

Program evaluation report 2016

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1 Background information

Report from programsensor for "Bachelorprogram i kognitiv vitenskap" (KogVit), Det samfunnsvitenskapelig fakultet, Universitetet i Bergen (UiB). Evaluation period: Calendar year 2016, i.e. spring and fall 2016.

The evaluation is based on material sent to me by Liv Kristiane Bugge, and public and private web pages (I have been granted access to privileged information). This is my third assessment.

2 Evaluation of the program

The program can enrol 22 students. For the fall of 2016 67 students had cognitive science as their first choice and 60 of these were offered to study at the program. The number of students per admission place was 2.7 student, still making it one of the more successful programs at Bergen University. At the start of the semester 2016 34 students showed up, and were enrolled in the program. Although 34 is less than the 60 offered a place it is more than the 22 places available. Based on statistics from 2009-2013 40% of the students in cognitive science leave the program without an exam. Thus, 32 students probably means that around 20 will graduate.

A comment on the rather high drop out. From my own experience, with cognitive science in Linköping, students often leave the cognitive science program mainly for the same reason that they apply. Cognitive science attracts students that have an interest in different scientific areas related to understanding human cognition, but do not always understand how research is conducted in the various disciplines. Once they get that understanding some students decide to focus on one discipline instead of staying within the interdisciplinary cognitive science program. I believe that there is not much to do to that. Better and more detailed information to presumptive students only helps to a certain extent; cognitive science study programs need students with a mind open to different scientific disciplines.

The cognitive science program has been more or less the same during the three years that I have evaluated it. The only change in courses is the replacement of INFO232 Logikkprogrammering with INFO283 Problemløysing og søk i kunstig intelligens. A very well motivated change.

There are changes in the learning outcomes "læringsutbyte" that I find strange and worrying. The students are no longer required to be able to cooperate in groups and no longer be able to orally present their work. Such skills are important for any student and I do not think that they really are excluded but I could not find out where they are emphasised otherwise or why they have been removed from the learning outcome.

3 Evaluation of program courses

In this section I look at each course that cognitive science students have taken during 2016. Courses the first two years are compulsory. The final year students can choose more freely which courses to take.

3.1 Semester 1

This semester comprises three courses:

EXPHIL-PSSEM Examen philosophicum, 10 sp

This is a general course with no specific content related to cognitive science. No course evaluation 2016.

INF100 Grunnkurs i programmering, 10 sp

This is an introductory programming course. No content specific for cognitive science but being able to write computer programs is essential for cognitive scientists. To the exam 30 students were registered, 19 passed, and 5 did not show up. Mean grade C. There is a course evaluation for this course that gives the course rather good scores. The students think that the course gave them both theoretical and practical knowledge. The content was also rather relevant and up to date. Especially interesting is that the students think that the course is very important for their education. 78 bachelors students responded but it is unclear how many of those that were cognitive science students.

EXFAC00SK Examen facultatum, Språk og kommunikasjon, 10 sp

This is also a general course. Understanding language and human communication is an integral part of cognitive science. To the exam 24 students were registered, 16 passed, and 5 did not show up. Mean grade C. No course evaluation 2016.

3.2 Semester 2

The second semester comprises four courses, as LOG110 and INFO102 are 5 sp each.

LOG110 Introduksjon til formal logikk, 5 sp

This is an introductory course and comprises propositional and predicate logic, the most common means for formal representations of human knowledge. To the exam 13 students were registered, 10 passed, and 2 did not show up. Mean grade C. No course evaluation 2016.

LOG111 Deduksjon og metalogik, 10 sp

This course builds on LOG110 and focuses on natural deduction. To the exam 14 students were registered, 10 passed, and 3 did not show up. Mean grade C. No course evaluation 2016.

INFO102 Formelle metoder for informasjonsvitenskap, 5 sp

This course provides basic knowledge on logic, set theory, relations, graphs and functions, concepts that are important in programming. To the exam 8 students were registered, 5 passed, and 1 did not show up. Mean grade C. There is a teacher evaluation of the course. The teacher thinks that the course works fine. The student evaluations, as interpreted by the teacher, show that the main problem is that the students think that the course comprises too much content. The teachers comment on this is that the students come from various study programs that may be the reason for this. Two of the 16 students that responded on the student evaluation were cognitive science students and they say that there is a difference in the amount of work between LOG110 and INFO102.

KOGVIT101 Introduction to the Cognitive Sciences, 10 sp

This course provides an overview of cognitive science and as such it is very important for the program. To the exam 12 students were registered, 10 passed, and 1 did not show up. Mean grade C. There is a teachers assessment of the course indicating that the course works well. The students like the course and find the content relevant, according to a student evaluation referred to in the teacher's assessment. The teacher has focused more on machine learning in this course and it was appreciated by the students. Machine learning is further commented on below when I assess INFO283.

3.3 Semester 3

This is another semester with four courses.

DASPSTAT Statistikk for kognisjonsforskning, 5 sp

In this course quantitative methods are presented with a focus on statistical analysis. To the exam 9 students were registered, 7 passed, and 2 did not show up. Mean grade B. There is no course evaluation 2016.

INFO282 Knowledge Representation and Reasoning, 10 sp

This seems to be a classical introduction to AI course, a topic that is one of the cornerstones of cognitive science. To the exam 12 students were registered, 8 passed, and 4 did not show up. Mean grade D. There is no course evaluation 2016.

INFO283 Problemløsning og søk i kunstig intelligens, 5 sp

This is a new course that replaces the course INFO232 Logikkprogrammering, 5 sp. The content is adapted to modern AI techniques on search and machine learning, a very important topic for cognitive science students. Data analysis using modern machine learning techniques is an area where cognitive science students, with interest in the computer science oriented side of cognitive science, can have an important job market, both in academia and in industry. The course uses an on-line free course book, which is good for the students. I may also recommend the book *Intelligence Emerging* by the Norwegian professor Keith Downing that I personally think has a more modern approach to the topic. Maybe a bit advanced at the end, on the other hand, the author often shows how knowledge about the human brain influences modern machine learning which should attract students in cognitive science. To the exam 11 students were registered, 5 passed, and 6 did not show up. Mean grade C. There is a teacher course assessment where the teacher points out that especially students in cognitive science dropped out of the course, probably due to insufficient mathematical competence. May I suggest to include

a short tutorial on Linear Algebra somewhere in the program. I believe that modern machine learning techniques, mainly based on vectors and matrices, have become more important for artificial intelligence than traditional symbolic paradigms based on logic. AI is an important area of cognitive science and artificial neural nets have always played an important role in cognitive science research.

LING122 Språk og kognisjon, 10 sp

In this course cognitive and psychological aspects of language is emphasised. To the exam 13 students were registered, 9 passed, and 4 did not show up. Mean grade B. No course evaluation 2016.

3.4 Semester 4

This semester comprises three courses.

PSYK120 Biologisk og kognitiv psykologi, 10 sp

This course includes two of the most important areas of cognitive science, neuroscience and cognitive psychology. To the exam 14 students were registered, 9 passed, and 5 did not show up. Mean grade C. There is no course evaluation 2016.

INF227 Innføring i logikk, 10 sp

This is an introductory course to logic. To the exam 15 students were registered, 4 passed, and 11 did not show up. Mean grade C. No course evaluation 2016.

FIL105 Innføring i sinnsfilosofi, 10 sp

Classical course on philosophy of mind, an important topic in the understanding of human cognition. To the exam 13 students were registered, 11 passed, and 2 did not show up. Mean grade C. No course evaluation 2016.

3.5 Semester 5 and 6

For the final year students are encouraged to go abroad or select courses that allow them to enter a master's program in "informaticsvitenskap"¹, "informatikk", or philosophy. "Informationsvitenskap" allows the students to select any INFO-course, not already taken, for 50 sp; 10 sp are free. The other specialisations have more or less no free courses.

There are no courses that can be termed cognitive science the last year. For students specialising in "informaticsvitenskap" where there are a number of courses to choose from, there are courses such as Interaction Design and Semantic Technologies, that can be considered as applied cognitive science, but for the other there is nothing on cognitive science.

The students specialised 2016 on informasjonsvitenskap, 6 students, informatikk, 1 student, and computational linguistics 1 student that will change to informasjonsvitenskap as computational linguistics will no longer be available.

One student also specialised in philosophy and 3 in psychology oriented courses.

3.5.1 Informationsvitenskap

In Informationsvitenskap five courses had students from the cognitive science program.

¹I will use the Norwegian terms here as the content in these subjects varies between universities.

INFO233 Avansert programmering, 10 sp

This is an advanced course on object oriented programming, data structures and algorithms. An important course for any programmer. To the exam 1 student was registered and passed. Mean grade C. There is a teacher assessment of the course. The teacher thinks that the course organisation, with a focus on practical programming, works fine. The course book is new, as the previous was too old. The content of the new course book is not perfect, too much abstract data types, and the teacher indicates that the course may change. It is unclear if that means including more or less abstract data types. I have no opinion on this; the students need both.

INFO262 Interaction design, 10 sp

This is an introductory course to interaction design, an important area for many cognitive science students. To the exam 7 students were registered, 6 passed, and 1 did not show up. Mean grade B. There is a teacher's assessment indicating that this course works well; the student evaluation also shows that the students were positive to the course and that the content is relevant. The teacher points out possible improvements.

INFO125 Datahantering, 10 sp

This is an introductory data base course. Data bases can be useful cognitive science students, especially those with an interest in programming, or those developing web services. To the exam 6 students were registered, all passed. Mean grade B. There is a teacher course evaluation based on a student survey that shows that the course works fine. The students think that the content is relevant and that the teachers are good. Work load is a bit high.

INFO207/INF207 Sosial nettverksteori, 10 sp

This course teaches theoretical frameworks for modelling and analysing social networks. For cognitive science students it may be an interesting course, especially as it can connect to their knowledge on human behaviour. To the exam 3 students were registered, all passed. Mean grade B. There is a very good course evaluation showing that the course material is relevant and gives ok theoretical knowledge. The practical part is considered less good by the students. There are a variety of comments from the students on how to improve the course and especially the teaching. The teacher has also responded to some of the criticism in an adequate way and I think that the problems are rather easy to fix for the next year.

INFO212 Systemutvikling, 10 sp

An introductory course to systems development. Important for cognitive science students with an interest in programming, but may also give tools for those cognitive science students that only write small programs for their own purposes. To the exam 6 students were registered and all passed with grade A. No course evaluation 2016.

3.5.2 Informatik

In Informatik five courses had students from the cognitive science program.

INF102 Algoritmar, datastrukturar og programmering, 10 sp

This is an introductory course in algorithms and data structures. Cognitive science students benefit from such a course as it gives them tools for complexity analysis and means for data modelling. To the exam 1 student was registered but did not show up. There is a very good student course evaluation that shows that the course is important with relevant content. The students really need to read the course material for this course and the students consider the content important for their education. The teacher is considered very good.

MAT111 Grunnkurs i matematikk I, 10 sp

This is a traditional calculus course. Can be interesting for some cognitive science students. To the exam 1 student was registered but did not show up. No course evaluation 2016.

MAT121 Lineær algebra, 10 sp

A traditional linear algebra course. Often more useful for cognitive science students than calculus, especially since many modern machine learning techniques are based on vector models. To the exam 2 students were registered, 1 passed, and 1 did not show up. Mean grade C. There is no course evaluation 2016.

INF112 Systemkonstruksjon, 10 sp

A project oriented course on systems development. Content similar to INFO212 and similar importance for cognitive science students. No students registered for the exam. No course evaluation 2016.

INF223 Kategoriteori, 10 sp

This is a Category theory course which covers theoretical concepts of, for instance, data bases and is equally important for cognitive science students as data bases. To the exam 1 student was registered and passed. Mean grade B. No course evaluation 2016.

4 Masters program

The cognitive science committee had a meeting to discuss the possibilities to start a masters program in cognitive science. At the meeting a variety of practical issues were on the agenda, such as obligatory elements and supervision. One comment on that is that I believe that the students should have a 30 sp Master's thesis course and that they may need something on methods/projects, either as part of the thesis course or as a separate course. The Bachelors program does not have much on research methods after the first year's compulsory EXPHIL-PSSEM and there is no bachelor's thesis course.

Looking at the list of possible courses many are given on an irregular basis, especially a number of very relevant courses in Information science, especially, INFO316, INFO371, INFO381 and INFO361. Together they comprise one years study with a relevant cognitive science content, from a computer science oriented perspective. With a master's program it may be that these courses can be given on a regular basis, or at least every other year allowing master's students to take the course their first or second year as long as they are not pre-requisites to one another.

Complementary courses include INF-283, DASP309, FILxxx and PSYKxxx. From what I understand there are more relevant courses from the master's in general psychology

which may be needed to complement the rather technical perspective on cognitive science given by the INFO-courses. It may also be a good idea to have an advanced course in cognitive science where the students can reflect on and discuss what cognitive science is and what results various methods used in cognitive science provides, based on their knowledge from the bachelor's program.

One issue related to this is that I see no discussion, in the minutes from the meeting, on what background the master's students are supposed to have. My comment on an advanced course in cognitive science supposed that they had a bachelor's in cognitive science. That may not be necessary, especially if the master's program is based on the INFO-courses. In that case it may well be possible to attract students from other computer science oriented programs; students with an interest in human cognition and development of "intelligent" systems or use of modern AI techniques. Students from, for instance, philosophy, linguistics or psychology will probably not be that interested in such a computer science oriented cognitive science master's program.

5 Evaluation of assessments

The courses have a variety of assessments and I am confident that each teacher has chosen the appropriate type of assessment for their course and also that the gradings are appropriate and that markings are correct.

The program has a policy that every course shall be evaluated each year by the teacher and every third year by students. For many courses this is not the case, at least not when I look in Studiekvalitetsbasen. I have also had access to student assessments for some courses in informasjonsvitenskap. For most of the evaluations I do not know how many students that studied cognitive science and, thus, my comments on student evaluations are not specific to cognitive science students, unless explicitly stated.

This year a number of courses, INF100, INF207, and INF102, had really good student course evaluations. The students gave detailed feedback and the presentation of the evaluation is easy to understand. These are very good instruments for the cognitive science program committee in their further work with the program and I can only hope that more courses get such good evaluations. Some courses have teacher assessments including student evaluations. I have not seen the raw data from all these assessments, only the teachers interpretation of them.

6 Summary

My impression is that the cognitive science program in Bergen still is a program that works well with enthusiastic teachers and motivated students. In my previous reports I raised some issues that I still believe would improve the program. The new course on search and machine learning covers an important area of modern research and applications of artificial intelligence and is an important improvement of the program.