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Study of Teaching and Learning Activities and Constructive Alignment Aiming at Deeper Learning

Sami S. Brandt

Department of Computer Science, University of Copenhagen

Introduction

Marton and Säljö's (1976) model categorize learning into two distinct approaches called the surface and deep learning. The surface approach focus on inappropriate and/or low level activities where as deep approach focuses on understanding the message what the author is actually trying the say. Some students (Susans) intend to naturally select the deep approach where another group of students (Roberts) have different objectives and would naturally select the less effective surface approach. However, by well-designed teaching, it is possible make more of those students who would naturally select the surface approach to select the deep approach.

This project is fundamentally oriented along the Level 3 objectives Biggs & Tang (2007), that focuses what the student does and on how well the intended learning outcomes are achieved. The project is carried out along with the course Signal and Image Processing at the University of Copenhagen. The project is essentially (1) formulating weekly and course intended learning outcomes (ILOs) that relate to mastering the course topics, (2) designing teaching and learning activities (TLAs) to achieve the stipulated levels understanding, and (3) constructive alignment, i.e., designing the assessment in such a way that it measures the ILOs as well as possible.

The organisation of this report is as follows. I start by defining weekly ILOs for each week. And I provide a suggestion, on the basis of the weekly ILOs, for revised course ILOs for next year. Using weekly ILOs, I then designed TLAs to serve the deeper learning. Afterwards I describe how con-

structive alignment was achieved in the assessment. The results are then discussed, where I investigate both the grade distribution and student feedback. The conclusions follow in the last section.

Intended learning outcomes

Weekly ILOs

As the basis for each week teaching, I formulated the ILOs for the week, and designed the TLAs and the assessment to be aligned with the selected ILOs. As the starting point I used the ILOs of the course (see Appendix A), but since the course ILOs are about to be developed as part of the project I took the freedom to step into direction that serves deeper learning objectives.

As the theoretic basis I used both SOLO and Blooms taxonomy (Biggs & Tang 2007) and emphasized verbs that imply deeper leaning objectives with understanding on the relational and extended abstract level. In determining the intended level of understanding I took into the consideration that the course is a Masterï¿½s level course and using my own judgement what are the most important topics in the course.

The weekly objectives I designed on this bases are collected into Figure 10.1.

Revision of the course ILOs

After the course, I summarized the ILOs to provide a suggestion for a revised course ILOs for next year. An earlier consideration of the course ILOs (see Appendix B), made in part of the Adjunktpædagogikum, was also taken into consideration. The modification was preformed so that the revised ILOs are aligned with the programme ILOs.

Similarly, as on the week level, I picked up the appropriate verb characterizing the intended level of understanding and tied that together with the course topics. Even though I taught only a half of the course, using the same principle, I proposed the course ILOs in total since the course ILOs needed a thorough revision. The proposed revised course ILOs are below.

To get maximum grade the student must successfully be able to:

- Discuss and apply the theoretical basics of digital signal and image processing

• Relate the processing of discrete and continuous signals. • Relate sampling, signal band width, aliasing, and the role of the anti-aliasing filter, interpolation, and resolution. • Reflect and design of low-pass high-pass, band-pass digital filters. • Relate the extension of digital signals by zero-padding and non-periodic signals. • Apply filtering of discrete signals in practise. (a) Week 2	• Discuss, explain, and demonstrate, the concept of noise. • Identify, analyse, characterise and use linear and shift invariant systems. • Relate the point spread functions and transfer functions. • Interpret, explain and illustrate inverse filtering in well-posed and ill-posed problems. • Design, compare, and characterise noise removal and inverse filters for image restoration. (b) Week 3
• Explain the limitations of Fourier analysis. • Explain the ideas of multiresolution analysis for signals and its benefits. • Relate multiresolution analysis, signal subspaces, scaling functions, wavelets, and filter-banks. • Perform time-frequency analysis of signals. • Apply multi-resolution analysis for images. (c) Week 6	• Explain the data compression fundamentals. • Relate different types of redundancy. • Explain the fundamental principles of image compression methods. • Relate the lossless and lossy compression approaches. • Design and implement methods for image compression. (d) Week 7

Fig. 10.1. Weekly ILOs for the Signal and Image Processing Course.

- Reflect the linear processing of signals and design and apply digital filters for discrete signals.
- Explain and identify different types of noise, design noise removal algorithms for image restoration and solve statistical linear inverse filtering problems for images.
- Compare Fourier analysis to multiresolution analysis, relate the fundamental concepts of multiresolution analysis, and perform time/space-frequency analysis for signals and images.
- Analyze the image histograms, and transform the images to another forms to enhance the visual content of the image or to facilitate easier interpretation and processing.

- Explain the fundamental image segmentation approaches and implement them to extract homogeneous regions on the images.
- Explain the principles of image compression methods and design and implement lossless and lossy compression methods for image compression.
- Relate and apply elementary representation methods in description of image content.

Teaching and learning activities

The weekly ILOs provided me the basis to design the TLAs that serve deeper learning. I decided to use student centred activities and self-reflections as well as supervision feedback to guide in the development. The TLAs were also intended to guide the students towards solving the mandatory exercise and make this transparent to the students. I always started the week by stating the ILOs of the week so that it was clear to the students what was expected.

The course contained five hours of teaching on each week plus three more with the teaching assistant, where she was helping the students with the mandatory exercise of the week. I initially thought dividing the week to $2 \cdot 45$ minutes of lecturing on Mondays and 45 minutes on Wednesdays and using one or two more hours on exercises with the students. I always had a 15 minutes break after every 45 minutes teaching. I was flexible to modify the TLAs according to what seem to work well with the students and matched with the topic. In the following I am now going to discuss what kinds of TLAs I selected for the class.

Week 2

On the first lecture I used student activation in the form of providing them small problems about every 20 minutes. I let the students discuss with the neighbour a couple of minutes after which I discussed the answers with the students and provided the institutionalization. The problems were selected so that they guided towards a deeper understanding of the topic, typically relational level of understanding according to the SOLO taxonomy. An example of such a problem I used was the following.

How well do the discrete samples represent the continuous function in practise? In what case is it accurate? In what cases is it inaccurate? Can it be perfect? Discuss the question with you neighbour.

My pedagogical supervisor Michael Drastrup was listening to this lecture and provided a feedback that he could hear from the student discussion that they got into a deeper level of learning as anticipated.

For the Wednesday exercise session I selected a collection of problems, that I let the students solve alone first and then I was intended to circulate in the class and finally go through the answers with the students on the white board. However, I noticed a problem in the class as the students did not react as I expected but turned into a passive mode. To cope with this problem, I decided to solve the exercises interactively on the white board so that I continuously asked the students how one should proceed. This seemingly worked much better as I keep them active.

Week 3

As to the lectures on the Week 3, I continued in the same track as on the Week 2 but I decided to give one a slightly bigger problem for the students for which I used about 20 minutes of the lecture. In practice, I introduced a problem in one-dimensional signal processing and then lectured solutions for analogical problems in image processing. After presenting three different approaches I let the students discuss how these approaches could be used in solving the given analogical one-dimensional problem. I got really interesting discussion from the students since the problem was such that there was not a clear answer. The setting forced them to a deeper learning through the discussions and reflections against the two-dimensional examples.

On Wednesday I decided to mix the traditional lecture and exercise sessions in order to increase the student activation. I took related problems every now and then in a middle of the lecture and I solved interactively with the students. An example activation
problem was.

Exercise: What is the adjoint when the linear operator is a real matrix?

Thus using the Level 3 objectives (Biggs & Tang 2007) the focus was on what the students did. Working in this way thus provided at least two benefits: (1) the student activation and learning by doing and (2) formative

feedback what the student have actually absorbed from the lecturing part. The mathematical content was quite challenging to the students, but as my department supervisor Sï¿½ren Olsen noted during after the session, by giving only a little help, the students were able to solve relatively advanced tasks. I also could sense from the atmosphere of the class that the students learnt a lot during the session, and could literally hear the moments when certain things were illuminated to them.

Week 6

The topic of the week 6 was the most advanced on the course. The course book did not help me a lot in this matter, since the chapter was quite poorly written. I therefore put a lot of emphasis on developing the lecture slides and first provided an intuitive definition of the wavelet transform. Then to reinforce the learning on the students I provided a task for them to formulate themselves what the topic was about:

On the basis of the discussion above, please formulate verbally a sentence describing what the wavelet transform is, and write it down. Work in groups.

I collected the answers and discussed each of them and provided a definition given by the mother of the theory to provide the institutionalization.

As I found from the week earlier, I increased using small exercises on the lectures so that I kept the student actively working on the topic during the teaching sessions. I thus no longer had a separation to a traditional lecture and exercise sessions but they were more fused together so that the exercises provided the student activation part couple of times on each teaching session.

Week 7

On the last week when I taught, I continued the teaching by mixing lecturing and student activation by questions and exercises on the Monday teaching session. However the topic contained many different approaches and methods, so I decided to make a group work on Wednesday, where each group selected method and prepared a 10 minutes presentation of the main idea of the method and how it would suit for solving the mandatory exercise of the week. The motivation for this group work was that, as

stated in (Biggs & Tang 2007) a most effective learning method is to teach somebody else. By the group work they (1) prepared the presentation, and teaching the method to the others and (2) got the other students conclusions how technique could solve the mandatory exercise of the week.

Constructive Alignment

In the assessment of the course I used continuous evaluation. In practise it meant that the students got a mandatory exercise every week and the grade of the course was determined as the mean over the grades of the mandatory exercises. The constructive alignment was obtained by selecting such mandatory exercises that measure as well as possible the weekly ILOs. I also made it explicit to the student that the weekly objectives are those towards we worked during the weeks and the mandatory exercise is going assessed against the weekly ILOs.

In the continuous assessment I see it is important to see the difference to exam. In preparation to the exam the students would not know what is going to be asked and the questions could sample only some relevant parts of the ILOs. This also gives a possibility to speculate the exam questions and would easily encourage the students to use surface learning tools. On the other hand, in continuous evaluation the students know the questions in advance, so it is very important that the ILOs are completely covered since the students tend to work only on topics they are assessed. One might criticize that the students might have only returned the mandatory exercises and passed the course - but the ability of completing the mandatory exercise was aligned with weekly ILOs, i.e., I did not provide any way through without entering the deep learning.

As far as the course was concerned, I carefully reflected upon the weekly ILOs and designed the mandatory exercise to maximally meet those i.e. providing the constructive alignment. I considered wide variety of problems from theoretical pen-and-paper exercises towards practical programming exercises. I also used an essay assignment since I found it most suitable to one part of the weekly ILOs and simultaneously it was part of the learning process since the students had to work through the ideas themselves. The evaluation form hence allowed continuing the learning process longer while the final product of the learning process was assessed.

Results

Mandatory Exercises

The evaluation form of the course was continuous assessment that meant that we have a mandatory exercise on each in order to assess the weekly learning. Each exercise was assessed with the 12 point ECTS scale and the mean of the grades was the used as the final grade of the course. The distribution of the grades of the mandatory exercises is collected in Figure 10.2. The Peak on -3 on the left is due to the fact that of the 33 students who signed up on the course 9 dropped the course in an early phase. The graph suggests that deep learning was achieved on most of the students as the distribution is monotonically increasing from grade 2 upwards.

Student Feedback

The course was taught together with Francois Lauze so the student feedback reflected the teaching given by both of us. However, I added extra questions to the student evaluation form that precisely asked the learning with respect to the weekly ILOs which I set in the beginning of my teaching weeks in order to get more focused response of my teaching. The student feedback is collected to Appendix C.

As to the weekly ILOs, 80% of the students reported that they were ambitious but realistic. The majority of the students (60%) complained that the workload was by far too high. However, about 80% of the students used less than 30 hours per week for the course and 40% 25-30 hours, so course being 7.5 ECTS course, the computational time budget for each week is 25.75 hours week. In this light, I do not think that workload was much too high after all.

Concerning the TLAs, the majority of the students about 65% reported that the lecturing supported well in achieving the learning objectives. 70% agreed or strongly agreed that the teaching material was adequate for the course. Majority (55%) also found that the student activations supported moderately or well the weekly ILOs. And 65% strongly agreed or agreed that there was good coherence between the course elements.

As to the constructive alignment, over 90% of students found good or very good correspondence between teaching and course objectives. About 70% found that the mandatory exercises were well or very well aligned to measure the fulfilment of the objectives of the week. Most importantly,

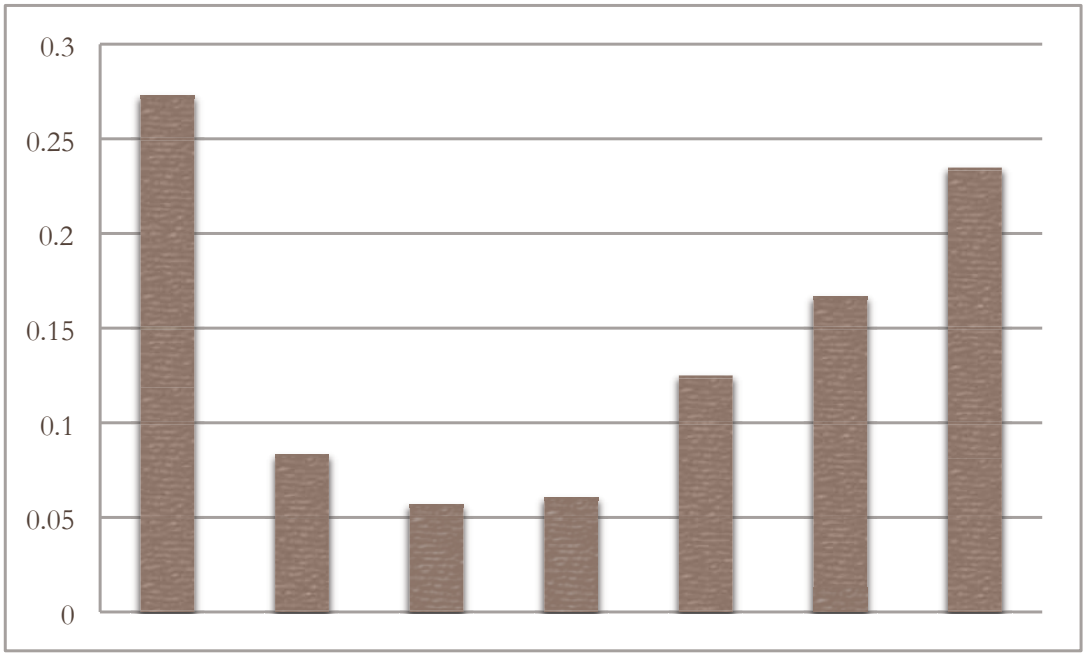

Fig. 10.2. Empirical distribution of the grades of the mandatory assignments. The bars refer to the 12 point ETCS scale i.e. the bars correspond to the grades -3, 0, 2, 4, 7, 10, and 12.

when asked how the students would characterize their learning outcome with respect to the weekly learning objectives, 50% reported that they learnt almost all topics deeper or mostly deeper and 30% of the students learnt some topics deeper and some on the surface.

Conclusions

In this project I have studied designing intended learning outcomes, teaching and learning activities, and constructive alignment aiming at deeper learning during the course Signal and Image Processing. I found it fruitful to try different kinds of teaching and learning activities depending of the course topics. I realized that different methods work in different situations and even the mandatory exercise was an important part of the deep learning. In my experience, the continuous evaluation suits very well for these kinds of courses, while the mandatory exercise can be formulated in such a way that they directly measured the learning objectives of the course. Both quantitative results as well as student feedback suggested that deep learning

outcomes were achieved and the teaching was well aligned. The students criticized the high workload but simultaneously they reported deep leaning outcome and gave overall positive feedback of the course. In the light of all these results, it can be concluded that the goals of this project were successfully achieved.

A Course description

SIS-hovedside -> Naturvidenskab -> Datalogi -> Kandidatuddannelsen -> Blok 1

Signal and image processing

C 7,5

Udgave:	Efterår 2012 NAT
Point:	7,5
Blokstruktur:	1. blok
Skemagruppe:	C
Fagområde:	dat
Varighed:	Full quarter
Omfang:	About 20 hours of course activity per week.
Studieordning:	Computer Science Master
Uddannelsesdel:	Kandidat niveau
Kontaktpersoner:	Sami Brandt, sbrandt@diku.dk
Andre undervisere:	Francois Lauze
Skema-oplysninger:	Vis skema for kurset Samlet oversigt over tid og sted for alle kurser inden for Lektionsplan for Det Naturvidenskabelige Fakultet Efterår 2012 NAT
Undervisnings-form:	The course will be a mixture of lectures, pen-and-paper exercises and programming exercises in e.g. Matlab
Formål:	The purpose of this course is to give the student working knowledge of common pre-processing algorithms on data sampled on a regular grid, with special emphasis on how basic concepts from continuous analysis are used as data models, and how these may be implemented numerically.
Indhold:	This course is about transformation and analysis of sampled data. Methods and examples are drawn from applications on 1D signals and 2D images. The tools learned are common first steps in any application involving sampled data. Topics to be covered are: • Signal and image processing fundamentals • Sampling, Sampling theorem, Fourier transform • Convolution, linear and non-linear filtering • Image transforms • Image restoration, inverse filtering • Image segmentation and feature extraction • Representation, and description • Data compression
Målbeskrivelse:	To get maximum grade the student must successfully be able to: • Know and apply the theoretical basics of digital signal and image processing • Implement filters in the frequency and spatial domain. • Implement algorithms for pre-processing of images and evaluate the result. • Analyze and highlight the relevant content of images by using image transforms. • Understand the principles and design filters for image restoration. • Write programs that extract features such as edges and regions. • Know and apply elementary representation methods in description of image content • Know and apply the principles of image compression methods
Tilmelding:	Via KUnet from May 15th to June 1st.
Faglige forudsætninger:	None.
Formelle krav:	None.
Eksamensform:	Continuous evaluation of written assignments evaluated using internal grading and the 7-point grading scale. Re-exam: oral examination (25 minutes including grading) in course curriculum without preparation. Internal grading using the 7-point grading scale.
Eksamen:	Løbende evaluering. Reeksamen: Mundtlig prøve den 30. januar 2013.
Undervisnings-sprog:	Kun engelsk
Sidst redigeret:	10/5-2012

B Reflection of the Intended Learning Objectives (ILOs) on the Signal and Image Processing Course ï¿½ Sami Brandt, Adjunktpædagogikum 2012

1. The intended learning objectives (ILOs) of the course are attached to the end of this document. In my opinion the students should understand the related theory signal and image processing and become able to successfully apply image and signal processing tools in practical problems. The ILOs are in the right direction, but they would need to be revised to obtain better learning outcomes: explain, analyse, and reflect should be used, for instance, instead of know, apply, etc. The objectives are operational, i.e., they can be used to help planning of the teaching; however, during the teaching one should continuously reflect what are actually the most central parts of the course and revise the objectives for the next year. The course is assessed using continuous evaluation without an exam, which suits well to this kind of course, where one learns most by doing. ILOs and Teaching and Learning Activities (TLAs) are somewhat aligned but ILOs can be revised to improve the alignment. The final assessment is based on the ILOs (summative assessment) which makes it imperative to revise them to obtain better learning outcomes. In my opinion the course is constructively aligned, but needs careful review and revision next year during the development of the course.
2. To summarise the changes I would like to suggest to the ILOs: (1) they should better reflect the deeper understanding of the topics, (2) It is need to consider what are actually the most important topics in the course and reflect those considerations in ILOs, and further in TLAs. Only in this way, we teach the learning outcomes of the students will be better focused, and the constructive alignment correctly implemented.
3. For the study programme of Computational and Mathematical Modelling I would formulate the ILOs as follows.
   Specific competences to:
   - reflect, analyse, compare, relate, theorize complex problems in the domain of computation and mathematical modelling, data-analysis
   - Apply and develop, and evaluate mathematical models, and data processing tools in old and new applications domains

   Specific skills in:
   - Analysis and modelling of real digitized data, signals, and images contaminated by noise and outliers

- Application, implementation, evaluation and comparison of mathematical and statistical models for real data
- Relating and comparing the limitations of analysis and modelling methods
- Formulating, evaluating hypotheses, and testing them experimentally
- Conducting and evaluation of computer-based experiments

Specific knowledge of:

- Numerical and analytical methods for data-analysis, modelling, and simulation
- Statistical and numerical optimisation methods
- Statistical methods for estimation, modelling and model evaluation

Compared to the ILOs of the study programme, I have the following major differences.

As to the competences, I would like to raise the demands so that the objectives would become towards reflecting and theorizing the methods rather than only compare, analyse and evaluate. In addition, instead of just aiming to combine existing methods, I would like that the students would be able apply and develop the methods for different new application domains.

As to the skills I instead of considering only ï¿½noisyï¿½ data, the student should be able to also analyse data containing outliers. One should also be able to compare different analysis tools and critically evaluate their applicability for tasks. Conducting and evaluating of computer-based experiments should be a skill, not knowledge as it is in the current study programme.

As to the knowledge, there should be knowledge about analytical methods in addition to numerical methods in contrast to the current ILOs of the study programme. Statistical optimisation, and statistical evaluation should also be also mentioned.

4. On the Signal and Image Processing course, ILOs are well aligned with the ILOs of the study programme. The assignments are to be designed so that they train the students towards to the competences described. Almost all the ILOs of the study programme are covered (see attachment) - an ILO that is less relevant for the course is the skill of “formulating and evaluating hypotheses that can be tested experimentally, and disseminating, planning for, producing and processing the results of experiments”. In addition, the knowledge about optimization methods will not be disseminated on the course.

C Course evaluation

English 7,5 ECTS

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Number of respondents: 14

1. Multiple choice question	**Percentage**

Name of course: Signal and Image Processing

Course Objectives:

To get maximum grade the student must successfully be able to:

-Know and apply the theoretical basics of digital signal and image processing
-Implement filters in the frequency and spatial domain.
-Implement algorithms for preprocessing of images and evaluate the result.
-Analyze and highlight the relevant content of images by using image transforms.
-Understand the principles and design filters for image restoration.
-Write programs that extract features such as edges and regions.
-Know and apply elementary representation methods in description of image content
-Know and apply the principles of image compression methods

I experienced a good correspondence between the teaching and the course objectives (as indicated above):

(Please indicate the answer that best represents your opinion)

Strongly agree	42,9%
Agree	50%
Neutral	0%
Disagree	7,1%
Strongly disagree	0%
Don't know	0%

2. Multiple choice question	**Percentage**

I think that the practical execution of the course was successful (facilities, equipment, information dissemination etc.):

Strongly agree	0%
Agree	64,3%
Neutral	14,3%
Disagree	14,3%
Strongly disagree	7,1%
Don't know	0%

3. Multiple choice question	**Percentage**

I experience a good coherence between the various course elements (lectures, practical work, etc.):

Strongly agree	14,3%

Agree	50%
Neutral	21,4%
Disagree	14,3%
Strongly disagree	0%
Don't know	0%
4. Multiple choice question	**Percentage**

I experience the course as relevant to my personal educational objectives:

Strongly agree	14,3%
Agree	57,1%
Neutral	14,3%
Disagree	7,1%
Strongly disagree	0%
Don't know	7,1%
5. Multiple choice question	**Percentage**

In cases where I needed feedback on my work (presentations, assignments, papers, reports) I was able to adequately get such feedback from the teachers:

Strongly agree	7,1%
Agree	42,9%
Neutral	14,3%
Disagree	21,4%
Strongly disagree	14,3%
Don't know	0%
6. Multiple choice question	**Percentage**

For me, the teaching material is adequate for this course:

Strongly agree	7,1%
Agree	64,3%
Neutral	7,1%
Disagree	14,3%
Strongly disagree	7,1%
Don't know	0%
7. Multiple choice question	**Percentage**

Compared to my background knowledge I experience that the academic level of the course is:

Far too low	0%
Low	7,1%
Adequate	57,1%
High	28,6%
Far too high	7,1%
Don't know	0%
8. Multiple choice question	**Percentage**
I experience the work load of the course as:	
Much too low	0%
Somewhat low	0%
Adequate	14,3%
Somewhat high	28,6%
Much too high	57,1%
Don't know	0%
9. Multiple choice question	**Percentage**
In this course, for me the average work load per week was: (including classes, preparation, written assignments etc.)	
Under 10 hours	7,1%
10-15 hours	0%
15-20 hours	7,1%
20-25 hours	21,4%
25-30 hours	42,9%
Over 30 hours	21,4%
10. Multiple choice question	**Percentage**
In the begining of the week, the learning objectives of the week were introduced. How would you characterize the weekly learning goals?	
They were by far too ambitious.	0%
They were a little bit too ambitious.	14,3%
They were ambitious but realistic.	78,6%
They were a little bit too light.	0%
They were by far too light.	0%
I do not know.	7,1%
11. Multiple choice question	**Percentage**
How did you find the lecturing during the lectures in the light of the learning objectives of the week?	
It did not support learning at all.	0%
It supported learning only a little.	21,4%
It supported learning moderately.	7,1%
It supported learning well.	64,3%
It supported learning very well.	0%

I do not know.	7,1%
12. Multiple choice question	**Percentage**
How did you find the student activations during the lectures in the light of the learning objectives of the week?	
They did not support learning at all.	14,3%
They supported learning only a little.	21,4%
They supported learning moderately.	35,7%
They supported learning well.	21,4%
They supported learning very well.	0%
I do not know.	7,1%
13. Multiple choice question	**Percentage**
How do you think the teaching and learning activities helped you to solve the mandatory exercise of the week?	
They did not help me at all.	0%
They helped me a little.	64,3%
They helped me a lot.	28,6%
They helped me very much.	0%
I do not know.	7,1%
14. Multiple choice question	**Percentage**
How well do you think the mandatory exercises were aligned to measure the fulfillment of the objectives of the week?	
They were weakly aligned.	7,1%
They were not so well aligned.	7,1%
They were moderately aligned.	7,1%
They were well aligned.	57,1%
They were very well aligned.	14,3%
I do not know.	7,1%
15. Multiple choice question	**Percentage**
How would you characterize your learning outcome with respect to the weekly learning objectives?	
I think I did not meet the objectives at all.	7,1%
I think I learnt the topics mostly on the surface but a little part deeper too.	14,3%
I think I learnt some topics on the surface and some other topics deeper.	28,6%
I think I learnt the topics mostly deeper but some topics only on the surface	35,7%
I think I got deep understanding on somewhat all of the topics taught on the course.	14,3%
16. Multiple choice question	**Percentage**
Which of the following teaching and learning activities helped you in achieving the weekly learning goals of the course? You can select many alternatives.	
Lecturing.	64,3%
Student activation.	21,4%
Training exercises.	42,9%
Mandatory exercises.	85,7%
Self-study.	85,7%

Group work.	50%
Other.	0%
None of the above.	0%
I do not know.	0%

17. Open question

If you have further suggestions for improving the course – or other comments and/or elaborations on your answers above (please refer to question number):

-
- I think 8 mandatory assignments might be a little too much for the grading. Maybe one could have 8 mandatory assignments, but only the 7 best count or something.
-
- Quite a lot of the mandatory exercises took too much time to finish properly in my oppinion. I didn't learn much extra from attending the exercises on monday compared to if I had spent the three hours studying myself or with my fellow student group.
- Very disappointed with the lack of response on the discussion forum. This needs to improve.
- Too mangy assignments!Each week has assignments,it means if we want to get high points,which needs us focus this course,which will really affect another lecture we have in the same block!
  Maybe it's the problem of level of English.I could not understand Teachers' English! :(
- Loved the course!
-
-
-
-
- First of all, I think this multiple choice evaluation misses some important nuances that would help you determine what, specifically, it was that made me answer them in the way that I did.

  For instance, under question 6, the teaching material refers to everything used in the course, and depending on the goal set for a particular week, I would say that the book was better than slides for some of the concepts, and that the slides were hard to follow in other cases.

  Under question 7, what is academic is not defined, and so I have answered this question presuming that it refers to the theoretical part, and not, in any way, the hard work it took to find out how to do anything in Matlab.

  Generally, I found the questions in the assignments to be too vague, and in grading the answers, you did not seem to take into account very often the alternate interpretations that some people had when they read them the best they could.

  I found that information about the grading process was obscure when it should have been clear. What does it matter that you get a number, when you do not know the criteria that were used to compute it?

  Yes, we were told about the grading procedure in the second week, but as it turned out, later in the course it became clear that this had dhanged considerably by introducing a point system where the final grade was calculated according to what everyone else in the class had obtained. This method was described only verbally, and only after the fact that it had been in use for the earlier assignments.

  How is anyone supposed to know what their given grade means? It becomes even harder, when it is only explained during the subsequent walkthrough what had been assigned which many points (half poins even).

  And it made the evaulation even less constructive that the different questions were, well, different and so giving only one grade for each assignment only left people confused about where their strong and weak sides were.

I spent so much time programming, and it would have been really helpful to have been given code-examples after each assignment, so that I did not need to keep writing work-arounds, when I could have had more efficient code to move forward with. Moving forward in the sense that the hardest part in this course for me was never the mathematics or the rest of the theoretical content. It was mainly with programming. I think it is a bad idea to strongly encourage people to use Matlab, if they are more familiar with other tools that do precisely the same, at least within the limits set by the assignments in this course.

I also think that it is unfair not to give any working examples during the walkthroughs, since this robs people the chance to actually learn something, even if they did not achieve a nice grade for that particular assignment. Explaining each assignment within less than 10 minutes did not seem compellingly efficient, even for me. Sometimes the wrong answer in an assignment is based on a simple misunderstanding, and if that can be clarified during the walkthrough, it might save that person crucial time in preparing for the next assignment and even in passing the course having learned something useful.

Almost-lastly, I think that you should spend some time answering people's questions in the forum on Absalon. I seems disrespectful not to, and there are some questions in there that were really important, not just to those individuals, but to everyone on the course. Some were answered in the beginning. You even used it as a platform for providing us information regarding the early assignments, so you can not have known that it exists. Not answering the questions just wasted those people's time and was a cause of unnecessary frustration, at least for my part.

Otherwise, I think that the content of the course is just as interesting as I had hoped for, and I really feel like I have learned a lot, although the price for it was in time that I could have used better on other things. Time that I think was unnecessarily spent on deciphering assignment questions and slides or trying to obtain basic information about the course.

Also, thanks, Françoise, for that one time where you led the excersise class. It really helped that you walked around and asked everyone how it went.

- This was a tough course! I did not manage a single day off during the block (other than the autumn break) but I think it was nonetheless rewarding. There should have been more feedback from the assignments, other than a simple grade. For example, a suggestion of which parts of the answer could be improved.

  A bit more activity from the teachers on the Discussion Board would have been useful. As would links to extra reading material - I did not find the main textbook enough sometimes and had to find more materials in order to understand certain aspects.

  The main things that I would suggest changing in future are (1) to avoid teaching in Week 8, because that coincides with a very heavy exam on the compulsory Advanced Programming course. The Sunday night deadlines meant I didn't have a chance to rest between weeks so I was pretty exhausted at the end of the course (this had very negative effects on my performance in the AP exam where I was simply too tired - I attended the lectures during the exam week and in retrospect I should have spent the time on the exam). I was very grateful for the extension of the last deadline, however.
- First off: Sami really need to learn to speak up. I suggested it at least twice. It's hard to hear what he is saying, but besides that I find him to be a good lecturer. Too bad half of it is mumbling.

  My strongest criticism of this course is directed at the assignment feedback, assignment formulation, and in general the attitude towards the students. I found that Chen was arbitrary and inconsistent in her feedback, when you actually managed to obtain it. I also found it was hard to get any help unless you had very concrete questions during the Monday or Wednesday lectures. Two things that very demotivational. Lastly, either you work out a document on how to produce solutions or you're a bit more forth-coming on elaborating how it should be done

All contributions to this volume can be found at:

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