

Kursanalys

<p>Kursens namn och kurskod:</p> <p>Advanced Organic Chemistry, KD2310</p>	<p>När kursen genomfördes :</p> <p>HT 2019, period 1</p>
<p>Kursansvarig:</p> <p>Markus Kärkäs (kursansvarig, examinator, föreläsare, övningsassistent, seminarie)</p>	<p>Övriga lärare i kursen:</p> <p>Peter Dinér (föreläsningar, seminarie)</p> <p>Helena Lundberg (föreläsningar, övningar)</p> <p>Anders Bøgevig, Chemnotia (ext. föreläsare)</p> <p>Daniel Petersson, AstraZeneca (ext. föreläsare)</p>
<p>Antal registrerade studenter:</p> <p>55 officiellt</p>	<p>Examinationsgrad efter 1a examinationstillfället:</p> <p>33 st A–E av 47 totalt = 70% av de som skrev tentan</p>
<p>Redogör för hur studenternas synpunkter på kursen har inhämtats (kursenkät, kursnämnd, annat), samt huvudsakliga synpunkter från studenterna:</p> <p>Studenternas synpunkter inhämtades genom en kursenkät som var uppdelad i två delar bestående av en del som innehöll frågor från LEQ och en del som innehöll mer kursspecifika frågor. 49% av studenterna (27 av 55) svarade på utvärderingen.</p> <p>2019: Från LEQ-utvärderingen kan man främst se att de frågor som resulterar i lägre poäng kommer från frågor som handlar om "I regularly spent time to reflect on what I learned", "I received regular feedback that helped me to see my progress" och "The intended learning outcomes helped me to understand what I was expected to achieve". Detta kan bero på att kursen inte innehåller någon laborativ del där studenterna får kontinuerlig feedback från labbassistenterna vad gäller labbjournaler och labbrapporter. Istället får studenterna feedback under övningarna då övningsledarna går runt till de enskilda studentgrupperna för att diskutera eventuella problem och hur man kan ta sig an de olika problemen. Användandet utav "collaborative learning" gör också att studenterna "tvingas" interagera med varandra, vilket är ett moment som annars sker under kurslabbarna.</p> <p>På den kursspecifika utvärderingen var det inget som stack ut i utvärderingen. Man kan som vanligt se att studenterna förbereder sig lite inför föreläsningarna och att få studenter kontinuerligt läser kurslitteraturen.</p> <p><i>2018: Överlag så visar LEQ-utvärderingen att studenterna är nöjda med upplägget på denna kurs. Jämfört med 2017 ser vi en klar förbättring av resultaten, både i LEQ och i den kursspecifika kursutvärderingen (se kursutvärdering nedan). De lägsta resultaten erhöles för punkter 1–5 i LEQ, men inget värde var oroväckande lågt. För att förbättra "The intended learning outcomes helped me to understand what I was expected to achieve" så kan man behöva poängtera kursmålen tydligare vid</i></p>	

kursstart, men eftersom målen ska skrivas om inför nästa termin är detta ett utmärkt tillfälle att förtydliga dessa.

I den kursspecifika utvärdering så har det också skett en generell förbättring i studenternas svar. Att kursen kunde drivas under mindre stressade förhållande än förgående var förmodligen en orsak till att kursen mottogs bättre. Mer specifikt kan man se att övningarna förbättrades mest, vilket beror på att Markus Kärkäs tagit över som övningsledare. Största skillnaden var att han införde "collaborative learning" (gruppsamarbete) som föll väldigt bra ut bland studenterna.

På det hela taget har det skett en förbättring av studenternas uppfattning och upplevelse av kursen.

Beskriv hur kursen har utvecklats från förra kurstillfället:

2019: Ny kursansvarig/examinator för i år var Markus Kärkäs. Antalet lärare på kursen reducerades från 8 till 5 stycken för att få en mer koherent kurs (3 föreläsare från Avdelningen för Organisk kemi + 2 externa föreläsare). Kursansvarig gav ca 30% (5 av 16 föreläsningar) medan Peter Dinér gav 30% och Helena Lundberg gav 25% av föreläsningarna. Kursansvarig och Helena Lundberg höll i alla övningarna.

Föreläsningen som behandlade radikalkemi (gavs av kursansvarig) gjordes om från scratch. Fokus för årets radikalföreläsning var att behandla koncept relaterade till radikalers stabilitet och reaktivitet, och användandet av radikaler i syntetisk organisk kemi.

Ett av "grön kemi" projekten byttes ut för att bättre tydliggöra "grön kemi" aspekten. Nytt för i år var också att varje grupp var tvungen att presentera en utvald mekanism som ingick i deras projekt. Detta för att bättre försöka knyta samman projektdelen med teoridelen.

2018: Förra året framkom en del synpunkter på att kursen var lite repetitiv (samma innehåll som KD1270), vilket främst berodde på kort förberedelsestid för kursansvarig/huvudlärare och begränsad tillgång till föregående års kursmaterial. Till detta år byttes enolatkemin ut mot en introduktion i övergångsmetallkemi, främst palladiumkemi inom organisk syntes, vilket fungerade bra och var ett steg mot mer modern organisk kemi. Vidare minskades antalet lärare på kursen (från 8 till 7) för att få en mer koherent kurs.

Nytt för i år var att Markus Kärkäs var övningsledare och höll i alla övningarna. Inspirerad av de diskussioner som förekommit på den pedagogiska kursen "Teaching and Learning in Higher Education" (LH231V) så bestämde sig Markus för att applicera konceptet "collaborative learning". Istället för att övningsledaren endast stod framför whiteboarden och löste uppgifter så delades studenterna in i grupper bestående av 4–5 personer. Grupperna fick sedan diskutera och arbeta med övningsuppgifterna medan övningsledaren gick runt och gav feedback till de enskilda grupperna. En student från varje grupp fick sedan komma fram till whiteboarden och presentera gruppens lösning på övningen/problemet varav övningsledaren gav ytterligare tips på hur man kan tänka för att lösa uppgiften. Från kursutvärderingen ("What was the best aspect of the course") kan man se att detta koncept var väldigt uppskattat av studenterna.

Synpunkter från övriga lärare:

Till materialet som handlade om stökiometriska reaktioner i fosforkemi (Mitsunobu och Staudinger) presenterades nyligen publicerade forskningsartiklar för att tydliggöra hur kunskap om klassiska reaktioner kan användas för att utveckla gröna katalytiska atom-effektiva varianter eller varianter av högsta relevans för exempelvis bio-applikationer. Detta uttryckte flera studenter att de uppskattade vid efterföljande föreläsning.

Förslag på förändringar till nästa omgång:

2019:

- Med avseende på det dåliga resultatet för tentafrågan som behandlade Hammett-parametrar bör man på ett bättre sätt inkludera uppgifter som relaterar till detta koncept (reaktionsmekanismer) i övningarna.
- Man kan också fundera på att ha flera mindre inlämningsuppgifter för varje övningstillfälle för att bättre täcka in det mångsidiga kursinnehållet.
- När det är tillämpligt kan man inkludera fler kopplingar av materialet till modern kemi, exempelvis utvecklingen av katalytiska versioner av stökiometriska reaktioner, för att tydliggöra hur kunskap om grundläggande organisk kemi är användbar i utvecklingen av nya syntetiska applikationer.

2018:

- *Från kursutvärderingen kan man se att uppgifter som relaterar till radikalkemi och Hammett-parametrar bör inkluderas (bättre) i övningarna. Denna modifikation diskuterades mellan övningsledaren och kursansvarig redan innan kursutvärderingen gjordes. För att förbättra detta "glapp" så bör man också modifiera föreläsningmaterialet om radikalkemi så att fokus ligger på syntetisk organisk kemi.*
- *Eftersom avdelningen för organisk kemi under de senaste åren haft få undervisande lärare så har avdelningen tvingats använda sig av ett flertal lärare (7-8 st). Förhoppningsvis kommer avdelningen för organisk kemi få in ett antal unga forskare/gruppledare som är villiga att undervisa inom en snar framtid vilket kommer göra det lättare att ha lärarträffar för att diskutera och möjliggöra en mer koherent presentation av föreläsningmaterialet.*
- *Modifiera ett av "grön kemi" projekten för att tydliggöra "grön kemi" aspekten. Man bör också förlänga presentationstiden vilket underlättar/förbättrar efterföljande kemidiskussioner.*

Har denna kurs lärandemål inom området miljö och hållbar utveckling (JA)?

JA. Grön kemi (Hållbar kemi) behandlas på en av föreläsningarna av extern föreläsare samt i projektdelen av kursen (se nedan).

I sådana fall, hur examineras dessa?

I projektdelen av kursen (1,5 hp) ska studenterna i grupp analysera hur "gröna" (hållbara) synteserna av olika läkemedelssubstanser är med avseende på E-värde, hälsorisker, och energieffektivitet. Resultatet av deras analys presenteras muntligt vid ett halvklass-seminarie.

Övrigt

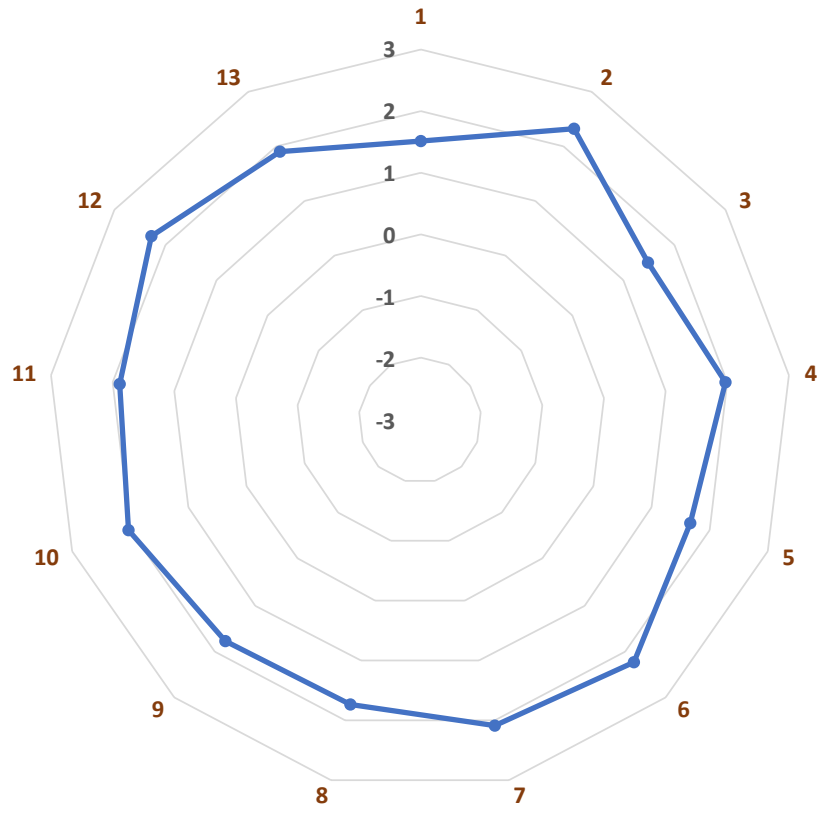
Kursutvärdering

Learning experience questionnaire (LEQ)

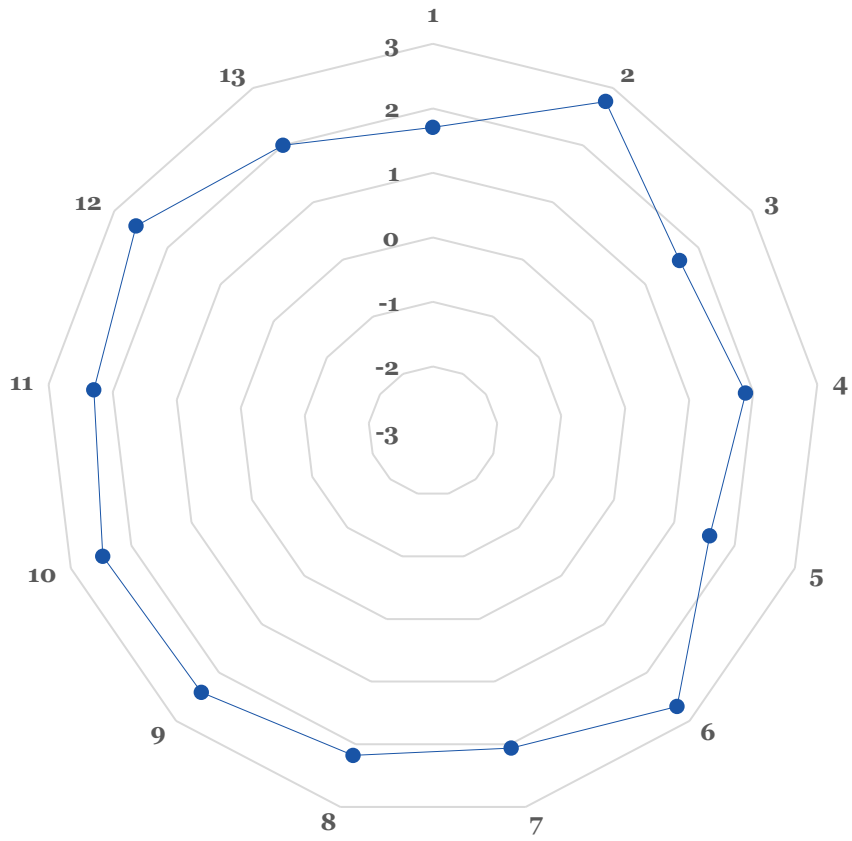
(Skala: -3: tar helt avstånd från påståendet... 0: neutral till påståendet... +3: instämmer helt med påståendet)

- 1** The intended learning outcomes helped me to understand what I was expected to achieve
- 2** I worked with interesting and engaging issues
- 3** I regularly spent time to reflect on what I learned
- 4** My background knowledge was sufficient to follow the course
- 5** I received regular feedback that helped me to see my progress
- 6** The course was challenging in a stimulating way
- 7** I understood what the teachers were talking about
- 8** Understanding of key concepts had high priority
- 9** The course activities helped me to achieve the intended learning outcomes efficiently:
- 10** I was able to learn by collaborating and discussing with others
- 11** I was able to learn in a way that suited me
- 12** I understood how the course was organized and what I was expected to do
- 13** I was able to learn from concrete examples that I could relate to

2019



2018



143051:
General questions

What was the best aspect of the course?

Systematic approach, following the course material closely.
Exercises.

The professors in general were very good, and they were approachable to ask questions.

Close relation to working life and examples of syntheses were "real"

The lecture slides were well organised and represented well what was expected to know

Learning "name reactions" designed to overcome particular obstacles encountered in earlier courses, at least when there is a clear physical argument on why it works.

Green chemistry

Jag tycker att alla föreläsningarna var jättebra, väl förberedda och presenterade!

I liked the structure of the exercises, where one could work together on the problems and get help at the same time.

The green chemistry was interesting and I enjoyed the practical pharmaceutical examples.

Close discussion with the lecturer and guidance before the exam.

The textbook selection was extraordinary and comfortable for even a beginner in Organic Chemistry like me.

Approachable teachers.

I learned many new ideas and conventions used in Organic Chemistry.

I can learn many interesting things that I want to learn.

The course was well-organized. Even if I took the related courses in my previous university. 3 years ago. I got used to schedule and everything easily.

Really interesting to bring up how reaction mechanisms are determined, always been wondering about that (and asked without satisfying answers in previous courses :P).

Very nice with the hand in-questions, good practice.

Nice atmosphere, very friendly lecturers!

The lectures held by Helena Lundberg.

The exercise sessions were challenging, but you learnt a lot.

The exercises

Good, informative, structured and generally pedagogical lectures which made it easy to learn the material.

Exercises and the number of examples available on canvas for practicing and mastering problem solving was excel!

The lectures were really good.

For the most part, the lecture were really good. All three lecturers were engaging and were good at explaining new concepts.

The enthusiasm of the lecturers and the clarity of their explanation

It's unusual, people can discuss deeper into it.

Regular exercise sessions. Easy contact and possibility to exchange with both teachers and students

All teachers very helping and with very good communication skills. I am very thankful and satisfied.

143052:

What would you suggest to improve?

More variability in projects (only medicinal now)

Shorter exam

Connect to research frontiers.

Provide an overview/list of important reagents (and perhaps reactions as well)

I felt that the exercises from the workshop were not that good in terms of preparing for the exam.

Excercise sessions don't have to be done a group

Please don't answer "you're supposed to know this" when someone asks a question about something that's been covered in earlier courses. It makes us feel dumb and heightens the threshold for asking questions at all.

Maybe to make the students learn to draw mechanisms better. A general way of thinking of the mechanisms.

I wanted to do some experiment.

The green chemistry project, it was not that interesting

Maybe provide a summary of several exercises, which one can use to study the mechanisms. Because if every exercise has only one example of one mechanism, it is hard to learn how it can be applied in different situations

The exam was a bit to long and intense, so maybe a pre exam/KS would help to cover on part of the course already before the exam.

In the exam, there was a question (I think it was number 7) which had a lot of point, and all the questions were correlated to the first part of the question. If one does not get the first part (the intermediate 1), the hole question is hard to handle. Maybe include a small part were one can get back on track and does not lose so much points.

Being able to bring in even just a single page of notes would have greatly helped. This course had so many mechanisms to learn and memorise and forgetting one simple thing resulted in losing many marks in the exam. Realistically Chemists are able to consult the internet, textbooks and articles to perform synthesis questions. Mechanisms are some of the hardest things to learn in Chemistry and a little bit of help would have made exam time so much less stressful. Also, the subject is so dense and the exam barely covers it all. A little more direction about what to study might have been helpful.

The questions in exercises can be more close to the ones in the exams.

For those students who lack sufficient background in Organic Chemistry, the teachers can give cheatsheets/study materials, so that the students can get a background at the start of the course and have engaging participation in the later classes during the course. It is not very useful to only mention the chapters in the textbook which were covered in the earlier courses.

Some of the solutions for the exercises are not legible. The teachers may kindly look upon, in case multiple students have reported the same.

Sorry, I don't know.

Some sort of KS, it was really a lot to learn and difficult to process. KS would help to portion it study wise.

I fully understand why you want to include group work (the project), but if you knew how much more stressful it is to create something as a group (socially, since you have to coordinate several opinions and are responsible not only for yourself but will cause other people problem in case you fail your part) compared to the positive outcomes I don't think you would have it in the course. Especially since this course is already heavy on its own.

The amount of course material felt huge and sometimes rather scattered (kinetics AND exploring mechanisms AND green chemistry AND NGP AND synthesis of N-compounds AND heteroatoms AND pericyclic chemistry AND olefination AND etc.). This led to just smashing in a lot of information and didn't give much time to actual understanding and investigation of the subject by my own, so

unfortunately I didn't find the course as interesting as I could have felt. Maybe cut some parts out? For the exercises I think working 15 min with a problem, then having a teacher going through is the best. It makes me give a very serious try for every question and I also get help when the confusion is fresh. I don't want to be mean to my fellows, but having a nervous and/or confused student explaining something already complicated isn't the most helpful.

That the intended learning outcomes could be evaluated during the course through "kontrollskrivningar" or smaller tests, in which some elements are tested. An exam for 6 h is too long. It's not productive and students get exhausted.

A small book with exercises where you practice the same reaction type several times in order to understand and remember the mechanism would be beneficial. There are not enough assignments in which the same concept can be practised over and over again.

More exercises that exemplifies the theory! A small booklet with several examples on different levels would be highly appreciated. Also, I don't think the exam reflected the course in a good way, which I was very upset about.

Easier, but more hand-in questions for each exercise, covering a broader span of each chapter

Exercise assignments more similar to the exam questions. The exam felt way more difficult than the problems we practiced to solve together.

I found the information regarding the project to be a bit scattered and confusing. Would have liked to see it collected and a bit more organized.

The exercises could be more organized. It would be interesting to hear more discussion from the teachers, since it feels like we are always guessing. Maybe start the lecture with some example that brings up a key concept and let us discuss it, instead of the presentation at the end of the exercise.

The course is very big and it was difficult to understand which concepts were the most important, and I felt that the exam did not really reflect what was communicated during the course.

I liked the exercise sessions for the most part, but perhaps it would be could to have a little more explaining of important aspects of what to consider when solving problems for each section of the course either at the end or at the beginning of the exercise session.

It would be good to get a little more instructions regarding what is expected from us in the green chemistry project.

Perhaps slowing down the speed of the lecture

So far so

Have the home assignments back with mistakes "highlighted"

143053:

What advice would you like to give to future participants?

Study old exams, they are much harder than the exercises.

You need to study regularly, and you should solve the exercises before the workshops!

Repeat organic chemistry 2

Don't spend a lot of time reading the course book, read it if necessary as a complement to the lectures

Realize that the course has a lot of content, easily 300 topics depending on how you see it. The exams is only 9 questions so you better feel familiar with most of the topics covered to be sure.

Go on everything and learn to draw mechanisms

Join exercise part!! That's good chance of output.

Var med på föreläsningarna och övningarna.

Do the hand in questions for the exercises they are really helpful!

Try to do a recap from organic chemistry 1&2 before you start the course

The pharmaceutical lectures, while interesting were not assessed, so focus more on mechanisms only.

Concepts are as important as the mechanisms and equations. Do not ignore them.

Start studying from the start of the course.

Use exercise sessions wisely. It is better to solve the problems at home and then come to the session to solve the queries/doubts with friends/teachers.

The teachers are very friendly and approachable. Try to get all your doubts cleared by them.

Have fun and get progress every day.

I would like to recommend that if they repeat what they learn in the lecture several times, they will digest all the concepts better. The reason is that there are a lot of mechanism and reactions and it is not easy to remember all of them.

Learn. Learn A LOT. Because the course will cover A LOT. And you will be expected to know A LOT.

Be prepared that there is a lot of mechanisms and very much information that you need to remember.

Try to plan ahead and do not have too much on your plate while taking the course.

Start going through the theory/different reactions as soon as you learn them in class! It will help you a lot.

Put a lot of effort into understanding each mechanism

Look at the old exams when studying for the exam, and do so maybe a month before hand (rather than a week...) so you know what you're up for. It does not look like the exams for OK1 or 2

Practice until you think you've got the hang of each new concept, then practice some more! Work on the exercises and don't be afraid to get it wrong. It's a great way for both memorizing and understanding the different concepts.

Work continuously during the period!

Keep up with the course content as much as possible! It is a lot better to understand the mechanisms and at least some of the exercises for each section of the course before the exam period than trying to learn everything at the end.

Practice makes perfect

Have some background knowledge will be helpful.

Take time to solve the exercises

143054:

Is there anything else you would like to add?

Teachers are nice and helpful.
Course content is a little tedious.

Would be nice to have more problems to practise on
It's a bit surreal taking a organic chemistry course without having any labs. I assume there are good reason for there being no labs in the course, but it sure feels reassuring seeing some of the concepts actually work in practice.

Nothing.

I liked the course in general!

The teachers may consider asking questions from all the topics. Green Chemistry/Medicinal Chemistry topic was missed out in the final exam.

It is hard for me to learn many things in a short 10 weeks. I am a student who is often work bad in the beginning of the term. I need to warm up for a long time for some reason. I like to study 4 courses in 20 weeks than 2 course in 10 weeks and 2 course in 10 weeks.

It is a very nice course, hope you don't get shocked by all my improvement suggestions.

I felt that the exercises were an excellent idea, however I felt that the level was so high on many questions that, without a lecturers help, I would not have been able to solve them in a group in 2 hours

Overall an interesting course with dedicated and knowledgeable teachers!

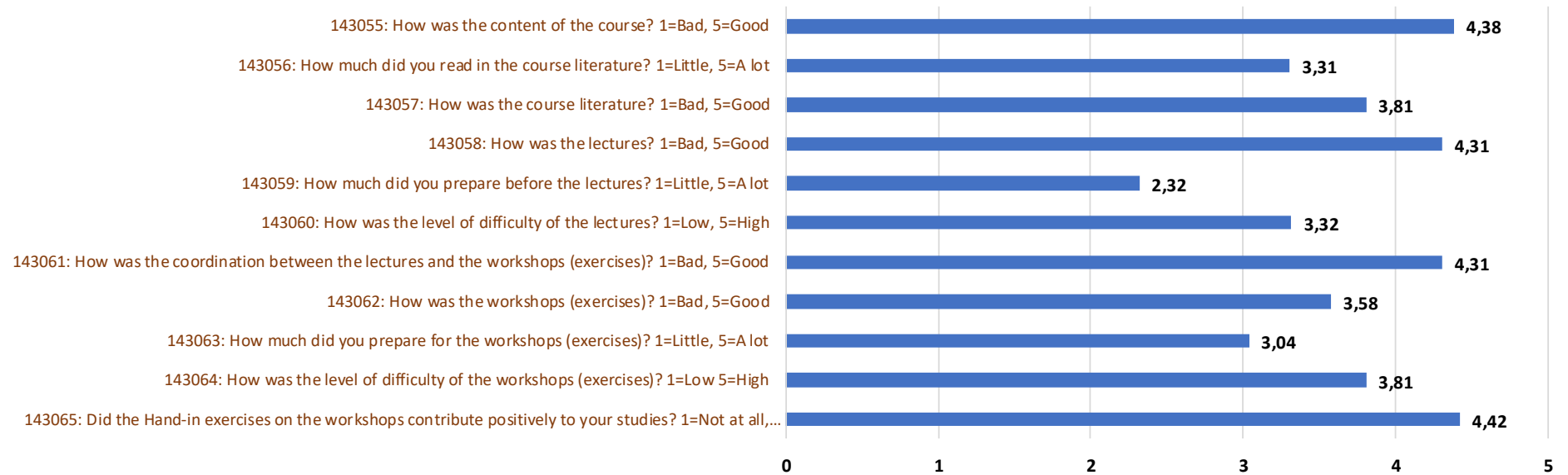
Very interesting course over all. I was a bit sad over all the Grignard reactions on the exam though.

Nil

Advanced result discussion. (About newest advancement on these issues)

Course specific evaluation

2019



2018



143066:

Other comments and suggestions for improvement of the course are welcomed!
Lectures

Good lecture notes from Markus and Helena! Peter's were also good but sometimes a bit hard to understand afterwards

I think all the three main lecturers was good and I did not have a problem to be attentive. The speed of the lectures varied a lot with the person who was lecturing. Some lecturers always ended early, while others did not have time to cover all the slides. I guess this is a problem that will smooth itself out with experience.

I wish the exercises were lead more by the teachers, and less by the students. It can get quite confusing and not very helpful.

I consider the teachers can teach us how to think and solve the prombles in the lecture course. I don't want him or her only give me fish but not teach me how to fish.

More mechanisms on the board

Would have liked that a slide with full mechanisms was included in lecture slides e.g. Peter's digitally drawn slides

Really good lectures!

Nil

So far so good.

143067:

**Other comments and suggestions for improvement of the course are welcomed!
Workshops (Exercises)**

Excercises 3 and 4 had wrong chapters indicated to read for preparations, seems like you have mixed up 3 and 4. It should be the other way around

It is very personal, but I really don't enjoy tackling new concepts in limited time with people I don't know. I stopped going to the exercises.

Jag tycker det var svårt att lära mig från presentationerna av uppgifterna.

Det kanske kan vara bra att ge varje grupp ett tidsintervall för presentationen. T.ex. 5 min per uppgift så slipper grupperna stressa igenom sina presentationer. (många blir nervösa och stressade när de ska presentera "oförberett")

I liked the level of difficulty for the hand in questions, they were a bit challenging and not too easy but still not impossible to solve so that was good.

I want to have more workshops courses.

See above

An exercise book with "easier" exercises where you just test if you get the overall concepts first. The exercise questions explain a lot of exceptions, which is good! But the students still need to be able to test the fundamental concept.

Once again, felt that the level was a bit high for many of the problems. I did however feel that the level of freedom around attending/handing in and the amount of help offered was excellent

More exam-like reaction mechanism/reagent questions

I liked the exercise sessions for the most part, but perhaps it would be good to have a little more explaining of important aspects of what to consider when solving problems for each section of the course either at the end or at the beginning of the exercise session.

Nil

So far so

143068:

**Other comments and suggestions for improvement of the course are welcomed!
Green Chemistry Project**

It was nice to compare efficiency of synthesis routes but I felt it was a bit unclear how big the scope of the project was. Were we supposed to find or come up with routes beyond the ones references in the assignment? Were we supposed to propose a solution to weaknesses or just identify them?

Intressant och lärorikt projekt. Även kul att höra allas presentationer.
could be done more interesting, dont know exactly how

Considering the difficulty of the course, bonus points may be given for the project too.
Green chemistry is good program, it made me know the importance to cooperate between the environment and chemistry.

See previous comment (make it individual or work in pairs, group work makes me feel more exhausted compared to any other activity and yet I don't find it difficult)

well put together, relevant and felt help was available at all times.

The groups were too big (5-6 people) for the size of the project. I would suggest making groups of max 3 people and maybe finding a way of making the seminar a time for discussion. The other groups presentations were impossible to understand, not having read the articles beforehand.

It would be good to get a little more instructions regarding what is expected from us in the green chemistry project. Should we look at every step of the synthesis or have a more general picture?

Nil

So far so good.

143069:

Other comments and suggestions for improvement of the course are welcomed!
Anything else

Overall, I really enjoyed the course and I seriously consider taking Selective Organic Synthesis next year.

Jag tycker att övningsuppgifterna var väldigt bra och lärorika. Det hade varit bra om det också fanns uppgifter med flera steg involverad olika reaktioner (någolunda motsvarande sista uppgiften på tentan).
see above

I like to study here, because I can see I am making progresses every day.

Thank you for an interesting course! The different sections of the course are not very related, which makes it harder to get a good full picture of the course and what is expected of us. Therefore, it would perhaps be good to have a list of reactions and important concepts to learn at the end of each lecture (or even better: summarized in one document).

Nil

So far so good.