3-årig emneevaluering

Emne: GEOV219

Semester og år for gjennomført emneevaluering: V2020

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Innhold

1. **Beskriv og begrunn pedagogiske valg i emnet, reflektér over studentens læring som følge av disse valgene.**

GEOV219, Computational Methods in Solid Earth Physics, was taught for the last time in the spring of 2020. Only 4 students took the course in that semester: two master students, one PhD student and one exchange student.

GEOV219, as usual, consisted of two related parts: programming for geophysicists (in which it is a optional sequel to GEOV112) and a literature or research project on a topic in computational geophysics. The first part lasts about 9 weeks. The second part lasts about three weeks.

Both parts were taught using active learning techniques (as described in our EOS paper 'Resources for Computational Geophysics Courses' that appeared in 2014). We believe that this is very appropriate for a practical course that involves computer programming as well as a literature/research project and is the best way for the students to master these topics, which typically are considered to be quite difficult.

The programming part of the course started with a review of GEOV112 and then moved on to introduce to the students various programming topics that are important in geophysics and that, very often, they use in their master thesis research: ray tracing, waveform modeling and signal processing. The students finished 6 exercise sets on these topics.

For the literature and research projects the students chose topics in computational geophysics that were of interest to them. The topics of the projects varied significantly. Two of the projects were a literature project with titles 'Electrical Resistivity Tomography on Volcanoes' and 'Detection of Seafloor Massive Sulfide Deposits using Self Potential Method'. The other two projects were research projects. The titles of these projects were 'Ocean Acoustics for Climate Monitoring: A Study of the Fram Strait' and 'AVO Modeling in Anisotropic Media'. All papers were interesting and well written and presented. We believe that also this part of the course is very useful for students when doing their master or PhD thesis research, including the write-up and presentation.

In order to prepare the students for the literature/research project we spent quite some

time outlining to the students how to do such a project and how to write and present a paper. We used a rubric to grade the students' paper and presentation.

During the first 6 weeks of the semester GEOV219 was taught in the normal way. During the remaining 6 weeks GEOV219 had to be taught online, because of the Corona related lockdown. This meant that part of the programming part of the course as well as the literature and research project had to be taught online. This was not ideal but we believe that, under the circumstances, everything went well and that the student learning outcomes were not negatively affected by the lockdown.

This was the 10th and last time that GEOV219 was taught. The content of GEOV219 will to a large extend transferred to GEOV265 (Global and Applied Geophysics), a new mandatory course for geophysics Bachelor students, and GEOV277 (Signal processing and Inversion in the Earth Sciences). GEOV265 will contain the programming part of GEOV219, except for the signal analysis, which is part of GEOV277. GEOV265 has a literature project and GEOV277 since 3 years also has had a literature/research project.

2. **Oppfølging av tidligere evalueringer** - In GEOV219 in 2019 two points were brought up by the students: the relatively long time it took for feedback on the exercises and the lack of reading material. The first point was addressed in the course and the students received the exercises back within one week of handing them in. The second point was only partly addressed as work on reading material (i.e. a book) is still work in progress. However, some reading material was provided to the students and no complaints were received regarding this point.

3. **Studentevaluering og andre evalueringer som er relevante for emnet**

We asked the students what they thought about the course and this is what they wrote:

Student Evaluation GEOV219 Spring semester 2020

Lectures:

We really enjoyed GEOV219. During the course, we were encouraged to work together as a group and interact with each other. This provided an including study environment, and we think that is an excellent way of learning. During the course, we were asked to give small presentations and present exercises. This was a good experience for both presenters and listeners for several reasons. We were able to share thoughts and ideas around the exercises, which promotes learning, and we got more experience with giving presentations in front of a crowd in a low key setting. The course was well adapted to the Covid-19 health crisis, and the video lectures were great. The lectures were clear and provided with good explanations.

The only thing that we think could have been improved is a clearer syllabus for the course. We know that a syllabus is in the making, but temporary power points would

have made the lectures easier to follow. The need for a proper syllabus is especially important if a student can not attend. The student is then able to keep up with the ongoing topics and not fall behind.

Exercises:

We liked the exercises because they were applied to real situations of earth sciences. The exercises provided a good baseline for the research projects, and we all learned a lot during the course. Both lecturers and teaching assistants were very available for us students as we worked with the exercises. The level of the exercises was as expected, as they were neither too easy nor too difficult. However, some parts of the course were a bit overwhelming due to the amount of work with the exercises, especially in the first two months. Most of the exercises were concrete, but some were challenging to interpret and lead to some confusion. We highlighted these exercises during the course.

Project:

The project we did was an excellent opportunity for us to learn to be independent scientists, at the same time as we received good follow-up by the lecturers. This gave us motivation and a feeling of mastery in the course of geophysics. The project's workflow was not always consistent with the given guidelines (maximum pages), which was a bit confusing.

4. Erfaringer fra andre som bidrar i undervisningen på emnet, både studenter og ansatte

Two teaching assistants (TAs) helped out with the course. Both TAs were very positive about the course.

The feedback from the first teaching assistant is:

As GeoV219 is a while ago now, I have to admit that I might have forgotten about some of the details there. But here is what I remember:

1. I found the communication/interaction with the students extremely pleasant and it went really smooth in the sense that all students managed to come to see me/send me a message whenever they had questions/trouble to solve any of the exercises, which is something that I did not experience all that often in the other courses where I was "TAing" (That said, I knew almost all of the students pretty well and it was a small circle, so people tend to be less shy).

2. Also in 219, I did not have the feeling that remote teaching had such a big (negative) impact - but again this may be due to the low number of students, which made it easier to follow up on every single student.

3. I believe that the communication between us (i.e., the TAs and teachers) worked quite well. There were no troubles with organisation / planning that I could recall.

All in all, I really enjoyed TAing in 219 that year as it was a very pleasant and intimate atmosphere!

The feedback from the second teaching assistant is:

It was such an amazing experience to be a teaching assistant in the GEOV 219 course.

Regarding communication with the teachers, it was really easy to get a lot of information about teaching as well as solving the exercises. When it comes to communication with the students, I found it a bit difficult at the beginning since the exercise sessions were held online. However, it went smoothly afterward.

I think that the content of the exercises was engaging. The student got a good knowledge about solving scientific problems in geophysics. Additionally, they improved their programming skills, specifically in Matlab.

The workload during the GEOV 219 was quite reasonable. The students managed to solve these exercises within the time window. Furthermore, they were able to perform very well in solving the exercises, which is evident by their grades. Consequently, this suggests that more exercises could be included in the GEOV 219 course.

5. **Strykprosenten på emnet** - 0%

6. **Eventuell fagfellevurdering** – Not applicable.

7. **Vurdering av samsvar mellom emnets læringsutbyttebeskrivelse og undervisnings-, lærings- og vurderingsformer -** We believe that the active learning methods match the learning outcomes of the course. See also above.

8. **Vurdering av om framdrift og opplegg for emnet er i samsvar med de fastsatte målene for emne og program -** See above.

9. **I de tilfellene det er tilknyttet praksis eller arbeidsrelevans i emnet, skal det evalueres om ordningen fungerer tilfredsstillende.** - Not applicable