab report writing in good time before the exam period. The lab related activities should be concluded preferably by the end of October. There have been additional extraneous issues affecting the scheduling this year, none of which I'd consider as resulting in major problems affecting course progression, with the exception that it took too much time before the students received feedback on the first lab reports. In principle, the students should get feedback on their first lab report before they have to deliver the second one so that they can take it into account. I will attempt to further optimize timing issues next year.

I found it interesting how strongly the feedback on the questionnaire indicated that the students considered the course more demanding than other classes. In contrast, the very much related course KJEM244 was deemed "more or less the same" as other classes in its evaluation. I designed the courses so that effort required is expected to be identical. The content of the lectures is by and large the same, while the seminar presentation in KJEM244 has been substituted with the lab exercises in NANO244. The time allocated in the course design for the seminar corresponds to the time allocated for the lab exercises. Interestingly, when asked how much time they spend on preparing their seminar presentation in KJEM244, the students' answers indicated that they actually spent significantly less time than allocated in the course design. In contrast, the answers in respect to time spent on writing the lab reports in NANO244 varied widely – ranging from the time I allocated for it to multiples of it. Still, I suspect the main reason for this change in sentiment on how demanding the course is relative to other classes lies in the fact that KJEM244 was taught in spring semester while NANO244 is taught in the fall semester, which *de facto* is significantly shorter and requires the same amount of learning to be achieved in less time.

By and large, I consider the course has worked out well, especially considering the wide range of subjects covered. Compromises in selection of content for the lectures have to be made – one could easily set up two full (10 credit) courses, one in materials chemistry and another one on nanochemistry, covering the fields in more detail and depth, and even that would scarcely approach the importance of these fields today.

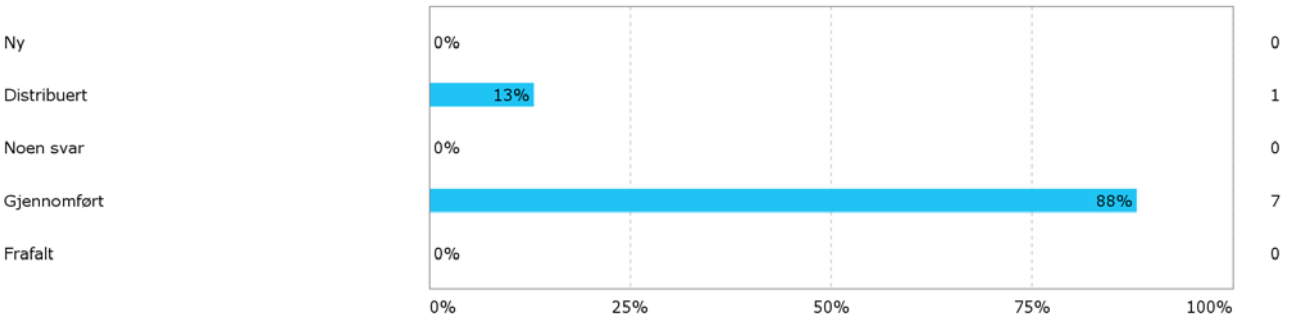
If the absence of participants from the bachelor and master program in Chemistry continues, one should consider reverting to a KJEM code again. The course is obligatory for students in the nanotechnology program anyway, and a KJEM code will hopefully make it more visible to the Chemistry students.

Appendix: Results of the student evaluation

NANO244 Material- og nanokjemi

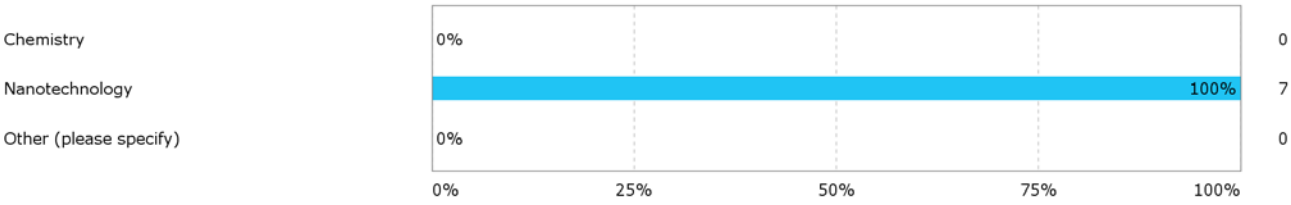
Studentevaluering høsten 2014

8 respondenter
7 responser
Avsluttet 9.12.14
Studentene hadde valget mellom å svare på norsk eller engelsk



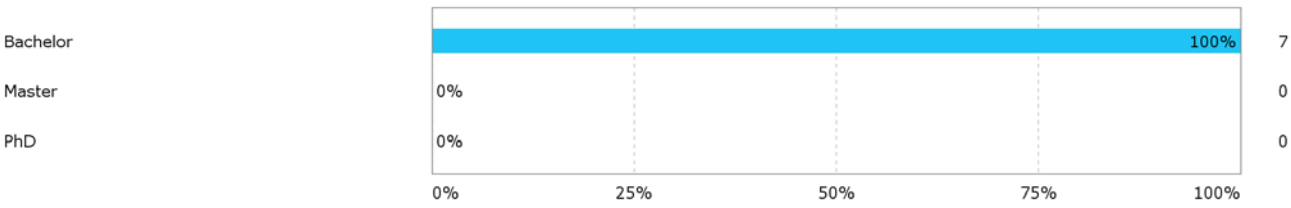
Svar på undersøkelsen

Are you studying towards a degree in



Are you studying towards a degree in - Other (please specify)

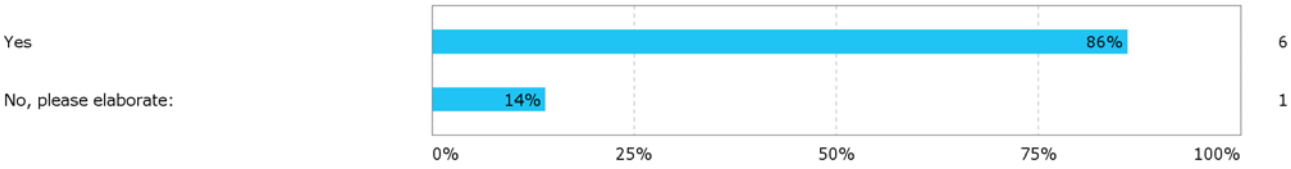
Please identify the study phase you are in:



Why did you choose to attend this course?

- Mandatory
- Part of the bachelor
- Mandatory
  Intreaging subjects and exercises
- Mandatory, but also very relevant
- It's obligatory.
- Mandatory in my bachelor
- It is required for my bachelor's degree in nanotechnology.

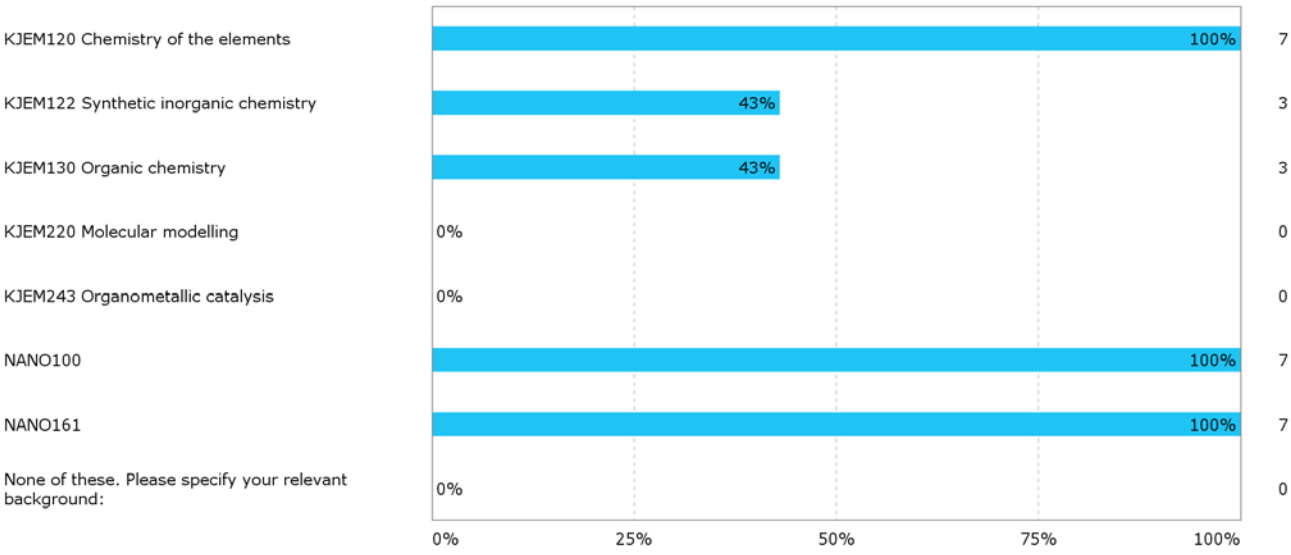
Did the course meet your expectations?



Did the course meet your expectations? - No, please elaborate:

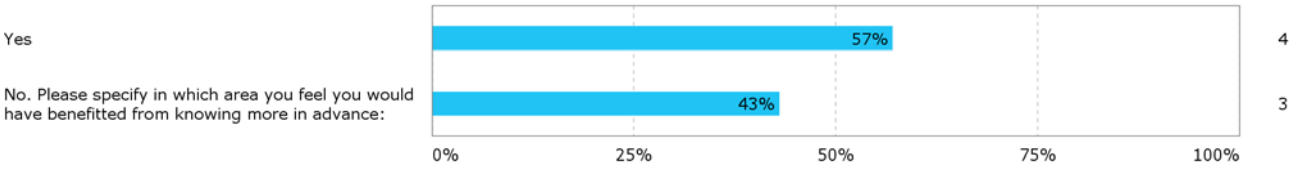
- The lectures and reports regarding laboratory were not very well prepared.

Please mark which of the following courses you attended earlier:



Please mark which of the following courses you attended earlier: - None of these. Please specify your relevant background:

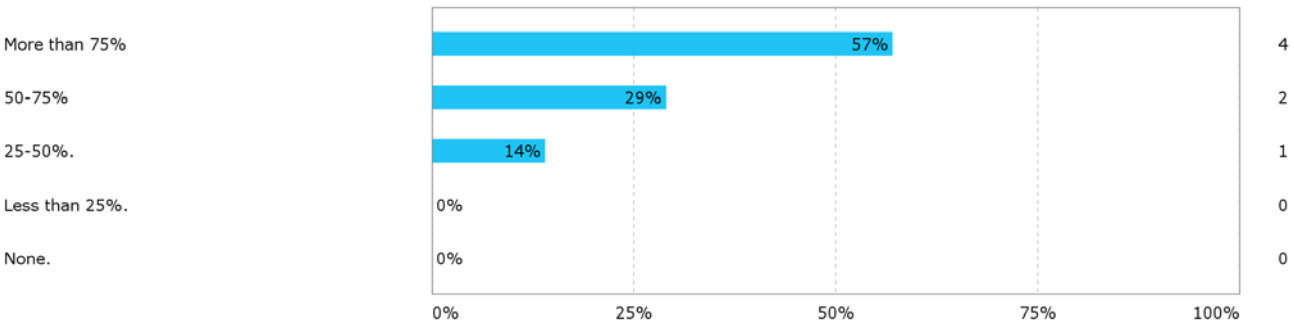
Did you feel your background knowledge was adequate to follow the content of this course?



Did you feel your background knowledge was adequate to follow the content of this course? - No. Please specify in which area you feel you would have benefitted from knowing more in advance:

- Organic chemistry
- Organic chemistry, quantum mechanics.
- general chemistry

How many of the lectures have you attended?

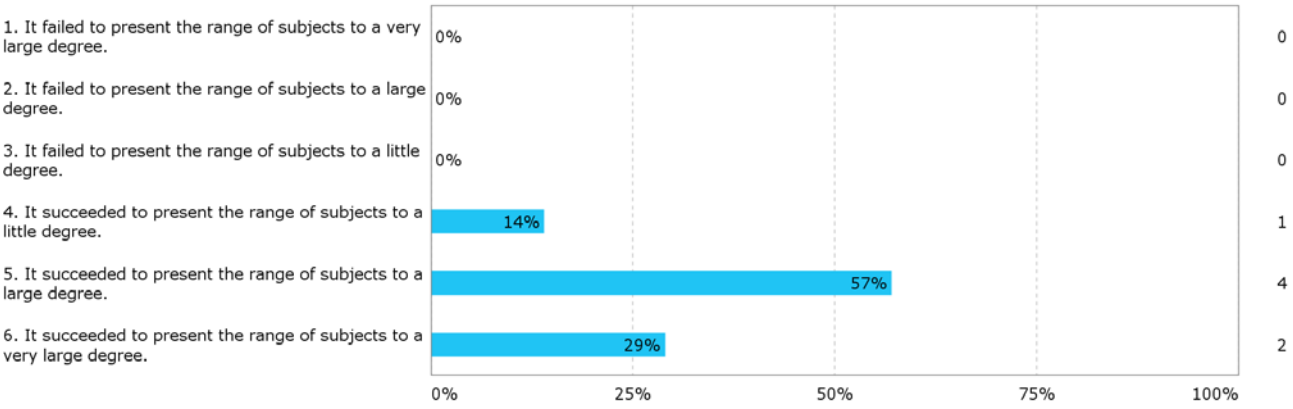


What was the main reason you did not attend the lectures you missed?

- I was not in Bergen.
- Writing the lab rapports
- Attended all lectures
- Crashing with other lectures or school meetings
- The lectures was at the same time as another subject I had to attend this semester. (PHYS115)

- My main reason for not attending missed lectures was due to mandatory workload from this or other subjects. Examples are studying for midterm, mandatory exercises, and finished lab journals.

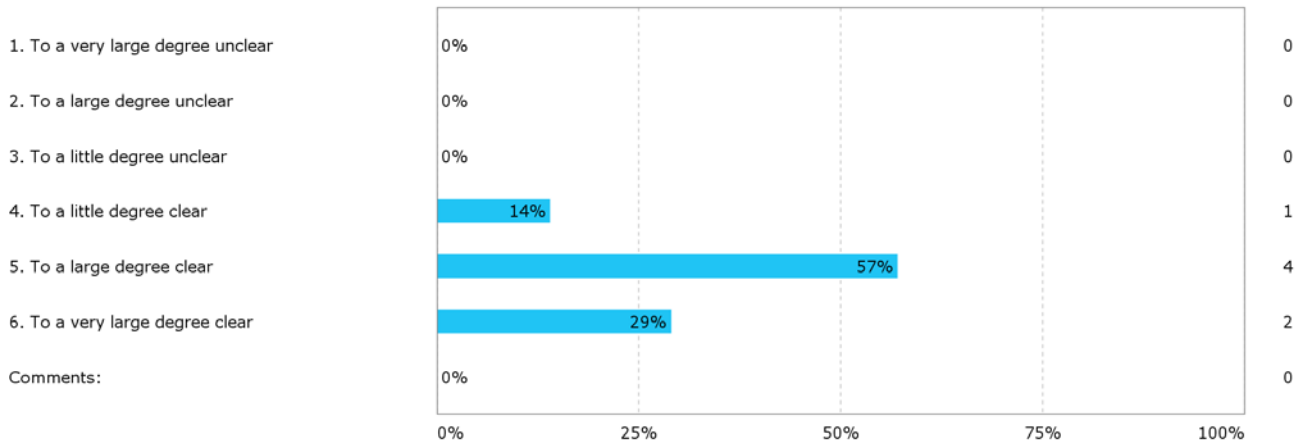
The course encompassed a wide range of subjects from fundamental solid state chemistry to nanomaterials. How well do you think it managed to integrate this variety and present it in a coherent manner (1=very much failed, 6=succeeded very much)



Please elaborate if you think the course did not manage to present the breadth of its subject. Feel free to give other comments about the content of the course, too.

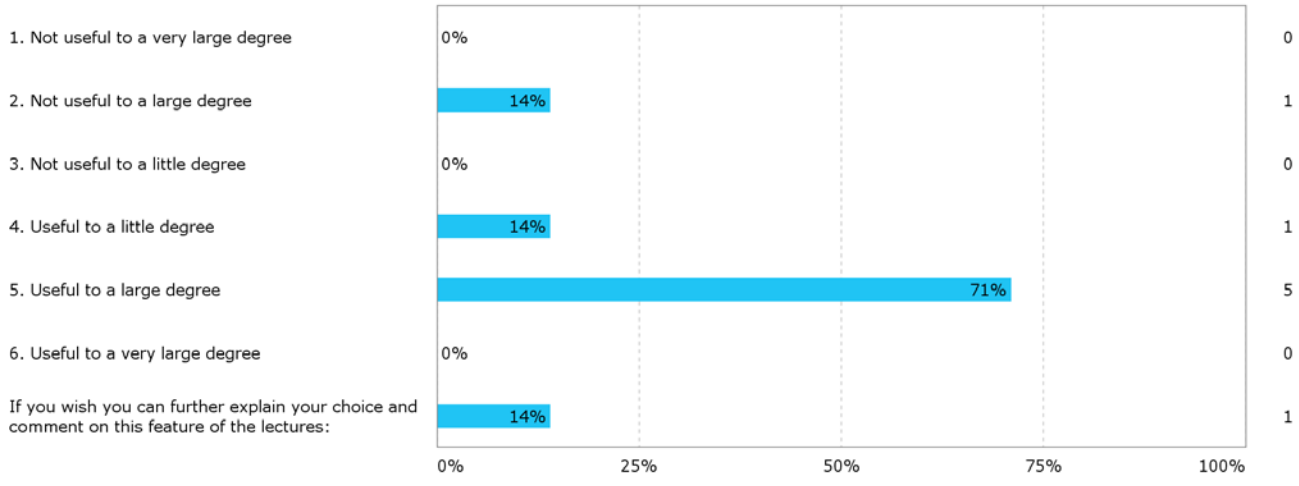
- The curriculum is a bit too large. Not cutting down the amount when labs are introduced is unfortunate since the amount of time spent writing lab rapports is quite extensive.
- The course is very big, and it was not enough time to go through everything in the lectures, which made it difficult to understand some of the theory.

How clear was the presentation of the different topics during the lectures? Rate on a scale from 1 to 6 (1=very unclear, 6=very clear)



How clear was the presentation of the different topics during the lectures? Rate on a scale from 1 to 6 (1=very unclear, 6=very clear) - Comments:

The lectures were to a certain degree meant to be interactive with intermittent questions being posed by the lecturer. Do you think this approach helped you in your learning progress? Rate on a scale from 1 to 6 (1=very little useful, 6=very useful).



The lectures were to a certain degree meant to be interactive with intermittent questions being posed by the lecturer. Do you think this approach helped you in your learning progress? Rate on a scale from 1 to 6 (1=very

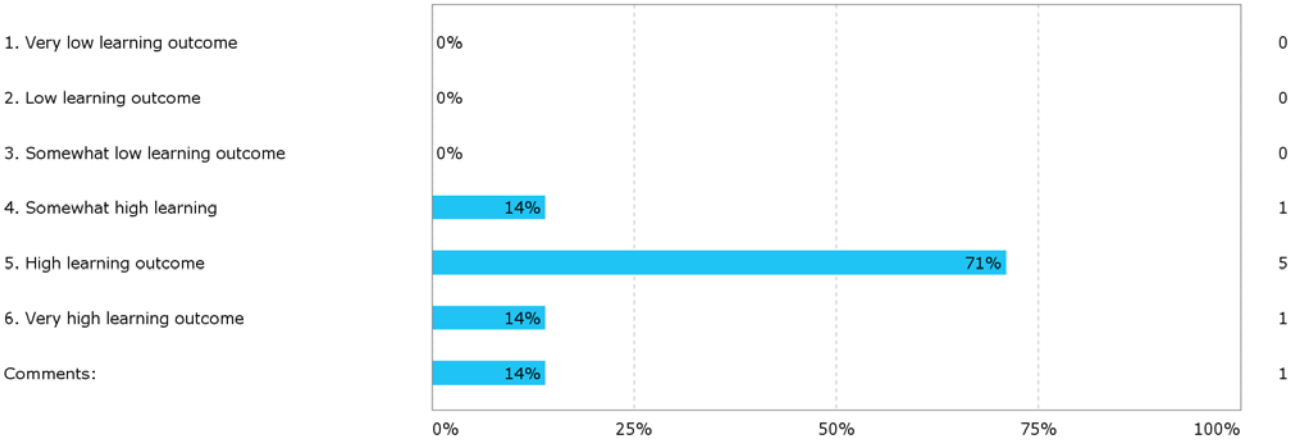
little useful, 6=very useful). - If you wish you can further explain your choice and comment on this feature of the lectures:

- Unfortunately the students in this class was rather poor at answering questions, which I personally think made this course more difficult. However, when questions was asked it was very useful (for me at least, since I asked some of them), and I hope Pascal will continue to make the lectures interactive with intermittent questions. Hopefully the students participating next year will participate more than we did.

If you have other comments regarding the lectures, please write them here:

- A whole lecture dedicated to summarizing the concepts we have learned previously that the topics of the course is based on, would be very helpful. A list of all previous courses is only demotivating a half of the students won´t remember all the courses they have had.
- Some lectures were presented by the lab assistants, and they were not particularly instructive. The other lectures were great, even though the interactive part didn't work.
- The subject has a very enthusiastic lecturer, which is good.
- The lectures were usually good structured and clear. I had the feeling that some of them had "too much information" crammed in them, though. For example when the power point slides are numbered, and I had the feeling that we were just "racing through them". In that sense, I'd like some of them lectures to be even more focused on what's really important, instead of cramming too much information in on 45 minutes.

How do you rate the learning outcome from the lectures? Rate on a scale from 1 to 6 (1=very low learning outcome, 6=very high learning outcome).

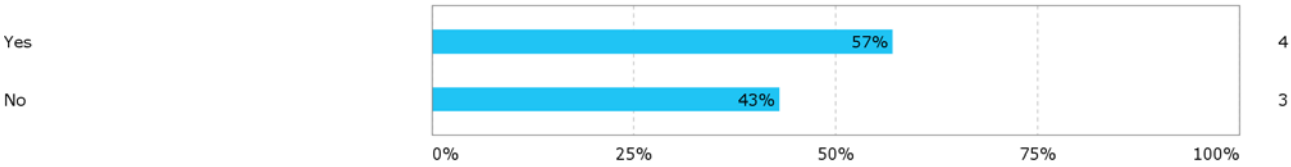


How do you rate the learning outcome from the lectures? Rate on a scale from 1 to 6 (1=very low learning outcome, 6=very high learning outcome). - Comments:

- Unfortunately the lectures was rather poor the weeks Pascal was in Japan. By poor I mean that the teacher opened the powerpoint and read it out loud, without being able to answering

questions or adding anything besides what was actually written on the powerpoint. The lectures was meaningless.

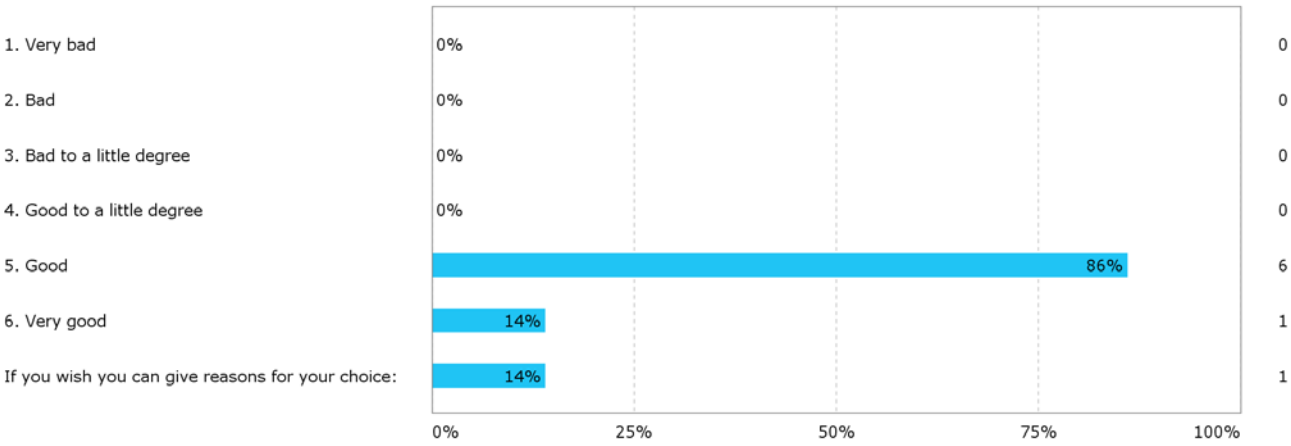
Did you prepare for the lectures in advance?



How many hours of self-study have you spent for this course? Give as average number per week.

- 6
- 20
- 20
- 8
- 8
- 4
- 10

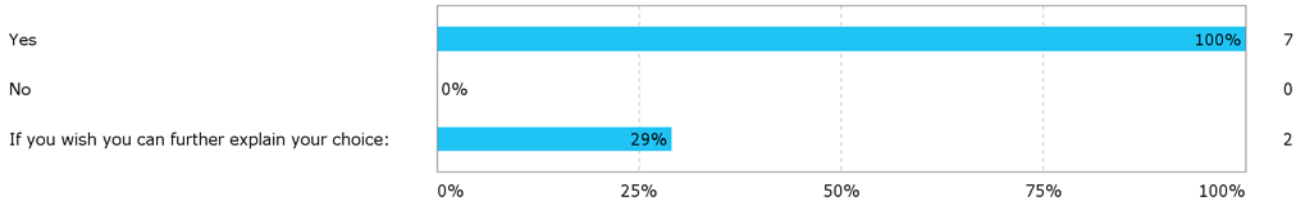
How has the contact with the lecturer been? Range on a scale from 1 to 6 (1=very little contact/inaccessible, 6=very good contact/accessible



How has the contact with the lecturer been? Range on a scale from 1 to 6 (1=very little contact/inaccessible, 6=very good contact/accessible - If you wish you can give reasons for your choice:

- It is difficult to give 6 since I have not been trying to reach Pascal very much, but the times I have tried, he has been very accessible. Thumbs up!

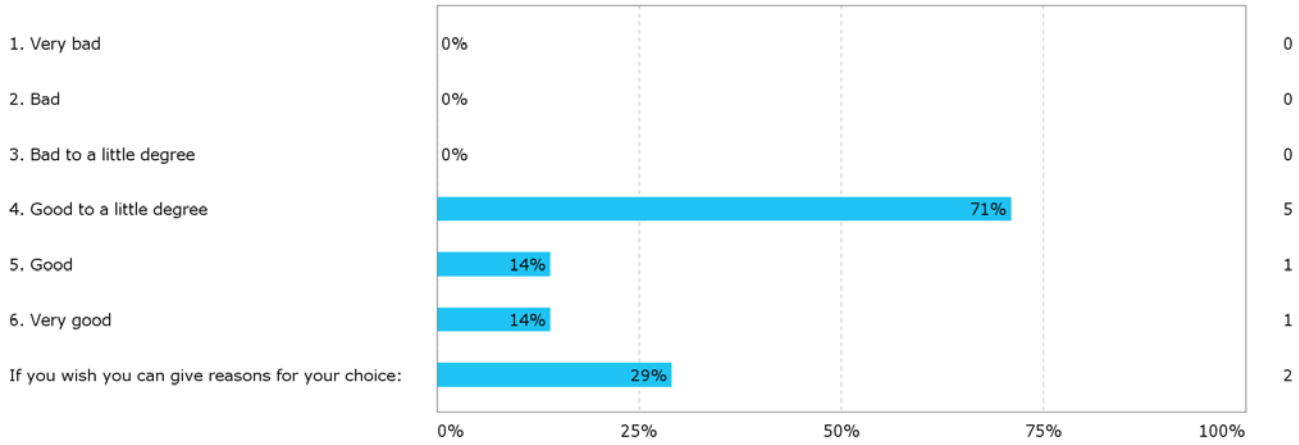
The course used two different textbooks. Do you think the combination achieved its aim of presenting the scope of the subjects treated in the course?



The course used two different textbooks. Do you think the combination achieved its aim of presenting the scope of the subjects treated in the course? - If you wish you can further explain your choice:

- Good, but you start with the hardest book and finish with the "easiest" book.
- In my opinion, the books are good, but not great. The lectures usually emphasizes different things - or more in depth - than what is presented in the text books. This makes it necessary to search online for further information.

What is your opinion of the textbook “Solid State Chemistry - An Introduction"? Range on a scale from 1 to 6 (1=very bad, 6=very good)

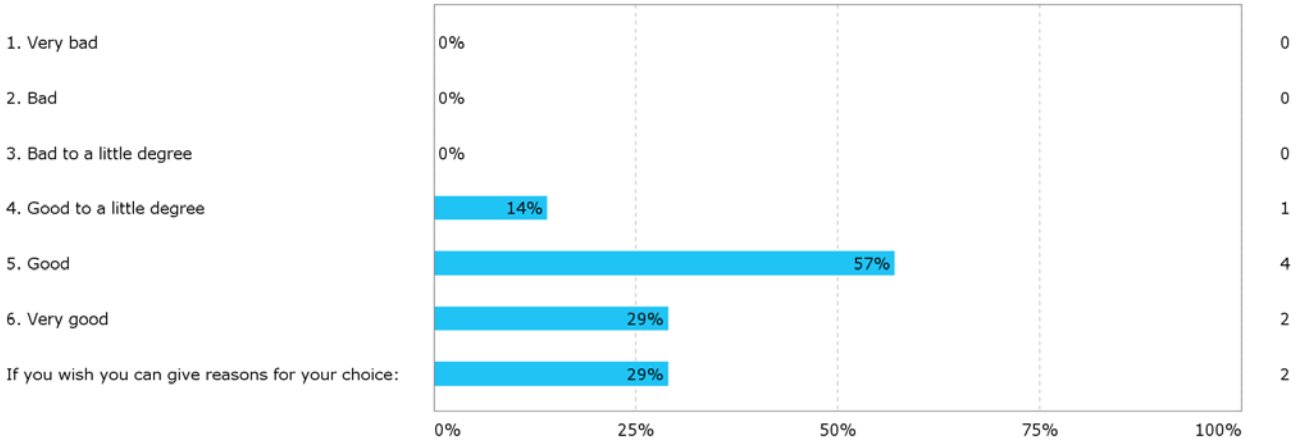


What is your opinion of the textbook “Solid State Chemistry - An Introduction"? Range on a scale from 1 to 6 (1=very bad, 6=very good)

- If you wish you can give reasons for your choice:

- I think it is a good book, but I find it somehow difficult to read.
- Sometimes hard to understand,

What is your opinion of the textbook “Concepts of Nanochemistry”? Range on a scale from 1 to 6 (1=very bad,6=very good)

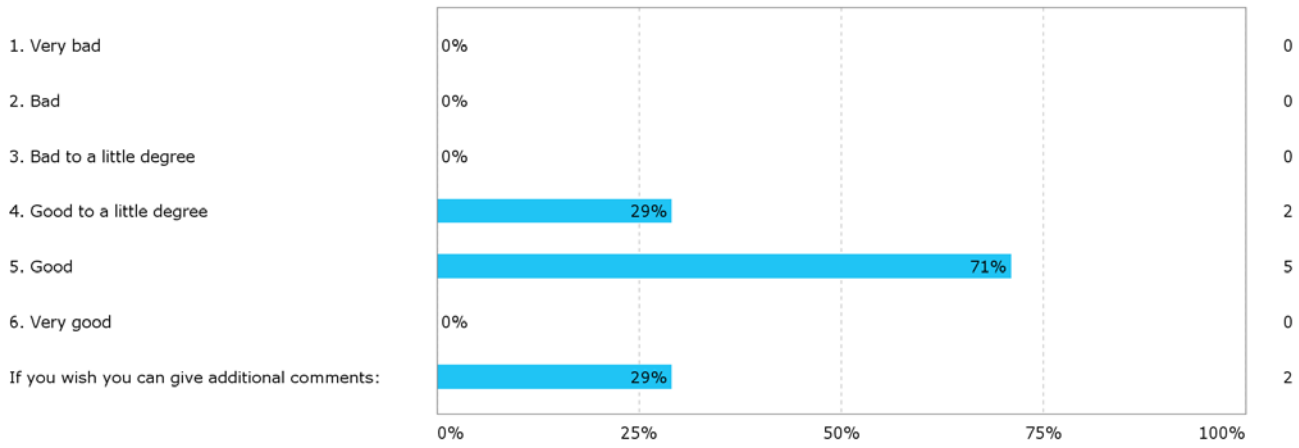


What is your opinion of the textbook “Concepts of Nanochemistry”? Range on a scale from 1 to 6 (1=very bad,6=very good)

- If you wish you can give reasons for your choice:

- Very easy to read with good examples.
- Very readable, but might lack some depth.

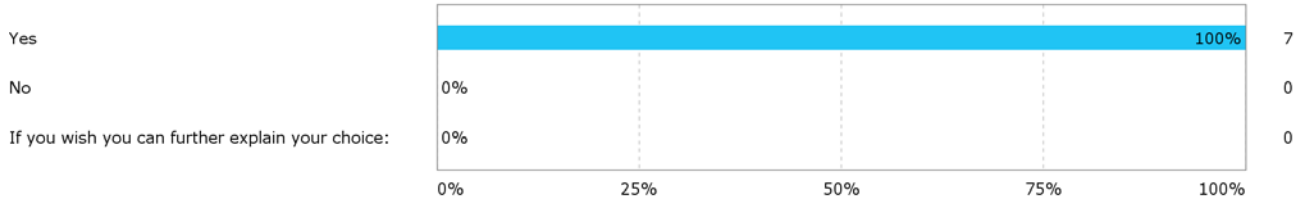
What do you think about the presentations of the lectures presented on MiSide? Range on a scale from 1 to 6 (1=very bad, 6=very good).



What do you think about the presentations of the lectures presented on MiSide? Range on a scale from 1 to 6 (1=very bad, 6=very good). - If you wish you can give additional comments:

- I wish the presentations could have been published earlier, as this would have made it easier to prepare.
- Very good for the lectures, but a bit harder to make sense of if you're preparing for lectures, going throug them afterwards or trying to catch up missed lectures.

The course included several practical exercises. Do you think the exercises were useful in your understanding of the subject?



The course included several practical exercises. Do you think the exercises were useful in your understanding of the subject? - If you wish you can further explain your choice:

How much time did you spend on average per exercise for analysis of the data and writing the report?

- Difficult to say, maybe 6 hours

- 10-15
- 30
- 10
- 15
- 35 hours
- around 30 hours

Please give a brief explanation of advantages or disadvantages related to the exercises:

- Nothing major, but I think the reports was evaluated both slow and poor (lack of comments), and on the last exercise the results was delivered way to late (in my opinion, at least)
- Relevant for the course (and interesting!)
- It takes a lot of time to write the rapports.
- The exercises should have come earlier in the semester, but after the background theory had been introduced (could easily have been presented earlier). Also, the results should have been published sooner, the corrected reports should have been returned more quickly and with clearer feedback, including more tips for improvement for future reports.
- The exercises took much time of the course. On the last report we didn't receive data results for analysis when we were supposed to(two-three weeks after), which made it very stressful since it was close to the exam. We didn't get much information about the report layout. It could have been helpful to know which chapters to read for information about the theory behind the exercises, cause this was not in the same order as the lectures. It was not very constructive to have all the three laboratory lectures in a row, and then have the last laboratory three weeks after. We should also have more time on the reports, not just one week. This semester we got the report back one day before the new had to be handed in, which made it difficult to fix errors about layout and language. However, the laboratory exercises were very interesting, dealt with several topics that's important in nanotechology, and it was much fun. I think it was good to have a focus on safety in the laboratory.
- Very good to get some practical work and it forces you to understand certain concepts, but the report writing takes a lot of time.

  Some of the not so good:
  -Short deadlines compared to the amount of work needed.
  -Very concentrated exercises (All three exercises in the span of three weeks, with one week to hand in the report afterwards, which leads to overlap between the exercises and the students not being able to finish the report before starting the next one.)
  -Lab lecture 1, 2 and 3 was held in the span of three lectures, all of them before starting lab 1.
  -Having the lab assistants doing all the measurements, which takes away some learning possibilities for the students.
  -The results from one exercise were handed out about a month after the exercise was conducted, making the deadline overlap with the exam period in other subjects.
  -The exercises took several hours more than stated, making planning hard and made people miss other lectures.

  Suggestions:
  -Have a lab lecure, then the exercise and a subsequent week-long break for writing the report before starting the next exercise.
  -Have the students taking a more active part in the measurements (if possible), under the supervision of the assistants.
- The theory behind the exerices were linked with the curriculum for this subject in a good way. They helped the understanding of how several analytical method worked. It also showed a larger sense of critical thinking when it comes to interpreting data, than I have experienced in other laboratory subjects.

  There are several disadvantages with the exercises as well:

  -I believe that the last exercise had too much workload. This is both compared to the other two exercises, and when keeping in mind that we have two other subjects, as well as lectures keep running in this subject. The coordination polymers had a lot of background theory, and

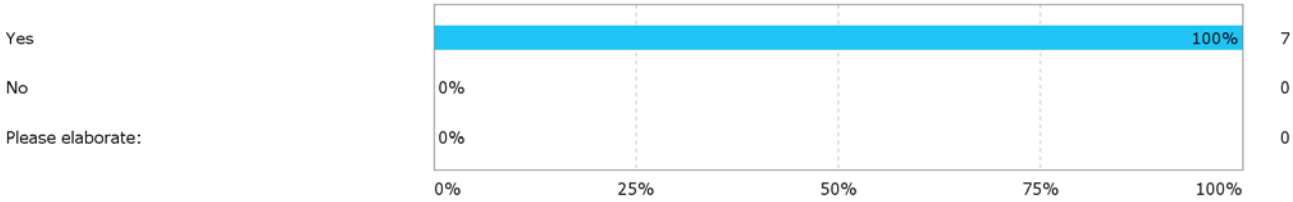
in my opinion it was required to present too much of this in the journal. For example did the journal questions specifically ask for two different acid-base definitions. Several analytical results were given; adsorption, x-ray and thermal analysis. Both adsorption analysis and thermal analysis were completely new tools for me and understanding and discussion of results took a lot of time for me. This was a major factor for why this exercise was separated from the two others.

- Another point worth noting is that good (i.e. easy to understand) literature doesn't really exist for most of the concepts behind these exercises. The lab exercises included several papers. The ferrofluid lab included the Adelman paper that worked well. For the silver nanoparticles the papers seemed a bit contradicting, and for the coordination polymers, the papers seemed hardly to be relevant for the exercise. Due to this, the student is forced to search for information online - and information found is usually scarce and hidden in lengthy scientific papers.

I would like to see more notes specifically tailored for the exercises in addition to the lab lectures. This could include more theory about what happens chemically in the synthesis. It could also present the different analytical methods, how to interpret data and what kind of results one can expect for different scenarios.

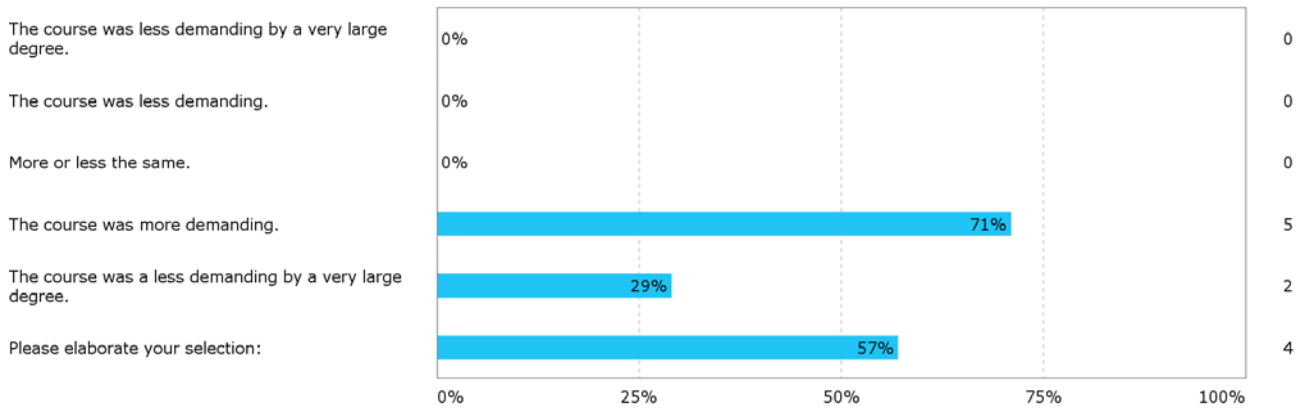
When asked, the lecturer held a 10 minute presentation on XRPD, which made more sense than hours of researching the subject online. A lecture dedicated to analysis techniques like this before the labs would have been very welcome.

Do you think the knowledge you learned in this course will be relevant to your further studies / thesis / research activities?



Do you think the knowledge you learned in this course will be relevant to your further studies / thesis / research activities? - Please elaborate:

How do you rate the work load of this course compared to your other classes?



How do you rate the work load of this course compared to your other classes? - Please elaborate your selection:

- It is more to learn and the things we are to learn are often more complex than in other courses.
- The course was a more demanding by a very large degree
- It was very very demanding due to the broad pensum
- Large and demanding curriculum.

If you wish to give additional feedback which is not covered by any of the other questions you can do so here:

- There was a long wait for the results of lab 3. I would have liked to have some information about when to expect them from the lab assistants regarding this.

  Lastly, I want to give some positive feedback to the main lecturer. He showed a great passion for the subject that spread among the students. He also showed a great deal of knowledge by answering questions relevantly in his stride. The blackboard was also used frequently, with good results.