Evalation report 2019 autumn

Course code: KJEM221

KJEM221 (Basic quantum mechanics)

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Faglærers vurdering av gjennomføring/*lecturers assessment of implementation*:

Kjem 221 consisted of 15 weeks of 2*2 hours of lecture and 2 hours of guided pen and paper computational exercises.

Praktisk gjennomføring/*practical implementation*

The lectures took place on Wednesday (10-12) and Friday (12-14). The excercises took place on Friday (14-16). Perhaps it is good that the exercises are moved to a different day, i.e. Monday, Tuesday or Thursday.

Strykprosent og frafall/*failure rate and loss of students*

There was one exam on 04.12.2019. Out of approximately 30 students, 16 students registered and qualified for that exam. 11 students passed the exam.

This report does not include the results of the second exam, which will take place on 10.02.2020.

Karakterfordeling/*grade distribution*

There were one A, one B, three Cs, four Ds, two Es, and five Fs.

Studieinformasjon og dokumentasjon/*information of studies and documentation*

Tilgang til relevant litteratur/*access to relevant literature*

The book entitled “Molecular Quantum Mechanics” by Atkins and Friedman was used in tis fifth edition. This book is a standard in the field.

Faglærers vurdering av rammevilkårene/*lecturers assessment of frame terms*

Lokaler og undervisningsutstyr/*locals and teaching equipment*

The course was held in the sp2 seminar room, realfagbygget, Allégaten 41. The main teaching tools were the blackboard and presentation slides using the present IT equipment in the seminar room. The exercises were held in the same seminar room.

Andre forhold/*other conditions*

Faglærers kommentar til student-evalueringen(e)/*lecturers comments to student evaluation*

Metode – gjennomføring/*method – implementation*

The commented on the computational exercises that it was a good idea to have a former course participant as an assistant. They commented however, that fewer and somewhat larger exercises were perhaps more efficient instead of weekly, smaller exercises.

Oppsummering av innspill/*summary of input*

The students commented that the course was too demanding. The course curriculum presented the student with entirely new material, to which they could not relate from before. The overall message from the students was that the work for the course was too much work for the 10.0 ECTS credits.

Ev. underveistiltak/*eventual underway measures*

Faglærers samlede vurdering, inkl. forslag til forbedringstiltak/*lecturers overall assessment, incuding suggestions for improvement measures*

The following measures are proposed to improve the course for the future:

1. The curriculum could be adapted:
    a. The course linear algebra (MAT121 or equivalent) should be compulsory for the students before taking KJEM 221.
    b. The course material presently covers roughly the following areas:
        i. Introduction
        ii. Particle in a box
        iii. Hydrogen atom
        iv. Angular momentum
        v. Point group theory
        vi. Hückel and perturbation approximations

    The course material for these areas could be made less dense, i.e. be less detailed in the points above, especially when it comes to the intermediate systems like particles on disks, because they have no relevance in chemistry. Similarly, the angular momentum chapter is too detailed. A point of reform could be to add the following areas:

        i. Gaussian and Slater basis functions
        ii. Self-consistent field method (Hartree-Fock).

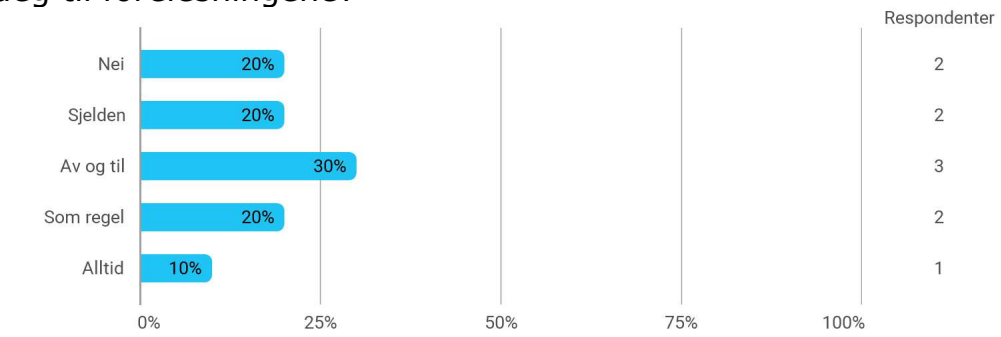
2. The computational exercises could be reformed:
    a. Four pen-and-paper exercises with fewer, larger problems. Examples could be: Introduction, Particle in a box, hydrogen atom, angular momentum, harmonic oscillator, among others.
    b. Three easy to medium-level programming exercises. Examples could be:
        i. Plotting particle in a box eigenfunctions in one and two dimensions. Introducing simple perturbations and computing the perturbed energies/wavefunctions. Span: Two weeks (2 hours each in computer room, rest at home on personal laptop)
        ii. Simple Hartree-Fock computations with subtasks of computing energy values depending on basis sets, computing the density, restricted and unrestricted calculations, and elementary perturbation theory computations. Span: Four weeks.
    c. The students would have to pass three pen-and-paper exercises and all programming exercises to qualify for the exam.

d. The recommended programming language is python. Python and numerical methods (numpy library, scipy library) would have to be known by the students.
e. The method of assessment is unchanged for the pen-and-paper exercises.
f. The method of assessment for the python scripts is assessed by turning in functional code that gives numerical output. The codes are reviewed and checked for plagiarism. As an alternative, group-work could be allowed, i.e. several students could work on the same code.

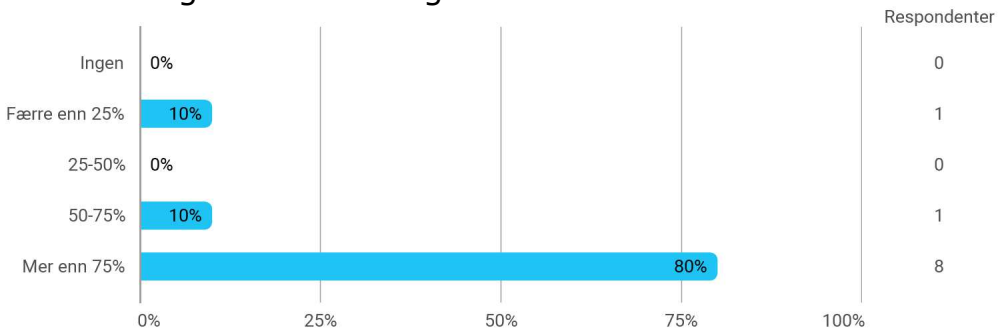
The proposed reforms would lead to a slight reduction in terms of exercise-related coursework for the students and introduce a programming component. A previous knowledge of linear algebra and programming (python) is required for this reform to work. This could be done by making a linear algebra course (MAT 121 or equivalent) and a programming course mandatory before taking KJEM221, making the material easier to understand for the students.

FORELESNINGER

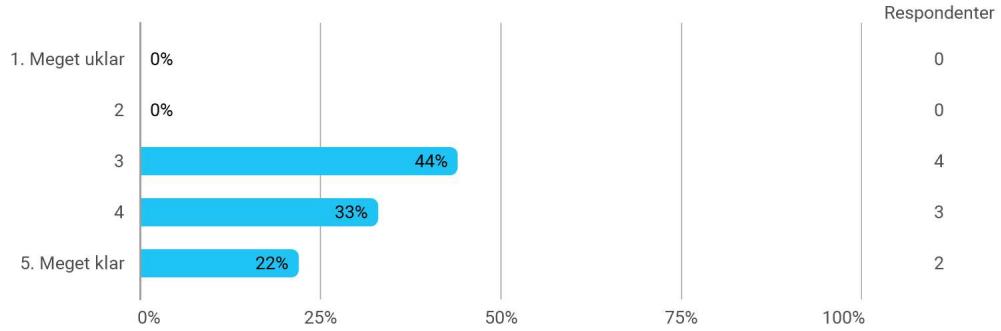
Har du forberedt deg til forelesningene?



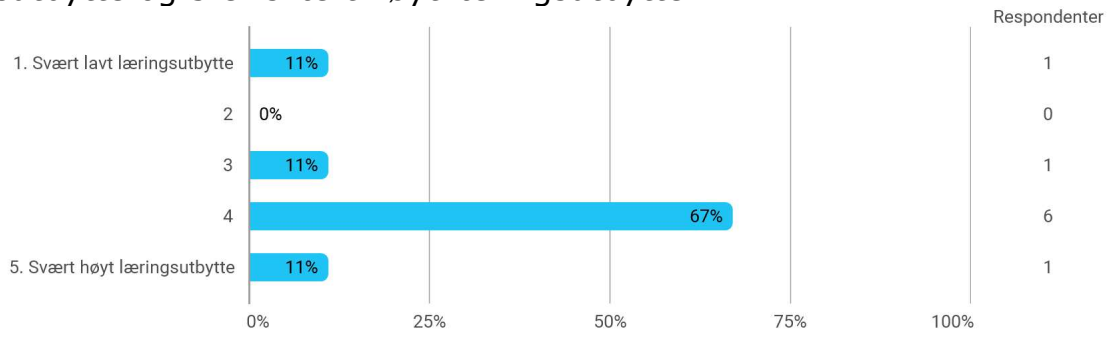
Hvor stor andel av forelesningene har du fulgt?



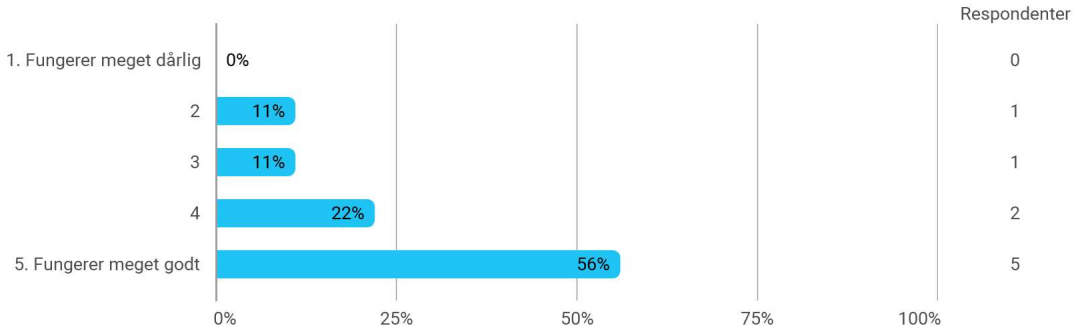
Klarhet i forelesers fremstilling av stoffet. 1 til 5, der 1 er meget uklar og 5 er meget klar.



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

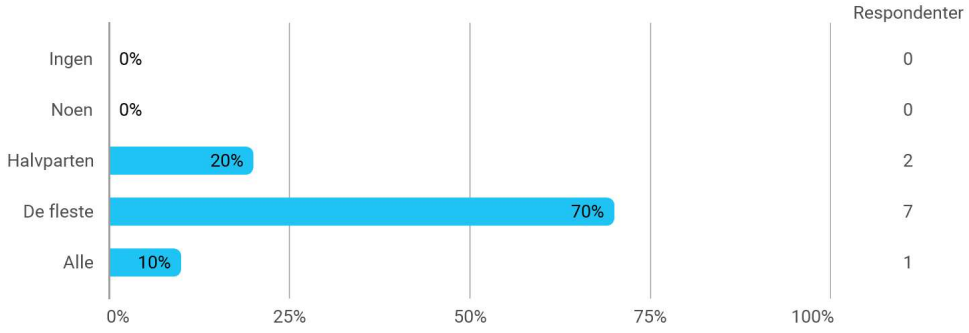


Hva synes du om bruk av tavle som hjelpemiddel i dette emnet? 1 til 5, der 1 er "Fungerer meget dårlig" og 5 er "Fungerer meget godt".

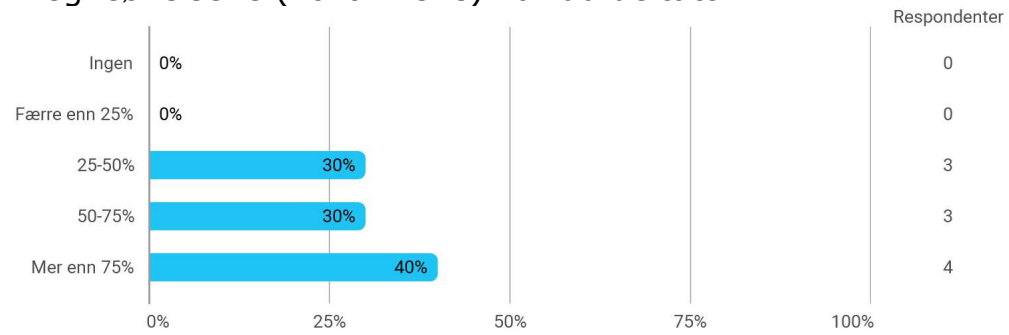


REGNEØVELSER

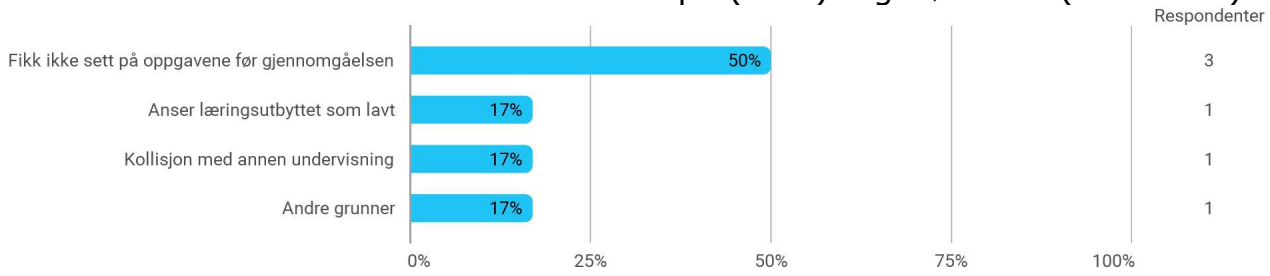
Hvor stor andel av regneoppgavene (kollokvieoppgavene) har du gått gjennom på egenhånd?



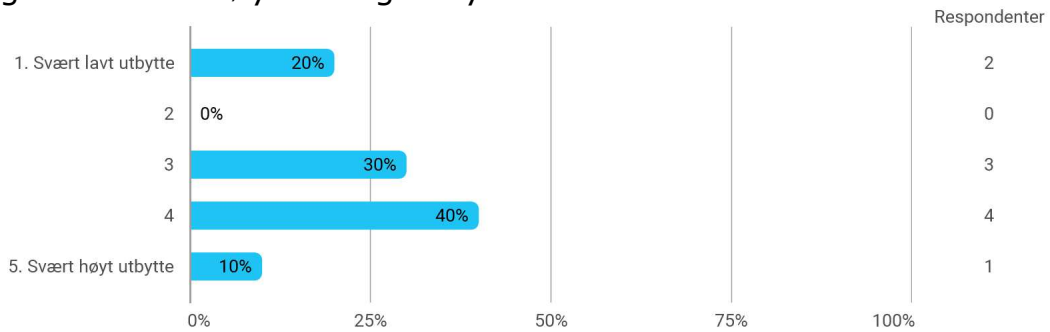
Hvor stor andel av regneøvelsene (kollokviene) har du deltatt i?



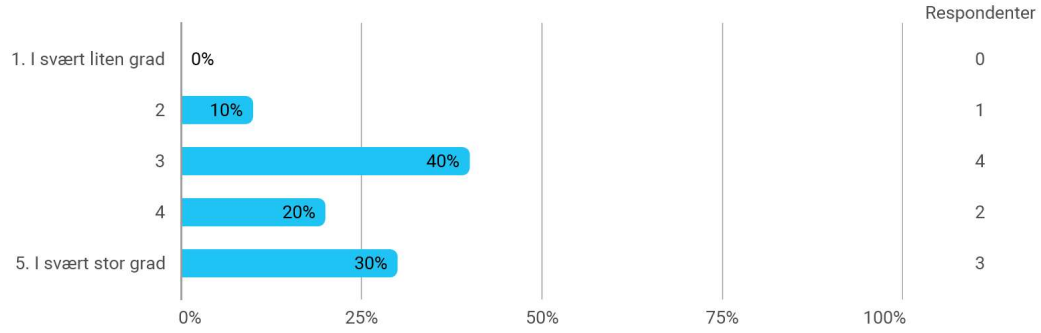
Hva var hovedårsaken til at du ikke deltok på (flere) regneøvelser (kollokvier)?



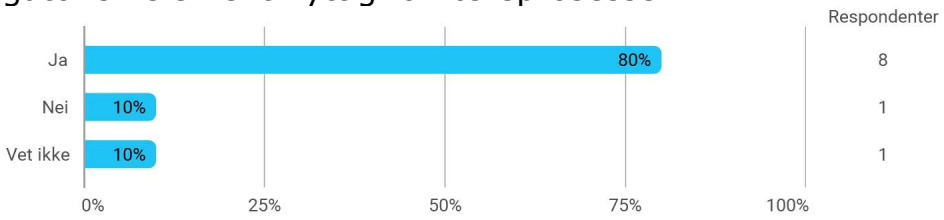
Hvordan har læringsutbyttet av regneøvlsene (kollokviene) vært? 1 til 5, der 1 er svært lavt og 5 er svært høyt læringsutbytte.



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

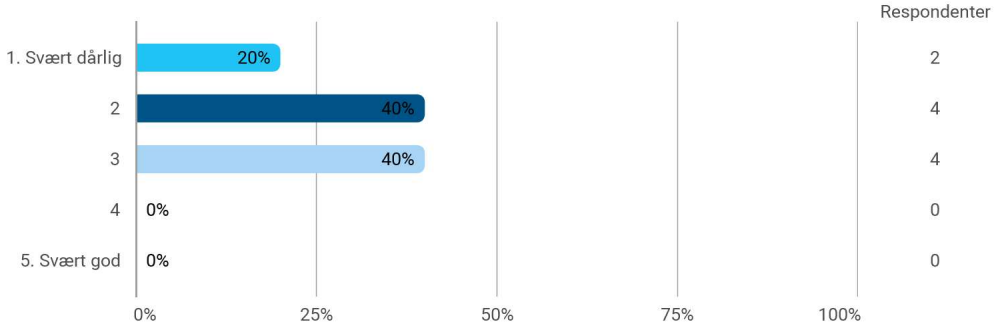


Vi har hatt obligatorisk besvarelse av minst 6 kollokvieoppgavesett i løpet av kurset. Er et slikt obligatorisk element nyttig for læreprosessen?

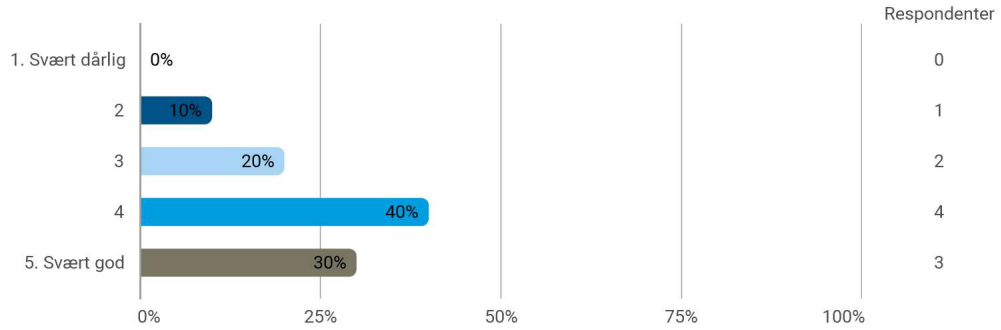


LETT BLANDING

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 tilsvarer?