ATLAS

EduCo Semester Documentation

Semester 4, 2016/17,
Class of 2018

Stef Koenis, Leron Kok, Frank Kwakkelaar, Tim Roelofs,
Kamiel Verhelst
February 2017 – June 2017

Introduction

This EduCo semester documentation consists of the evaluations of the courses, the project and the semester as a whole. All the evaluations have a similar structure: first, a short summary of the course/project/semester is given, followed by a discussion based on the results of the EduCo semester survey - which is based on the "EduCo criteria". In this discussion, the strengths and weaknesses of a course/project/semester will be pointed out. Then, solutions to these problems are suggested and in the last section, the agreements that were made with the teacher/coordinator are described. For the semester survey results, the results are shown in a 1-5 scale.

Table of contents

Semester

created by: Frank Kwakkelaar

e-mail: F.kwakkelaar@gmail.com

year/semester: Semester 4, 2017, class of 2018

semester coordinators: Wessel Wits

Summary of the semester

Semester four's theme was having students shape their expertise. This was facilitated through 18 ECs of electives, giving students a lot of freedom to choose courses that would help them specialize in the fields of their choice. The project was 9ECs and included three courses: Introduction to Ethics and Value Sensitive Design, Introduction to Systems Science and modelling for System Earth, and Introduction to Spatio-temporal Data and Geographic Information Science (GIS). The semester learning goals were to have the students (1) take an expert position within a multidisciplinary team, (2) analyse complex real world problems and challenges using systems thinking and modelling, (3) understand the nature of spatio-temporal systems, (4) decompose a complex spatio-temporal system and formulate critical issues, and (4) devise a strategy to mitigate (parts of) the complex real world problems. A large number of electives were given by ATLAS, but many students also took courses on the university given by other study programmes.

EduCo semester survey

Students were asked to rank the statements on a scale from 1 to 5 with 1 always being the most negative attribution (never, very poor) and 5 the most positive attribution (always, very good).

(n=24, scale 1-5)

EduCo Criterion	Score	SD
1: The semester planning was clear and changes were communicated in time	2.8	1.4
2: The expectations for this semester were clear	3.1	0.9
3: An evenly spread out workload throughout the semester was possible	3.2	1.2
4: The semester was coherent	3.6	1.0
5: Students were able to make informed and meaningful choices about the combination of courses within the semester	3.0	1.1
6: During the semester students were introduced to various topics that can assist them in narrowing down their interests towards a possible Master's program.	3.0	1.2
7: The semester allowed for personalization	3.9	1.0
8: Each student had an informed mentor that helped the student in his/her academic and personal development	4.1	0.9

Discussion

In general, students were quite happy with the semester, as reflected by the generally good scores on the survey. The lowest score related to semester planning and communication: Students complained that the spread of electives by ATLAS were not well balanced, with most of the electives offered in quartile 3 and less in quartile 4. Students also complained that many of the ATLAS electives in quartile three had the final deadlines in quartile four. There was also some confusion on Blackboard, since there was a late decision to allow first years to join the electives; what resulted was that some electives had the course information on the Semester 4 page, whereas others were put on the general electives page. The decentralization of information was confusing for most students at first.

However, the freedom to choose electives was positively experienced. The project and ability to specialize through courses meshed together well, resulting in a coherent semester for most students. Many students remarked in their SERs that they enjoyed the semester.

Suggested solutions to problems

The following solutions are suggested to improve the semester:

- The elective descriptions and syllabus should be available before the start of the semester.
- Quartile three courses should have deadlines within quartile three.

Agreements

The following agreements (which apply to semester 4 2017) have been made with the semester coordinator ():

- Quartile three courses should have deadline in quartile three.
- The elective syllabus will be ready at the same time as the semester description.

Project Phase I

created by: Leron Kok

e-mail: l.w.kok@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

project coordinator: Barend Köbben

Summary of the project

The project consisted this semester of two phases. During the first phase, every group, consisting of 5 – 9 students, had to choose a complex (wicked) problem with a spatial and temporal aspect. This problem than had to be investigated by modelling and mapping the problem to define the critical issues. Therefore, three introduction lectures in system modelling by Alexej Voinov and three introductory lectures were given in GIS by Barend Köbben. Furthermore, an introduction to value-sensitive design was given by Sander Voerman in four lectures and two group discussions to help to identify the ethical issues related to the spatio-temporal problem. This introductory course will be discussed further at the Ethics (project) section. The results of the mapping and modelling of the problem, as well as the critical issues, had to be presented on an interactive poster during a small market-like event, were two groups of teachers and staff gave feedback on the poster. This feedback would be used after the second phase to assess everyone's performance in the project. More information about the project can be found in the project syllabus.

EduCo semester survey

(n=24, scale 1-5)

EduCo Criteria	Score	SD
1. In the project non-Dutch students were not put at a disadvantage	4.0	1.6
2. All ATLAS domains/courses that were taught in this semester could be integrated in this project	3.3	1.2
3. Tutors/consultants were informed about the project, and had relevant knowledge	2.8	1.2
4. Tutors/consultants were readily available/accessible for students.	2.9	1.2
5. This project had a well-communicated and logical set-up	3.4	1.0
6. The students were provided with relevant information/knowledge that could be readily applied within the project	3.6	1.0
7. The project was based on a problem that includes both social and technical aspects	4.1	1.1
8. This project clearly stated which assumptions may be made by the students	2.8	0.8
9. The procedure for project assessment was clear in advance	2.9	1.2

Discussion

The scores related to the tutoring of the project are a bit low. This might be because there were no group specific tutors, but rather Bernard and Wessel who were available as tutors for all groups. While in general people feel like that they can be responsible for looking for help themselves, it could be made more explicit next time that Barend and Wessel can help as tutors. However, they are limited in their time. The project meetings could also be better used for this, but Bernard and Wessel are still struggling with the format of those.

It was not entirely clear for everyone that the poster session at the end of the first phase was no assessment, but merely an option to receive intermediate feedback. Next time this could be better communicated, for example by having a separate session with all group leaders, who can then pass on this information to their group.

Related to the poster session, not all groups got an equal amount of time from the teacher groups giving feedback. Next time, it might help to use a timer.

The communication between the different people involved in the project could be improved. One group heard that they did not had to incorporate ethics in their first phase, but they got negative feedback on this after the poster session. Bernard indicated that this was caused because the ethics teacher only became involved in the project later.

Students felt that the systems thinking course was too early. The lectures were given during before project groups were formed, and at one lecture Alexej already asked for a preliminary model. Next time, it would be better to do the systems thinking introduction later, so that it can be better related to the project.

The GIS introduction got some mixed reactions from the students. Some indicated that it was too superficial. However, last year, when it was more in depth, students complained that it was too detailed. Next time, it might be possible to have a tutorial or demonstration with some simple GIS software.

Finally, students felt that the group forming phase was too long. Although last year students indicated it was too short, it would be better to shorten it to one week.

Suggested solutions to problems

- It might be good to have consultants the groups can contact in case of questions.
- Revise the content and planning of the GIS and systems thinking lectures, to make it more directly applicable for the project.
- The aim and importance of the intermediate poster session could be communicated better and more in time, for example by having a session with the group leaders.
- The time each teacher group has per group should be better regulated, to make the time division more equal.
- The communication between teachers involved in the project could be improved.
- The group forming phase could be shortened to one week.

Agreements

- Bernard will try to give a tutorial during his GIS introduction, to better show the practical use of it.
- Next year, there will be another teacher for the systems thinking introduction. Format and planning will then be discussed again, thereby possibly also having a group assignment.
- The communication around the poster session will be improved.

Project Phase II

created by: Leron Kok

e-mail: l.w.kok@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

project coordinator: Barend Köbben

Summary of the project

During the second phase of the project, a mitigation strategy had to be developed for one of the problems investigated in the first phase. This was done in groups of two or three persons, where it was important that everyone positioned themselves as an expert in a multidisciplinary team. Every team was assigned a tutor who would help during the research, and who would also assess the deliverable, which was free of choice. At the end of the project, every group had to present their project on a market-like event. Afterwards, a symposium was held were multiple groups with a similar topic discussed the result of their research, as well as how their solution linked back to the original problem researched in the first phase.

EduCo semester survey

(n=13, scale 1-5)

EduCo Criteria	Score	SD
1. In the project non-Dutch students were not put at a disadvantage	4.0	1.6
2. All ATLAS domains/courses that were taught in this semester could be integrated in this project	3.2	1.0
3. Tutors/consultants were informed about the project, and had relevant knowledge	3.2	1.3
4. Tutors/consultants were readily available/accessible for students.	3.8	0.9
5. This project had a well-communicated and logical set-up	3.1	0.8
6. The students were provided with relevant information/knowledge that could be readily applied within the project	3.1	1.1
7. The project was based on a problem that includes both social and technical aspects	4.2	0.4
8. This project clearly stated which assumptions may be made by the students	3.2	0.9
9. The procedure for project assessment was clear in advance	2.5	0.9

Discussion

The group forming process was quite long for this phase (three weeks), leaving less time for students to work on the actual mitigation strategy. Next time, this could be shortened.

For some groups, it took long before they were assigned a tutor, causing them to have less time for the project. It was also not clear that the tutors would also be the assessors for the second phase. Some students thought this was weird, as in earlier projects the tutor was not involved in the assessment. Furthermore, feedback from one person is quite limited, so it might be better to have the assessment done by more persons. However, Bernard said this might be difficult, as the project topics are diverse, so it might be hard to find teachers with the relevant knowledge.

Students liked the poster session before the symposium, as they got to see what the other students did. They missed this a bit during the project, as there was not much communication between what the different groups did.

Related to the symposium, there was a lot of feedback from the students. Some students mentioned the questions were too general, and mostly relevant for students who did not switch topics between the two phases. Furthermore, the symposium seemed not to be prepared that well, and the moderation could have been better. Bernard indicated with the latter point, but that the person who would originally moderate became ill. On the other hand, it was perceived that the students could also show some more participation.

Suggested solutions to problems

- Let all groups do a short elevator pitch to update the class on what they have done.
- Incorporate a peer review at the end, so that the groups can get more feedback.
- Make the link between the first and second phase weaker at the symposium, or don't allow people to switch groups.
- Let the assessment be done by more than just one person.
- The assessment procedure could be more formalized, for example by having a panel discussion.
- Make the assessment procedure more clear in advance.
- Make the group forming process shorter, and assign tutors faster.

Agreements

- Barend agrees the start up time of the project was quite long. Next time, he wants to actively start with this directly at the end of the third quarter.
- Barend will into the option to have a second assessor for the final product.
- Barend acknowledges that the intention for this symposium was not very clear. He will improve this for next time, possibly by making it more clear in the syllabus.
- There has been feedback written down for everyone related to the symposium. This was sent out in the feedback form of the SER, but will next time also be sent to the students before writing their SER.
- Barend will try to accomodate that students will receive more feedback on the symposium.

Courses

Partial Differential Equations

created by: Stef Koenis

e-mail: s.p.j.koenis@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Martin Streng

Summary of the course

At the start of the course, we agreed on a set-up for the course together: we would study the material by watching online lectures (Antonios Zagaris) and read the suggested literature: lecture notes by Antonios Zagaris and Ruud van Damme, M. Pivato - *Linear Partial Differential Equations and Fourier Theory, Part 1*, and Kreyszig - *Advanced Engineering Mathematics, chapter 11&12*. Then, we would write a book covering all the basics of PDEs by expanding on the lecture notes by Zagaris and van Damme, which were deemed too condense. The topics that were dealt with in this course were: prerequisites (ODEs, Fourier theory), first order PDEs, classification of second order PDEs, the wave equation (on an interval), the heat equation (on an interval), and the Laplace equation on bounded domains (rectangle and disk). For all of these topics, the book would cover three sections: theory, applications, and exercises (including elaboration). Every student was encouraged to sign up for writing 2-4 sections of this book. There was a weekly contact moment on Friday afternoon which was intended as a session where students could ask questions and work on the book together. After a couple of weeks, it became clear that most students had difficulties starting up and that virtually no one had started writing for the book. Because writing a book did not seem as conducive to everyone's learning (see criterion 15 in the semester survey), Martin offered the *take home exam* as an alternative way to prove your competence for all topics. Elaborating an example in a lecture became another form of evidence and several students did this. These lectures nicely linked to the desire for more guidance and more lectures that some students had expressed.

The evidence deadline for for this course was Friday May 12th (already in Q4). In the end, most people opted for the take home exam and very few parts of the envisioned book were actually written.

EduCo semester survey

(n=8, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	3.3	1.0
2. This course featured both group and individual work	4.1	0.8
3. During this course, students were provided with a sufficient level of guidance	**3.1**	0.6
4. For this course, there was a variety of possibilities to prove your competence	**4.6**	0.5
5. This course facilitated personalization	4.5	0.8
6. This course related to the semester project and other courses	2.8	1.3
7. The course material was useful and relevant	4.3	0.5
8. This course allowed for an even distribution of the workload over time	**4.6**	0.5
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	4.1	0.6

10. Feedback given by the teacher(s) was complete, useful and timely	4.0	1.1
11. The teacher was sufficiently available for questions/feedback about the course	4.3	0.7
12. The teacher seriously took students' feedback about the course into consideration	**4.6**	0.5
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	3.8	0.9
14. The teacher(s) taught the course in an engaging and effective way	**2.9**	**1.4**
15. The format of the course was engaging and conducive to learning the course material	**3.0**	**1.1**

Discussion
Guidance (criteria 3, 14 and 15): some students would have preferred having more lectures (by Martin or students) as a means of guidance. Towards the end, more of these lectures were actually organised, but then very few students showed up. In general, people liked the individual guidance that Martin provided.
Course format (criterion 15): although there was consensus about writing a book at the beginning of the course, this course format did not really work out for most students. From the start on, it was already an ambitious project and students had trouble motivating and organising themselves which was also attributed to a lack of guidance.
Evidence possibilities (criteria 4 and 12): students liked that Martin quickly reacted to their feedback on the course format, and that he then offered a wide variety of evidence possibilities: students could write a chapter on one of the topics, make (parts of) the take home exam, or give a lecture on one of the topics. This evidence variety should be continued next year.

Course material: some students had difficulties finding good study materials (textbooks and exercises). It was especially difficult to find exercises that were accompanied by answers/solution manuals.

Suggested solutions to problems
1. Clearly stipulate the various evidence possibilities (presentation, writing chapters, take home exam) at the start of the course.
2. Stress the importance of the weekly contact moment where students can ask questions and work on exercises together. Evidently, student collaboration should be promoted and facilitated more because it was seriously lacking this year.
3. Have a list of suggested exercises that students can make to study the different topics. It is important to have *answers* (and sometimes the complete solution method) available for these exercises.
4. (something general for all electives) Make sure all course information is stored in one place that students know of, and not on two different Blackboard sites (S4 and ATLAS electives).

Agreements
The agreements were based on a wrap-up feedback session with Martin.

1. At the start of the course, the teacher (Martin) will give some short lectures about the very basics of PDEs to help people get started.
2. Martin will reconsider the recommended literature. Some students had difficulties finding the right study materials and commented that they did not like the book (Pivato). Next year, book chapters that were written this year, will also be used.
3. Martin will provide some drills with answers and solution manuals to practise.

4. Next year, Martin will also offer different evidence possibilities for PDEs: writing a book chapter, take home exams, presentations, new free assignments with a research component etc.

Note: next year, the PDEs course might be given together with Applied Physics students.

Quantum Computing

created by: Stef Koenis, Jarmo Kikstra

e-mail: s.p.j.koenis@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Chris Lee

Summary of the course
The course started off with an interesting introductory lecture, in which the idea of qubits and some notation were brought forward. At the beginning of the course, all students signed up for a shared Evernote notebook, but throughout the course, this was sparsely used.

The general setup of the course, which had one class of 1.5-2 hours per week, was set in the beginning as well. Though not explicitly stated, the course was largely self-study, and based on the concept of a flipped classroom. This means that the topics were distributed among duos of students in the class.The duos gave lectures on the topics; EPR paradox, Quantum Entanglement, Quantum Logic and Quantum algorithms.The topic Quantum Key Distribution (QKD) was presented in the first lecture by Chris himself.

As for the exercises in the course, this was left to the students; no planning existed. Once, relatively late in the course, it was indicated that assignments of Chapters 4 and 6 could be done, but this was never mentioned again.

In principle, the deadline for the QC assignments was the 14th of April. However, the final deadline was the 16th of June, the week before the SER deadline. Many students made use of this extra time.

The book: David McMahon, 2008. *Quantum Computing Explained* was used for this course. This book was not seen as perfect by some of the students, and some of them resorted to the book Reiffel, Polak, 2011. *Quantum Computing, A Gentle Introduction*.

Of the 9 students starting this course, 7 finished it.

EduCo semester survey
(n=5, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	2.2	0.8
2. This course featured both group and individual work	3.8	0.4
3. During this course, students were provided with a sufficient level of guidance	1.6	0.5
4. For this course, there was a variety of possibilities to prove your competence	3.2	0.8
5. This course facilitated personalization	3.8	0.8
6. This course related to the semester project and other courses	1.8	0.8
7. The course material was useful and relevant	2.8	0.4
8. This course allowed for an even distribution of the workload over time	3.6	1.3

9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	2.6	1.3
10. Feedback given by the teacher(s) was complete, useful and timely	2.0	1.0
11. The teacher was sufficiently available for questions/feedback about the course	3.0	1.0
12. The teacher seriously took students' feedback about the course into consideration	3.4	0.9
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	1.8	0.4
14. The teacher(s) taught the course in an engaging and effective way	2.0	1.2
15. The format of the course was engaging and conducive to learning the course material	1.8	1.1

Discussion

As can be seen in the results from this questionnaire, the course was not what most students had hoped. The scores on conveyed knowledge, guidance, relation to other courses feedback given, knowledge input for learning goals, how engaging the course was taught and the format of the course (criteria 1, 3, 6, 10, 13, 14 and 15) stand out in a negative way.

The score on criterion 6 (related to the semester project and other courses) is understandable, since the course dealt with a specialised topic.

From the students' experiences, the score on feedback is most likely due to that it was not given in a timely manner, as for example the feedback on the presentations was only given about 2 months after the presentations had been given.

The scores about the lack of conveyed knowledge and knowledge input are worrying.The students were under the impression that in general, the things that were presented were quite good, but the presentations were sometimes perceived as a bit too superficial. It was also felt by the students that Chris was not always well-prepared, and was not able to add things to the presentation that were missing. At times, it was perceived that the teacher skipped over some crucial aspects that created the feeling with some students that a basis for the course was missing. It would have been good if Chris would have feedbacked the presentations before they were given, as they comprised the main content of the course. It should be considered that it might be that the topic is too specialised to allow for the course to be taught in a flipped classroom style. Now, very little knowledge input came from the teacher of the course. The lecture on QKD game was felt to be engaging, but little informative.On another note, more structure or more suggestions with respect to the exercises would have been appreciated and would have motivated students to work on the course.

Interaction between students can contribute to how engaging a course is. Unfortunately, only for the presentations students worked together.

Lastly, where the freedom in the two final assignments allowed students to personalise their evidence, the lack of criteria that these assignments had to fulfil made it very unclear for the students what was expected.

Suggested solutions to problems

1. More clarity with regards to what is expected for assignments
2. Feedback on presentations of students before they are given to the class
3. Use a different book, such as Reiffel, Polak, 2011. *Quantum Computing, A Gentle Introduction*. (with solution manual available)
4. Have more classes in which guidance for doing exercises can be provided.

Agreements

1. More clarity on the assignment and essay is not necessarily desirable, since this prepares one for working with ill-defined problems later in life. That this idea is underlying the sober definition of the assignment and essay will be explained explicitly.
2. Feedback on presentations of students before they are given to the class will be given.
3. A different textbook will be used, and a solution manual will be made available, if possible. Using Reiffel, Polak, 2011. *Quantum Computing, A Gentle Introduction*. together with Griffiths, D. J. (2016). *Introduction to quantum mechanics*. (for more frontloading of the QM part) will be considered.
4. There will be time dedicated to making exercises in class with guidance available. A setup in which students give about 3-4 shorter presentations (around 10 minutes per presentation) per lecture, with the other half of the time dedicated to making exercises will be considered.
5. Overall, the course will feature more frontloading.
6. The course will not solely treat the mathematics representing Quantum Computing anymore, but also pay attention to relating the concepts to their physical application.

Numerical Mathematics

created by: Stef Koenis

e-mail: s.p.j.koenis@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Martin Streng (Bernard Geurts)

Summary of the course

This year, four students followed this 3 EC course. For this course, students first had to follow the 2 EC *M8: Numerically solving PDEs* course of the TN programme (module 8: 201600068 Continuüm Dynamica). This course was supervised by Bernard Geurts and consisted of 8 sessions distributed over 8 weeks. There was a Tuesday (13:45-17:30) and a Wednesday (08:45-12:30) group and ATLAS students could choose themselves which group they wanted to be in. During each session, the students had to work on a homework assignment which they had to hand in on the same day (00:00 and 20:00 for the Tuesday and Wednesday group respectively) via Blackboard. All except the first assignment could be worked on in duos.The first four sessions started with a short introductory lecture and during all sessions, student assistants were available to help. The study material could be found on Blackboard and consisted of the lecture slides and a reader composed by Bernard Geurts. There was an extra assignment for ATLAS students to stretch the course to 3 ECs. This extra assignment built on the last homework assignment about modelling a nuclear fallout. In the ATLAS assignment students had to manipulate their model to evaluate different mitigation strategies for such a disaster. The homework assignments were assessed by the student assistants of the TN course and the final ATLAS assignment by Martin Streng.

Discussion

No evaluation questionnaire was sent for this course because only four students participated. Students generally liked this course. Good points were an even distribution of the workload, the fact that the course featured individual and group work (in duos), and that the course material was useful and relevant, and linked well to the PDEs course

that was given in Q3. The homework assignments could not really be personalised but the final ATLAS assignment could. The sessions were definitely useful and the student assistants were helpful.

There was no feedback on the homework assignments, only the grades were communicated. This was unfortunate because it did not show the students on what they could still improve.

The extra assignment for ATLAS students was very unclear at the start. Only in the last few weeks, there was agreement between Bernard Geurts and Martin Streng about what this assignment should entail. This limited students a bit in their planning. What was good about this extra assignment was the clear link between the ATLAS assignment on the one hand, and the semester theme and project on the other hand: in both, the students had to think about ways of mitigating complex spatio-temporal problems. This link should be maintained and could even be expanded next year.

It was a bit inconvenient, also for the assessors (Martin Streng and the student assistants) that the deadline for the last two homework assignments and the extra ATLAS assignment was in the SER week (at least for one group).

Suggested solutions to problems
1. Discuss with the student assistants of the TN course how the feedback given on the homework assignments could be improved and made more specific. One of them (Bas) indicated to be open for this (if it wouldn't mean too much extra time spent on checking the assignments)
2. Make clear what the extra ATLAS assignment (for 1 EC) entails at the start of the course. This is especially useful since students can then consciously choose to do the ATLAS course or simply the TN course. Explicate the link between this assignment and the semester theme/project.
3. Agree on clear procedure for the assessment of ATLAS students that prevents irritations and time pressure at the end.
   a. Possibly: make sure that all ATLAS students are in the group that finishes first so that there are no deadlines anymore in the SER week

Agreements
In the wrap-up feedback session with Martin Streng, it became clear that although ATLAS wants to keep offering this course to students in the future, the way in which this will be done is still unknown. Martin still has to see whether the extra assignment will be added for ATLAS students next time. The TN curriculum will probably change and the Numerical Mathematics course might be moved to another module. Then there is also the possibility that the whole course is expanded and that the 'ATLAS assignments' becomes part of the standard course. We made the following agreements:

1. The assessment procedure for ATLAS students will be streamlined and made clear to all people involved (ATLAS students, TN teaching assistants).
2. If there is going to be an extra assignment for ATLAS students, it will be the same assignment as this year. The extra assignment will be communicated to the students appropriately in advance so that they have enough time to link it to the project and their semester goals.
3. The (lack of) quality of feedback on the homework assignments will be discussed with Bernard Geurts. Possibly, an ATLAS student assistant can be added to the course to assess the work of ATLAS students and give them more elaborate feedback.

Introduction to Nonlinear Dynamics

created by: Stef Koenis, Mark van den Heuvel

e-mail: s.p.j.koenis@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Chris Lee

Summary of the course

The course of nonlinear dynamics was taught by Chris Lee and had a value of 3 ECs.

At the start of the course, there were no clear course set-up, learning goals, deliverables or specific study materials (the book was mentioned, but no selected chapters). Only a series of 8 sessions, of which 6 lectures, 1 question hour and 1 presentation session, was set.

During the first session, the deliverables were set: a report and presentation on an analysis of a nonlinear dynamical system and a report on the relevance of a different nonlinear dynamical system for society. No clear deadline was set. A few weeks later, the deliverables were changed to a presentation on the analysis of a nonlinear dynamical system and a report on the analysis of this system, including the applications of the system. Also, suggested elements for the analysis were provided. Still, no clear deadline was set for the deliverables. Finally, a deadline for the presentation was set two weeks before the presentation which was during the SER week. There were no intermediate presentations or deadlines for this course, only the final deliverable. As for study materials, the book Nonlinear dynamics and chaos by Steven Strogatz was used.

Discussion

The course started with about 6 students, but at the end only 2 students were left. Therefore sending out a questionnaire to quantitatively evaluate the course did not seem useful.

Looking back, we see that several things could be improved on this course. During the course, several problems occurred. In general, the setup of the course was unclear as learning goals were missing, deliverables were unclear and changed during the course and no clear study materials were available. Because students had different backgrounds and also had their own learning goals, Chris found it difficult to make a planning for the course. Because there were no intermediate deadlines, students started working on their final deliverables only very late and there were not so many feedback opportunities. The slides that were used during the lectures were sometimes incomplete because of limited preparation time of the teacher, which made it difficult for students that were not present to know what was discussed during the lecture. Also, no reading lists (e.g. chapters, parts of chapters) were provided so this could not replace the lecture slides either.

It was a good decision to reduce the amount of deliverables, as otherwise the workload for the course would have been exceeded. Even with the deliverables that were set now, the workload might have been exceeded depending on the system being studied.

To end on a positive note: students were very happy with the willingness of Chris Lee to help students and the quality of the help provided. Again, better use could be made of this when the sessions were focussed more on this than on lecturing about the contents of the book.

Suggested solutions to problems

1. Change the set-up of the sessions, by assigning readings and assignments to be done before the session to the students and make the sessions itself more focussed on problems with the analysis of the system studied for the deliverable

2. Set intermediate deadline, in the style of project updates. This should be very well possible with such a small number of students. This would have stimulated the students to start working on their final deliverables earlier and would have allowed for more feedback opportunities.
3. Select a number of nonlinear dynamical systems that could be studied with the tool provided by the course, because some self-chosen systems were too complicated to analyze with the provided theory.

Summarizing: the course could be improved by better preparation of the course setup with a list of proposed readings, possible nonlinear dynamical systems that can be properly analysed with the tools provided by the course and a more spread-out course project along the course with multiple feedback opportunities. The sessions could be used to give feedback on the process of the deliverable, while students work on the course content at home.

Agreements

In a wrap-up feedback session with Chris, he admitted that the course had its flaws and he agreed with the discussion written in this semester documentation. Chris thinks this course should be offered next year because nonlinear dynamics is an important topic. If the course will again be given by Chris, it will definitely be better and more coherent. We made the following agreements:

1. Chris agreed with the first suggestion: the set-up of the course will be different
2. Chris also agreed to the second suggestion: there will be intermediate deadlines and there will be continuous feedback throughout the course.
3. As for the third suggestion, Chris mentioned that this is really difficult because the interesting systems are almost impossible to analyse while the analysable systems are rather trivial. In the new set-up, the evidence will become a compilation of multiple (feedbacked) assignments that were done throughout the course. The easier, trivial systems will be used for quantitative analysis while the interesting and harder systems will only be analysed qualitatively or with the help of papers.
4. The simulations, which were not really used this time, will become a more important part of the course. The idea was that students would use the simulations for curiosity-based learning but this did not work out. More guidance is needed.

Cell Biology

created by: Stef Koenis, Milou van Nederveen

e-mail: s.p.j.koenis@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Leonie Krab

Summary of the course

On the request of several interested ATLAS students, Leonie Krab decided to set up a cell biology course this semester. There were 11 students participating, of which 10 first year students and one second year student. Of these 11 students, one dropped out, but this was because this person quite the whole programme, it had nothing to do with the course. The course gave the student an introduction into the material of cell biology, discussing the cell components and cell processes. The course started with presentations; the teacher or the students themselves would prepare a presentation by either reading the book or using other outreaches (such as the internet). Each week, another person or duo was supposed to present. Sometime later (approximately 2 weeks after a presentation of the material), a quiz was given to the students. Each time, the students would get feedback on their tests, participation in class and presentation within approximately 1 week. Apart from these sessions, there was a weekly question hour.

After this, a lab tour was organized, combined with an introduction of the bachelor thesis of ATLAS student Chaja Hudepol. This was followed by a review of a cell biology paper, where the main focus was to evaluate the used methodology and the alternatives. In the end, Leonie provided students with a final feedback form that evaluated the students' learning. This final feedback form was an overview of all the feedback students had received on their work. The evidence deadline for this course was June 2nd.

Study materials:

- The essentials of Cell Biology, fourth edition, *by Bruce Alberts, Dennis Bray, Karen Hopkin, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter.*
- Other own resources (The molecular biology of the cell (book), the internet, etc.)
- Each other's presentation slides
- Preparational material about Chaja's bachelor thesis
- The research paper (chosen yourself)

EduCo semester survey
(n=8, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	3.9	0.6
2. This course featured both group and individual work	3.4	1.2
3. During this course, students were provided with a sufficient level of guidance	3.9	0.4
4. For this course, there was a variety of possibilities to prove your competence	4.4	0.7
5. This course facilitated personalization	3.9	0.6
6. This course related to the semester project and other courses	3.1	0.8
7. The course material was useful and relevant	4.3	0.5
8. This course allowed for an even distribution of the workload over time	4.3	0.5
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	4.5	0.8
10. Feedback given by the teacher(s) was complete, useful and timely	4.4	0.7
11. The teacher was sufficiently available for questions/feedback about the course	4.5	0.5
12. The teacher seriously took students' feedback about the course into consideration	4.3	0.8
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	3.9	0.7
14. The teacher(s) taught the course in an engaging and effective way	4.0	0.5
15. The format of the course was engaging and conducive to learning the course material	4.0	0.8

Discussion

The feedback provided was very good, constructive, representative and very elaborated!

Maybe more alternatives forms of evidence from the tests would be nice, however, Leonie was open for this as well. The tests could maybe focus a bit more on insight than on learning facts. Also providing a more engaging learning method than just reading the book would have been nice, however, this was maybe meant to happen with the presentations. The quality of the presentations was not always as good; either due to short preparations of the students or lack of time during the lecture hours. The downside of this was that it also affected the learning process of the other students.

The time planning of quizzes / presentations during lectures could have been better, because sometimes the classes run out. However, this clearly improved in the end. To end with, as Leonie also said herself: for a next course it would be nice to have a practical side to it as well! Due to the fact that Leonie set up this course on short notice, this was, understandably, not possible this time. The lab tour was a nice alternative.

In general, the scores (see table above) for this course are high and adequately reflect the course. There was clear structure, yet also a lot of room for your own ideas and freedom. It was really useful to get feedback throughout the whole course; in this way the students were able to continuously be aware of their progress and how to improve themselves, this really improved the learning process. There was a good distribution of workload through the whole semester. It was a really nice and interesting course; which made it obvious that students enjoyed following the course. Thereby, a wide variety of cell biology related material was touched upon, while students were also able to go deeper into the materials if they wanted to.

Suggested solutions to problems

1. Keep on giving the feedback this way, it is really nice and useful!
2. Use the take home tests in which you are allowed to use your book more often. This was a nice way to learn cell biology: you would read the book with a goal (finding the answer of the question), and thus still learn a lot. This would also solve the time issue.
3. Make sure to ask in advance for the material of the presentations, maybe even shortly go over it with the students and make suggestions for how they could make it more interactive and engaging. In this way, there is also the possibility to check whether the quality is high enough.
4. Do some real experiments in the future, that would really add to the course.
5. The people who formed duos and thus chose to work together clearly had more in-depth knowledge about the reviews, because they could discuss everything together. We advise to stimulate this collaboration. An additional advantage of working in duos is that it decreases the workload of the teacher.
6. Maybe try using open book tests instead of take home tests.

Agreements

1. This course will probably be given in the second/fourth semester in 2017-2018. This will probably also include lab work.
2. Stress that students should use the question hour to get feedback on their presentation. Or: let students send their slides to the teacher some days in advance. In any case, raise awareness about the fact that the quality is expected to be quite high.
3. Leonie agreed to keep giving feedback in this elaborate way, as all the students were very enthusiastic.
4. The reports will probably stay part of the course because the students really liked this way of taking another look at the material. However, it should still stay within the 3 ECs. Maybe presentations about papers could work. Leonie agreed to look into this.
5. Leonie also agreed to look into normal tests, take home tests and open book tests, and what works best for the students.
6. Next year, if the reports stay, students will probably work together in duos more often.

Introduction to Bioprocess Engineering

created by: Tim Roelofs, Victor Batenburg, Stef Koenis

e-mail: t.j.t.roelofs@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Leonie Krab

Summary of the course

The course introduction to bioprocess engineering was taught by Leonie Krab. 7 students (6 from the first and 1 from the second year) participated in this course. One of the dropped out. The classes consisted out of lectures (which were given by the teacher) and discussing/finishing assignments. The course would cover different types of reactors and teach you how to do calculations for these. Pitfalls of these calculations were properly addressed and explained. A very interesting guest lecture was also given to teach the more practical pitfalls and gave insight in the practical designing of bioreactors.

The assessment of the course consisted out of the feedback that was given on assignments (which had to be completed every week). The book that was used for the course was *Bioprocess Engineering Principles* (2nd edition, 2013) by Pauline Doran.

Discussion

The feedback on the assignments was unanimously considered great and gave clear insight on mistakes and errors. Also the format in which the course was set up was considered good. Most lectures gave clear explanations and expanded on the book in a proper way.

The subject itself was considered interesting, but overall students lacked the practical side. The guest lecture was a good example a more practical side but overall it was considered that there could be more attention for practical matters.

The speed in which the course was taught has been a point of discussion. Overall, the beginning of the course was considered too slow while the later part of the course would go too fast. These are all personal opinions of a small group, however the earlier part of the course felt as "repeating high school chemistry" while the latter part of the course could be elaborated further on.

It was also suggested that every lecture would have a short (15/20 min.) recap in order to make sure that a subject was fully covered and no questions were left unanswered. It was already intended that this recap would be given, but since not everyone could finish the exercises in time, it would be cancelled to make room for the finishing of the exercises.

Suggested solutions to problems

1. Some students suggested to take more time for the latter part of the course while spending less time on the first part of the course.
2. The earlier mentioned recap would make the classes even better.
3. Another suggestion would be to give the course a more practical side through showing of applications. This was already done to a certain extent, but could still be expanded.
4. As Leonie suggested herself, splitting the course might be a good idea. Bioprocess engineering could be split in two parts, one part which focuses on the more calculative side and teaches students the basics of doing these calculations, and another part which focuses more around designing your own reactor. The first course would be a prerequisite for the second course. It is up to Leonie whether she wants to split the course, since the outcome of this choice might depend on the amount of interest.

5. In order to lower the workload of giving feedback on assignments, it is recommended that Leonie will stress that students work and hand in assignments as duo's. This way, the students will still receive proper feedback, but it will save the teacher a lot of time.

Agreements
1. The course will probably be given next year.
2. Leonie will try to keep giving feedback in this way because students really appreciated it. This however depends on the amount of students.
3. The speed of course (in the beginning) will not change as Leonie thinks that basics are important.
    a. The speed might become more flexible. It will depend on the group of students.
4. Just like this semester, Leonie will try to do the recap. This will depend on whether students will finish their assignments in time.
5. As for the practical side: applications will be highlighted in the presentations.
6. Leonie will decide for herself whether she will split the course or whether she will teach it as one course.
7. Students will be stressed more to work in duo's, as this lowers the workload for checking assignments for Leonie.

Data Visualization

created by: Tim Roelofs

e-mail: t.j.t.roelofs@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Barend Köbben and Yuri Engelhardt

Summary of the course
This year, this 3EC course was taken by 14 students, of which 9 from the class of 2018. The course syllabus can be found here. For the course, 6 sessions were organized. These session differed in content: Three of the sessions were lectures, two were sessions for discussing the assignments, and one was an introduction and demonstration at the ITC GeoViz Lab.

Each students worked on a small portfolio of visualizations created for the course's assignments. There were three visualization assignments, of which the third one (the Visualization Challenge) served as a "master proof". Next to these visualization assignments, there was an assignment on software tools.

For two of the sessions, certain documents had to be read, which could be found on Blackboard. On the Blackboard page, all slides, exercises, descriptions of software tools and examples could also be found.

The course ran from April 26 to June 16. The evidence for the course was the small portfolio.

EduCo semester survey
(n=6, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	3.0	0.6
2. This course featured both group and individual work	2.7	1.2
3. During this course, students were provided with a sufficient level of guidance	3.8	0.4
4. For this course, there was a variety of possibilities to prove your competence	4.3	0.8

5. This course facilitated personalization	4.7	0.5
6. This course related to the semester project and other courses	3.5	0.8
7. The course material was useful and relevant	4.2	0.4
8. This course allowed for an even distribution of the workload over time	4.5	0.5
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	4.7	0.5
10. Feedback given by the teacher(s) was complete, useful and timely	3.3	1.2
11. The teacher was sufficiently available for questions/feedback about the course	4.1	0.8
12. The teacher seriously took students' feedback about the course into consideration	3.5	0.8
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	3.2	1.0
14. The teacher(s) taught the course in an engaging and effective way	3.0	1.3
15. The format of the course was engaging and conducive to learning the course material	3.3	0.5

Discussion

Generally, the survey responses were positive (though they were quite mixed for some criteria; unfortunately, only 6 out of 14 students filled out the questionnaire, so in those cases, the average might not be representative). There were a couple of improvement points that were brought up by students.

Firstly, some students indicated that there was too little theory, and that the theory that was taught was not always applicable in the assignments. One student noted that they did not think the course was worth 3EC. There seemed to be a bit of a disconnect between the theoretical part of the course and the practical part. Also, the feedback that was received on the final assignment was not that elaborate, perhaps because the deadline was late.

Suggested solutions to problems

- More theory, theory with a different focus (perhaps more focused on the process of visualizing data, or practical information e.g. about software)
- Change the schedule/deadline

Agreements

- Barend was doubting about how theoretical knowledge could be assessed. In his regular data visualization course, he used a test, but this would not be very ATLAS-y. He has the idea of having students write an essay.
  Barend developed the course as a practical course, more focused on skills rather than theory. Quite some time on the assignment were focused on learning the tools; Therefore, Barend thought that perhaps lessons could be focused on specific tools that can be used for assignment. However, this would give the students less freedom to do what they want. In the current assignments, there is more room for creativity, which Barend likes.

- Some feedback was not that elaborate, but this was because the deadline was late. Feedback could be more elaborate, but then deadline has to be earlier. Next time, Barend was to spread his electives more between the quartiles: He wants to shift either this elective or the Web Application Development elective to the third quartile.

Spatial Data and Geo-Information Science (GIS)

created by: Tim Roelofs

e-mail: t.j.t.roelofs@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Barend Köbben

Summary of the course
This elective was a deepening of the domain content part of the project that introduced Spatial Data & GIS technology and science. This course was taken by 8 students, of which 7 students from the class of 2018. The course consisted of five sessions, of which the first three were lectures. In the remaining two sessions, students presented on deepening topics.

Next to these presentations, students had to work on a practical assignment. This could either be a personal project or a preset one. The evidence for this course consisted of the presentation and the practical assignment.

The syllabus for this course can be found here.

The elective was organized for Q3; however, the evidence deadline was June 12.

Discussion
There was not of feedback for this course unfortunately. Although a questionnaire was send out, due to a lack of responses it is not included in this document.

 Some points were brought up though by some students:

- There was some overlap with other electives of Barend. The second session was about GIS and web services, and the third one on visualization, which overlapped with the Web Application Development and Data Visualization electives. Some content about other GIS-related topics like remote sensing might be more/also interesting. Some students also noted that the practical part of the elective seemed a bit disconnected from the theoretical part.
- Some students expressed that the presentations by other students were a bit superficial in some cases, and did not teach them a lot.
- Different students performed at different levels, some made it a quite easy for themselves while others spent a lot of time on the elective.

Suggested solutions to problems
The EduCo suggests the following solutions:

- Different content for the sessions/different focus
- Require students to provide reading material with their presentation (e.g. a paper that the other students have to read to prepare for the presentation)

Agreements
- Barend acknowledges the overlap, but says that it is important information that has to be taught anyway. Next time, it might be possible to have introductory lessons, that are not mandatory for people with certain pre-knowledge.
- To improve the presentations, Barend agrees that more interaction might be nice, or perhaps some extra reading material from the presenter. More preparation time is needed in that case; now half of the students only had a week to prepare.
- Different students followed the level on different levels. Next time, Barend thinks that the elective has to be finished in Q3, unless for those students who combine it with the project (Barend hoped that more students

would integrate the course in their projects). This way, progress meetings could be organised. This hopefully shows students who do the minimum that more steps are involved, and can improve their level.

Web Application Development

created by: Tim Roelofs

e-mail: t.j.t.roelofs@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Barend Köbben

Summary of the course
The elective "Web Application Development" was taught in the fourth quartile. 10 students partook in this elective, of which 7 students of the class of 2018. The course syllabus can be found here.

The course consisted of six sessions, of which one lecture and one guest lecture (the rest of the sessions were meant for asking questions and working). For evidence for this course, a web application had to be created as a "master proof". After the two initial lectures, the rest of the course was focused around working on these applications. Students could submit a proposal for what kind of application they wanted to make.

The course ran from April 26 to June 16 (the deadline for handing in the application).

Discussion
There was not much feedback for this course unfortunately. Due to a lack of responses, the questionnaire results are not included in this document. The general impression seemed to be that the course fine. Barend was also content with this course. There were two small comments by students that were discussed with Barend:

- A student indicated that they expected more input/lectures.
- The applications made in the elective could be shared.

Suggested solutions to problems
- More lectures could be given. The syllabus could also be uploaded earlier so that students have a better expectation of the course.
- Links to the applications could be shared on Blackboard, in an e-mail, et cetera. Students could also present their applications to each other at the end of the course.

Agreements
- Next time, the schedule will be known in advance, as this year the course was developed on the go, so students will be able to have better expectations. Barend thought about maybe giving more lectures on programming languages (e.g. Javascript). These would be optional for people who already know these languages.
- Links to the applications will be shown on Blackboard.

Communication Science: Trust, Crisis, and Risk Perception

created by: Kamiel Verhelst, Egbert Loeffen

e-mail: e.l.r.loeffen@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Ardion Beldad

Summary of the course

This 3 E.C. course was taken by nine students. The syllabus can be found here. It took place over nine weeks (from April 24 to June 16) with a total of five sessions. Originally, four sessions were planned, but one additional session was needed to cover all material. For the four original sessions, there were three papers which had to be read. These were the basis for the lectures and were needed to actively participate in the class discussions.

The evidence for this course consisted of one paper which should analyse an existing risk communication strategy or suggest a new risk communication strategy for a certain risky event.

EduCo semester survey

(n=5, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	4.00	1.00
2. This course featured both group and individual work	2.80	1.30
3. During this course, students were provided with a sufficient level of guidance	4.20	0.84
4. For this course, there was a variety of possibilities to prove your competence	3.40	0.55
5. This course facilitated personalization	4.20	1.30
6. This course related to the semester project and other courses	3.80	0.84
7. The course material was useful and relevant	3.80	0.45
8. This course allowed for an even distribution of the workload over time	3.60	1.14
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	3.80	1.30
10. Feedback given by the teacher(s) was complete, useful and timely	4.40	0.89
11. The teacher was sufficiently available for questions/feedback about the course	3.80	1.10
12. The teacher seriously took students' feedback about the course into consideration	3.80	0.84
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	4.00	0.71
14. The teacher(s) taught the course in an engaging and effective way	4.20	0.84
15. The format of the course was engaging and conducive to learning the course material	4.00	0.71

Discussion

In general, the course was well received. Students were happy with the material and the lectures added to the material that was supposed to be read. Through the final assignment, there was a lot of room for personalization. In addition, the final assignment was focused on a practical application, which resulted in showing the theory in a real life context.

The weak points of this course are related to assignments and evidence. Currently, there is only one assignment which focuses only on part of the course; risk communication. However, there is no possibility for showing competence in the other parts of the course. Therefore, it would be beneficial to have an (optional) additional assignment.

Next to that, this course is very individually focused; there are no group assignments. This could be overcome through having some lectures be given by the students. This can also result in a slightly more active class in the sessions, as the students were a bit passive sometimes during discussions.

The course mostly gave the possibility for an even workload. However, for the final assignment there was really only one week, since the session on risk communication was the final session. It might be useful to have slightly longer for this. In this quartile there were also a lot of Fridays on free days or during trips, so it might be useful to plan this course on a different day to distribute it more evenly over the semester.

Suggested solutions to problems
- flipped classroom might be a solution to get a more active class
- add an additional assignment

Agreements
- Ardion thinks perhaps a mix of the flipped classroom and the current setup might work.
- Ardion thinks of new additional assignment
- Ardion could try to schedule in such a way that there's two weeks between the final session and the paper
- Next year, the syllabus can be uploaded before students have to pick their elective and the blackboard should be shared between first and second years

Communication Science: Corporate Social Responsibility (CSR) and Ethical Consumption

created by: Tim Roelofs

e-mail: t.j.t.roelofs@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Ardion beldad

Summary of the course

This 3EC elective was taken by 2 class of 2018 students, and consisted of 4 sessions. The syllabus can be found [here](#).

For each session, two selected papers had to be read, on which a position paper (max. 1000 words) had to be written. The required readings and the position papers were the bases for the discussions in the sessions.

The course ran from May 19 to June 8. The evidence for the course consisted of the four position papers.

Discussion

The two students who took the course were very positive about the course. They felt like their learning was very efficient and liked that they could be very engaged in the discussions.

The feedback that students received was also elaborate. However, the feedback was only focused on the position papers; it seemed like the discussion did not matter for the student's evidence. Ardion agreed that feedback can be given on the discussions as well.

For next year, the course could be continued in a similar format with up to 10 students.

Ardion suggests that, to include more real-life examples, he could add a case study to each of the sessions' preparation materials.

The EC load of the course was also discussed, as Ardion was unsure whether students spent 3 EC on it. The students thought that while they might have not spent 84 hours on the course, they did learn 3EC worth of content due to how "efficient" the course was with only two people; however, adding the papers like Ardion suggested would not be too much.

Suggested solutions to problems
- Give feedback to the class discussions as well, instead of only the written position papers
- Make the course a bit longer by adding reading material

Agreements
- Ardion will add a case study to each session, to relate more closely to real-life situations
- Ardion will give feedback also on the class discussions

Machine Learning and Neural Networks

created by: Tim Roelofs

e-mail: t.j.t.roelofs@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Martin Streng

Summary of the course
This 3EC elective was taken by 9 students. After the Machine Learning course that was originally planned was cancelled as the teacher (Ruud) was not available, the class of 2018 students Ollie and Rik proposed that a new course would be set up. This new course became this elective and the Deep Learning elective. The syllabus for this course can be found here.

The course was build around the online Machine Learning course on Coursera by Stanford University. For this course (and the deep learning course) sessions were organized each Friday, in which students could present what they were working on, have discussions, help each other et cetera. Martin Streng facilitated these sessions (he was not involved in any teaching - Machine learning is not his field of expertise). After doing in the online course, students could send in their Coursera certificate, and received some additional feedback from Martin Streng. Next to the sessions, Martin Streng also created a Slack page.

Discussion
Students were generally positive about the online course: The course was quite straight-forward and easy to follow.

Unfortunately, the sessions were not very successful. Martin gave the responsibility for discussions and interaction to the students, but not much interaction happened. Though there were some presentations and discussions at the start of the course, towards the end the sessions were not very fruitful. Martin attributes this to the high workload that students have, which causes them to prioritize those courses/subjects which have more pressing deadlines et cetera. To combat this, interaction can be facilitated more by the teacher, for instance by measures like more deadlines and requiring presentations from each student.

Since the course ran the whole semester, and as everyone could determine their own planning, some students were way ahead of other students, somewhat to the detriment of the discussions. To improve this, the span of the course can be restricted to only Q3 for instance.

Lastly, next year Ruud could possibly be available to teach this course again, as he has more knowledge of the topic than Martin.

Deep Learning

created by: Tim Roelofs

e-mail: t.j.t.roelofs@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Martin Streng

Summary of the course

This 3EC elective was taken by 4 students, who had all also taken the Machine Learning elective. The syllabus can be found here. In this course, the online Deep Learning course on Udacity by Google, as well as a textbook the book *Deep Learning* by Ian Goodfellow, Yoshua bengio and Aaron Courville, were used. Furthermore, course had every student do a capstone project that involved deep learning. This project had to be presented at the end of the course, and the student was assessed by Martin Streng and Bernard (as he has more subject knowledge). The friday sessions from machine learning were also used for this course.

Discussion

All four students managed to finish their project and they all passed the course. Martin said that he and Bernard were positively surprised by the quality of the projects.

There are some improvement points for this course.

The choice of online course and book could be improved. The online course was not very good and did not fit the level of the students, so most decided not to finish it. The book was too deep for this course as well. Better materials can be picked next year.

Just like for machine learning, the sessions of friday were not very successful, and students did not seem to prioritize this course. By using the sessions as progress updates, more interaction could be achieved.

For the final presentations, more people could be present. Now, only the four students were there (plus martin and bernard), but perhaps it would also be interesting for other people interested in AI.

Because there was limited input on the projects (only from the other students and Martin, but they aren't experts either), there was a risk that students would not be able to complete their projects. Martin had faith in the group though, which is why he initially decided to greenlight the course - and it all turned out fine in this case. However, next year, again a judgement should be made whether it would be feasible for students to finish their project.

Mechanics of materials

created by: Leron Kok

e-mail: l.w.kok@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Jasper Homminga

Summary of the course

The course mechanics of materials taught about the knowledge needed for the analysis of the mechanical behavior of structures. Therefore, eight lectures were given were first the topics for that week were discussed, after which there was the possibility to do some assignments. The students could also read about the topics in the book *Mechanics of Materials, Steif P.S. (2012).* Course competence could be proven by doing one of the five provided take-home exams.

EduCo semester survey
(n=6, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	4.0	0.6
2. This course featured both group and individual work	2.2	0.9
3. During this course, students were provided with a sufficient level of guidance	4.0	0.6
4. For this course, there was a variety of possibilities to prove your competence	4.0	0.8
5. This course facilitated personalization	3.2	0.7
6. This course related to the semester project and other courses	2.7	0.9
7. The course material was useful and relevant	4.0	1.0
8. This course allowed for an even distribution of the workload over time	4.2	0.4
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	4.5	0.5
10. Feedback given by the teacher(s) was complete, useful and timely	4.2	0.4
11. The teacher was sufficiently available for questions/feedback about the course	4.2	0.7
12. The teacher seriously took students' feedback about the course into consideration	4.2	0.4
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	4.0	0.6
14. The teacher(s) taught the course in an engaging and effective way	4.2	0.4
15. The format of the course was engaging and conducive to learning the course material	4.0	0.6

Discussion

Generally, students were positive with the course. The score on relation to the semester project is low, but as this elective was not mandatory, this is not a problem of the course. The score for personalization is also a bit low, as the provided take-home exams were quite well defined on beforehand. This could be improved next time. Finally, students missed that there was no option for a group assignment.

Suggested solutions to problems

- Offer a group assignment.
- Offer more room for personalization within the course.

Agreements

- Jasper will incorporate a group assignment in the course next year. This group assignment will link to the real world, and will be more free for ideas from students to offer more personalization.

Ethics (Project)

created by: Leron Kok

e-mail: l.w.kok@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Sander Voerman

Summary of the course

During the first phase of the project, an introduction to value-sensitive design was given by Sander Voerman. The introduction consisted of four lectures and two group discussions where it was discussed how value-sensitive design could be applied in the project. At the end of the introduction, an individual position paper had to written in which the student had to argue for or against a philosophical position. On request of Sander Voerman, this introduction lecture has been evaluated as a separate course.

EduCo semester survey

(n=11, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	3.4	0.9
2. This course featured both group and individual work	2.2	0.8
3. During this course, students were provided with a sufficient level of guidance	3.6	1.3
4. For this course, there was a variety of possibilities to prove your competence	2.3	0.9
5. This course facilitated personalization	4.2	0.6
6. This course related to the semester project and other courses	3.5	0.8
7. The course material was useful and relevant	3.9	1.1
8. This course allowed for an even distribution of the workload over time	4.0	0.7
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	4.1	0.5
10. Feedback given by the teacher(s) was complete, useful and timely	3.1	0.6

11. The teacher was sufficiently available for questions/feedback about the course	3.8	0.6
12. The teacher seriously took students' feedback about the course into consideration	3.7	0.7
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	4.2	0.6
14. The teacher(s) taught the course in an engaging and effective way	3.8	1.4
15. The format of the course was engaging and conducive to learning the course material	3.6	1.4

Discussion

In general, students enjoyed this introductory course. The opportunities for evidence were limited with only one individual assignment, but for such a small course this should be fine. The course itself did not offer group work, but this was already incorporated in the project. The feedback on the final assignment was given quite late, so that could be improved for next time. However, students were happy with the quality and quantity of feedback they received.

Suggested solutions to problems
● Feedback could be given earlier next time.

Agreements
● Feedback will be given faster next time.

Ethics (Elective)

created by: Leron Kok

e-mail: l.w.kok@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Sander Voerman

Summary of the course

The course ethics in design taught about the ethical aspects in design and engineering. Therefore, nine sessions were scheduled. During the first session, the schedule for the rest of the sessions was made in accordance with the teacher and the students. During the first three sessions, the topic of value-sensitive design was further discussed. In the following 4 sessions, two students could present individually or together about a topic of their interest related to ethics in design. During the last two sessions, Sander Voerman told more about his research project in the healthcare system. Evidence for the course was the presentation that the students gave.

EduCo semester survey
(n=6, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	4.0	0.6
2. This course featured both group and individual work	3.7	0.9
3. During this course, students were provided with a sufficient level of guidance	4.5	0.5

4. For this course, there was a variety of possibilities to prove your competence	3.8	1.1
5. This course facilitated personalization	4.5	0.8
6. This course related to the semester project and other courses	4.7	0.7
7. The course material was useful and relevant	4.5	0.8
8. This course allowed for an even distribution of the workload over time	4.3	0.7
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	4.7	0.5
10. Feedback given by the teacher(s) was complete, useful and timely	4.5	0.8
11. The teacher was sufficiently available for questions/feedback about the course	4.7	0.5
12. The teacher seriously took students' feedback about the course into consideration	4.7	0.5
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	4.0	0.6
14. The teacher(s) taught the course in an engaging and effective way	4.2	0.7
15. The format of the course was engaging and conducive to learning the course material	4.0	0.6

Discussion

The course was perceived very well by the students, with no scores lower than 3.7. The only thing that can be mentioned is that there could have been more group work in the course, as well as more options for evidence. However, as the course was set up in accordance with the students, they agreed with this at the start of the course. Furthermore, next time the course will likely be set up in accordance with the students again, so that the format might change. The only other thing that has been discussed was that while it was originally the plan students would give each other feedback on their presentations, this did not happen much, especially not at the later presentations. Sander Voerman will therefore plan some time directly after the presentations where students can give feedback to the presenter.

Suggested solutions to problems
- None

Agreements
- Peer feedback after presentations will be better regulated, so that every student can get enough feedback.

Introduction to Light & Matter

created by: Leron Kok

e-mail: l.w.kok@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Jennifer Herek

Summary of the course

The course Light & Matter: Introduction to optical spectroscopy taught about the basic principles of optical spectroscopy. The course was given by Jennifer Herek, and as course literature the book *Physical Chemistry, Atkins P.* was used. Besides one introduction session, Three sessions discussing the theory of spectroscopy were held. Furthermore, there were two practical sessions during which the students had to build and test a spectrometer in some sort of scrapheap challenge. Students also had to made a poster about a topic of their interest (preferably in duo's), which were presented during the last group session. This poster was used as evidence, together with a primer that had to be written about an assigned topic and a report that had to be written about the practical. Finally, during the SER-week, knowledge competence was further proven in a pairwise scientific discussion.

EduCo semester survey

(n=7, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	4.4	0.7
2. This course featured both group and individual work	4.6	0.5
3. During this course, students were provided with a sufficient level of guidance	3.1	1.2
4. For this course, there was a variety of possibilities to prove your competence	4.3	0.7
5. This course facilitated personalization	4.4	0.5
6. This course related to the semester project and other courses	2.0	0.8
7. The course material was useful and relevant	4.3	0.7
8. This course allowed for an even distribution of the workload over time	3.3	1.2
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	4.3	0.7
10. Feedback given by the teacher(s) was complete, useful and timely	4.6	0.7
11. The teacher was sufficiently available for questions/feedback about the course	3.6	0.7
12. The teacher seriously took students' feedback about the course into consideration	4.3	0.9
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	4.4	0.7
14. The teacher(s) taught the course in an engaging and effective way	4.6	0.5
15. The format of the course was engaging and conducive to learning the course material	4.1	0.6

Discussion

Generally, the course scored good, and students liked the course. The score for guidance is relatively low, possibly because there were only three sessions with the teacher to discuss the theory.

The score for relation to the project is low, but is not a problem of the course as it is an elective.

The distribution of workload is also relatively low, as some assignments were due at the end of the quartile. However, students could have chosen to finish assignments earlier.

Some students indicated the expectations of the lab-report were unclear, so this could be made more clear in advance next time.

The lab sessions were currently done with four or five persons in a group. These groups were too big to make sure everyone was involved in the experiments. Next time, it would therefore be better to have smaller groups.

Finally, there was no intermediate feedback given during the courses, while some of the assignments already had to be handed in before the end of the course. This could be improved next time.

Suggested solutions to problems
- Offer more guidance, for example by having more lectures.
- More intermediate feedback could be given, so that students can improve themselves during the course.
- The expectations of the lab-report could be made more clear in advance.

Agreements
- Next time, the lab session will be done in duo's.
- The number of contact hours will be increased, for example by having office hours.
- The course might start earlier if possible, to give students more time for the assignments.
- Jennifer will try to give more intermediate feedback.
- Jennifer will give more information on the expectations for the lab-report on beforehand. Furthermore, she will organize a session after the lab sessions to discuss the results, and how these can be visualized and interpreted.
- There will be more focus and guidance next time on the topics students choose for their poster.

Introduction to Management

created by: Kamiel Verhelst

e-mail: k.j.verhelst@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

teacher: Frank van den Berg

Summary of the course

This course was set up to give the students an introduction to Management theory ánd practice. It revolved around four themes: planning, organization, leadership and control. The schedule included 3 practical sessions organized by the teacher (Frank vdB), 4 theoretical sessions organized by students. The assignments were: an essay on Historical Perspectives on Management, an essay on a new management perspective and a final assignment. In this final assignment, students were asked to do a case study of an organization, to interview one of its managers and relate the findings to the course theory.

EduCo semester survey

(n=9, scale 1-5)

EduCo Criterion	Score	SD
1. This course sufficiently conveyed both theoretical and applied knowledge	3.7	0.9
2. This course featured both group and individual work	4.1	0.8
3. During this course, students were provided with a sufficient level of guidance	3.0	1.1
4. For this course, there was a variety of possibilities to prove your competence	3.1	1.1
5. This course facilitated personalization	3.7	1.0
6. This course related to the semester project and other courses	3.0	1.5
7. The course material was useful and relevant	3.3	1.4
8. This course allowed for an even distribution of the workload over time	3.4	1.6
9. The communication about learning goals, schedule, deadlines and possibilities for evidence was clear	4.2	0.8
10. Feedback given by the teacher(s) was complete, useful and timely	4.2	0.7
11. The teacher was sufficiently available for questions/feedback about the course	4.2	0.7
12. The teacher seriously took students' feedback about the course into consideration	3.5	0.9
13. Sufficient knowledge input and support was given to reach the learning goals set for this course	4.0	1.0
14. The teacher(s) taught the course in an engaging and effective way	2.9	1.3
15. The format of the course was engaging and conducive to learning the course material	2.8	1.3

Discussion

The questionnaire results are generally positive. The course scores high on clarity (point 9), variety (points 1 and 2) and the teacher's feedback quality and availability (points 10 and 11).

The lower scores can be found in the 'engaging and effective teaching' (point 14) and the format of the course (15). These low scores can be explained when looking at some of the comments the students made. Multiple students indicated that the sessions organized by students varied in quality a lot, and sometimes the theory from the reading materials was repeated extensively.

Secondly, multiple students comment that the course load was more than the 3 ECs they received for it. Also, one student mentioned it was quite inconvenient that the deadline exceeded the quartile in which the course was given.

One student comments that (s)he already did some of the workshops before, or something similar. Of course, this will be quite hard to avoid, but it is at least advisable to update the workshops regularly.

Finally, students indicate that they like a practical, case study approach a lot. Possibly this can be applied also to the lectures, instead of just the final assignments.

Suggested solutions to problems

- In order to raise the quality of the sessions organized by students, the standards should be higher. For example: create guidelines, give examples, give inspiration.
- Students can be encouraged to present a case study in their organized session, or at least 'bridge the gap between theory and practice'.
- I suggest the course to be shortened by removing one of the first assignments.
- In order to avoid the course to exceed the time it has (one quartile), students should be encouraged to start the final assignment early (from the first course week). Another possibility would be to change the course time to one full semester.

Agreements
No formal agreements were made.

Introduction to Management

created by: Natasha Birari

e-mail: n.birari@student.utwente.nl

year/semester: Semester 2/4, 2017

teacher: Valerie Lapp

Summary of the course
The Introduction to Control Theory course was given by Valerie Lapp, supervised by Martin Streng. It was intended as a Semester 4 course, but was also attended by a few Semester 2 students. The course was 3 ECs and covered different topics of feedback control. We used the textbook Feedback Systems: An Introduction for Scientists and Engineers (˚Astrom and Murray). The course started in the fourth quartile of the year. The course used a flip-classroom approach, so that

1. you had to read up on the planned chapters at home before class.
2. in class you work on a case study and concept questions under supervision. Almost each in-class session also involved a presentation by one of the students on the planned chapter.
3. after class you work on practice problems and challenges.

Assessment was in two parts: classroom participation, and challenge problems (3 of which needed to be submitted to pass the course, and more for passing with excellence). Students could volunteer to do these presentations by email for gathering extra evidence. There was a possibility of a take-home test for students who somehow missed one of their deadlines for assignments. There was a feedback session at the very end of the course where we could give suggestions to Valerie and Martin, discuss what worked and what didn't.

Discussion
In general, course was well-organised and also well-received by the students. Valerie was always very timely with feedback, and the deadlines and schedule were always clear and accessible on Blackboard. The course syllabus clearly described the the course outline, topics, learning goals, prerequisites, assessment options. There were some ambiguities about the assignments, which was cleared up in the second and third weeks of the course.

The course was designed to be more mathematics-oriented than physics-oriented. However not all students were aware of this, and they expected more physics and less maths when they signed up. This was mainly the case with Semester 2 students.

Suggested solutions to problems

- Use a different textbook, as the one we used was not really liked by anyone - it was quite disorganised in terms of content and was not engaging.
- Make the quality of the assignments better by reducing ambiguity in the questions and making them clearer in terms of context, background knowledge, clear descriptions of variables and so on.
- The answers to practice problems could be made public already at the end of the class instead of waiting until the next class, because many students were initially confused and unsure about whether or not they were solving homework questions correctly or whether they had understood something correctly since they didn't know what 'success' looked like. This suggestion was adopted by Valerie a couple of weeks into the course.
- There could have been a possibility to combine this course with programming, however such a possibility had not been explored. There was a matlab script provided and regularly updated, but this could not successfully be used by sem2 students as they had little to no knowledge of matlab prior to taking this course (this may not be the case with the class of 2020, as they have had programming classes for MATLAB in their first semester already)

Agreements

No formal agreements were made.

Electives & Exchange

created by: Kamiel Verhelst

e-mail: k.j.verhelst@student.utwente.nl

year/semester: Semester 4, 2017, class of 2018

coordinator: Jan Schut

Summary of activities
In the fourth semester of 2017, there was 16 EC of elective space. A lot of internal electives were offered (+/- 20). This stressed the need for clear communication between students and the teacher team. The formal choices were passed on through a PDP attachment, but the preferences–to give teachers an idea of how to prepare their course– were indicated in a shared online spreadsheet. External electives could be arranged with Jan, like in semester 3.

Semester 4 is the semester in which the Exchange is arranged, which is a process of many preferences, selections and formalities. This year, the system Mobility Online was introduced, to smoothen the formal process.

Exchange Survey
(n=12, scale 1-5, date: End of June, 2017)

Question	Score	SD
I am well-prepared for my Exchange	3.58	0.51
I am satisfied with WHERE I am going	4.75	0.62
I am satisfied with WHAT I will study	3.92	0.67
Arranging my Exchange went fluently	3.42	0.90
The arrangement was NOT paired with a lot of uncertainty	2.92	1.00
Class sessions with the Exchange Coordinator were informative	2.83	0.94
Class sessions with the coordinator motivated me to arrange my Exchange	3.83	0.72
The coordinator provided useful information outside class meetings	4.33	0.65
Communication with the Exchange Coordinator was clear	3.83	0.72
The coordinator was often available for questions	4.17	0.83
Mobility Online guided me through the Exchange arranging process nicely	2.83	1.11
Mobility Online was clear in use	2.92	1.16
I knew WHAT information to find on Blackboard	3.08	1.00
I knew WHERE to find the right information on Blackboard	3.50	1.00
There was enough information on Blackboard	3.42	0.67

Discussion
Electives

The elective procedure has not been evaluated explicitly this semester. Overall, it went quite fluently. There were some discussion points regarding electives, but they were more in-depth than the practical arrangements.

Some points noted by the EduCo that should be focused on next year (copied in Suggestions below):

- Make sure teachers upload their syllabi/course descriptions timely so that students can make informed decisions.
- Set an upper limit for how many ECs can be chosen, or at least let the mentor critically look at if the student can complete a high number of ECs (to avoid dropouts).
- Long-term: create a sign-up system for electives, which will save administration work.
- Make very clear to students what happens when they fail their elective or when their results come in later than the evidence deadline.

Exchange

The survey data above gives a general impression of the strengths and weaknesses in the Exchange-seeking process of this year. It is good to start off with the observation that most students are very happy with their destination and the courses they will do. They feel quite prepared (3.6/5). However, they do indicate that the process was paired with quite some uncertainty, and that it was not very fluent.

These lower scores might relate to Mobility Online, which was a new system for both the students and the staff. Some technical problems caused confusion along the way, and the system was not always clear in use. Since Mobility Online is an external system, we will not feel responsible for evaluating it.

The uncertainty mentioned above–but also uncertainties caused by host institutions–were greatly mitigated by the availability of Jan Schut, the Exchange coordinator. He had regular office hours and was often able to help directly (4.2/5 score on availability). He also provided a lot of information and support to students individually.

Then, an observation from the EduCo: we got quite some questions from students about when to expect selection outcomes. It would be a good idea to send more regular emails about this to keep the class informed. The frequency of emails in general was good, but could have been a bit higher.

The class sessions, in which the coordinator gave information about certain options and procedures, were not always found useful. They did, however, motivate students to arrange their Exchange.

Lastly, the information available on Blackboard appeared to be sufficient. The only thing was that students were not fully aware of what could be found on Blackboard.

Suggested solutions to problems
Electives

- Make sure teachers upload their syllabi/course descriptions timely so that students can make informed decisions.
- Set an upper limit for how many ECs can be chosen, or at least let the mentor critically look at if the student can complete a high number of ECs (to avoid dropouts).
- Long-term: create a sign-up system for electives, which will save administration work.
- Make very clear to students what happens when they fail their elective or when their results come in later than the evidence deadline.

Exchange

- Put more emphasis on explaining the use of Mobility Online

- Send regular emails on where everyone is/should be in the process, especially regarding selection outcome.
- Idea: let students read the Blackboard material before the class sessions, so that these sessions can be more focused on Q&A than on a one-way flow of information. This will also make sure they know what is on Blackboard.

Agreements

No formal agreements were made.