Program evaluation report 2017

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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 2017, i.e. spring and fall 2017.

The evaulation is based on material sent to me by Liv Kristiane Bugge, and public web pages. This is my fourth assessment.

2 Evaluation of the program's enrolment

The program can enrol 22 students. The fall 2017 112 students had cognitve science as their first choice, this means 5,1 student per study place which is a tremendous increase compared to 2016, which in turn was a very good year. 73 students were offered to study at the program, 57 were admitted to the program, 49 are still active. One student changed to another program, Six never showed up and only one student left the program the fall of 2017.

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 were admitted to the program. During the year, 4 of these changed to another program at UiB, 6 students never showed up and 7 students left the program. Thus, there are 17 students left from the year 2016.

The year 2015 admitted 19 students. Three students never showed up, 7 students left the program and 4 students changed to another program. Five students remain 2017 from those that started 2015.

Year 2014 31 students were admitted. of these 3 students have graduated. One of these students continued at the masters program in information science. Two are on masters programs abroad. Six students have not yet finished, 4 are expected to finish spring 2018 and 2 the fall of 2018. Six students transfered to other programs at UiB, 2 never showed up and 14 have left the program.

I had a comment on the drop out from interdisciplinary programs in my comments last year that is still valid. It is a very good sign that the program now managed to admit as many as 49 students and with only one student that left the program it seems that the new students that were enrolled at the program 2017 are very motivated.

It should be very interesting to understand why so many students now find cognitive science interesting. I recommend the program board to, at least, ask the students why they decided to apply for cognitive science.

The content of the cognitive science program is more or less the same as it has been during my four years. For 2017 the only change in courses is the name change for INFO283 to Grundlaeggende algoritmer i kunstlig intelligens.

3 Evaluation of program courses

In this section I look at each course that cognitive science students have taken during 2017. Courses the first two years are compulsory. The final year students can choose more freely which courses to take.

3.1 Semester 1

The first semester contains three courses:

EXPHIL-PSSEM Examen philosophicum, 10 sp

This is a general course with no specific content related to cognitive science. No course evaluation 2017.

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 47 students were registered, 29 passed, and 11 did not show up. Mean grade C. There was a detailed course evaluation for the fall 2016 that gave the course rather good scores. No evaluation for 2017.

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 42 students were registered, 30 passed, and 8 did not show up. Mean grade C. No course evaluation 2017.

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 includes propositional and predicate logic, the most common means for formal representations of knowledge. To the exam 24 students were registered, 21 passed, and 3 did not show up. Mean grade B. No course evaluation 2017.

LOG111 Deduksjon og metalogik, 10 sp

This course builds on LOG110 and focuses on natural deduction. To the exam 24 students were registered, 19 passed, and 4 did not show up. Mean grade C. No course evaluation 2017.

INFO102 Formelle metodar for informasjonsvitskap, 5 sp

This course provides basic knowledge on logic, set theory, relations, graphs and functions, concepts that are important in programming. To the exam 4 students were registered and 3 passed. Mean grade C. There is a techers's course assessment for 2017 that indicates that the course is relevant, especially at the end, where the relevans for computer science is more obvious. It is not possible to distinguish the responses for the cognitive science students and thus not possible to assess their opinion on relevans. The work load is ok.

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 22 students were registered, 19 passed, and 4 did not show up. Mean grade B. There was a teacher assessment 2016 indicating that the course works well. One note is that the teacher focused on machine learning in this course which was appreciated by the students. No course evaluation 2017.

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 18 students were registered, 15 passed, and 3 did not show up. Mean grade B. There is no course evaluation 2017.

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 15 students were registered, 11 passed, and 4 did not show up. Mean grade C. There is a teacher's assessment of the course for 2017. The teacher thinks that the course followed the plan and worked fine except for problems with the class rooms being too small.

INFO283 Problemløysing og søk i kunstig intelligens, 5 sp

This course complements INFO282 and includes the AI techniques search and machine learning. To the exam 18 students were registered, 15 passed, and 3 did not show up. Mean grade C. There is a teacher course assessment for the course provided 2017, group 2. Overall the course is much appreciated. The lectures and seminars are good. Work load may be a bit high, especially the programming exercises, but the material is interesting enough for the students to accept that.

LING122 Språg og kognisjon, 10 sp

In this course cognitive and psychological aspects of language is emphasised. To the exam 17 students were registered, 15 passed, and 2 did not show up. Mean grade B. No course evaluation 2017.

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 5 students were registered, 3 passed, and 5 did not show up. Mean grade D. There is no course evaluation 2017.

INF227 Innføring i logikk, 10 sp

This is an introductory course to logic. To the exam 12 students were registered, 6 passed, and 6 did not show up. Mean grade C. There is a student course evaluation for 2017. Only 3 students responded so the results may not be conclusive. The students are very positive about the teachers but not the content, which is considered too mathematical. The teachers comments also point that out and are relevant and something that I have pointed out already in my first evaluation, and will also discuss further below.

FIL105 Innføring i sinnsfilosofi, 10 sp

Classical course on philosophy of mind, an important topic in the understanding of human cognition. To the exam 8 students were registered, 7 passed. Mean grade C. No course evaluation 2017.

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 "informasjonsvitenskap"[1], "informatikk", or philosophy. Informasjonsvitenskap 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 informasjonsvitenskap 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.

Only five students are still active from those that enrolled 2015, i.e. those that decide on a specialisation the fall of 2017. Two of these specialize in informatikk and three students elect "free" subjects in order to qualify for masters programmes at UiB.

3.5.1 Informasjonsvitenskap

In Informasjonsvitenskap eight courses had students from the cognitive science program.

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 5 students were registered, 5 passed. Mean grade C. No course evaluation 2017.

INFO262 Interaction design, 10 sp

This is an introductory course to interaction design, an important area for many cognitive science students. To the exam 1 student was registered and passed with grade E. No course evaluation 2017.

INFO125 Datahantering, 10 sp

This is an introductory data base course. Data bases can be useful for cognitive science students, especially those with an interest in programming, or those developing web services. To the exam 1 student was registered but never showed up. There is a teacher course assessment where the teacher raises concerns with the open open book exam and

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

that exams not necessarily contribute to learning. The teacher also proposes changes in content for next year.

INFO103 Informasjon och kunnskap, 5 sp

This is a theoretical course on modelling information in computer systems, i.e. there are no practical excerises. It also includes knowledge modelling and its relation to information. For cognitive science students with an interest in information processing it may be of interest. The role of knowledge and information for human cognition is, however, not emphasized in the course. To the exam 2 students were registered and passed. Mean grade C. No course evaluation 2017.

INFO110 Informasjonssystem, 10 sp

This is a traditional administrative data processing course with a practical project. The course may be relevant for cognitive science students that are interested in organsiations and administrative data processing. To the exam 8 students were registered and passed. Mean grade B. No course evaluation 2017.

INFO115 The social web, 10 sp

This is a broad course on aspects related to the social web including topics such as privacy and ethics, but also technology aspects. The course may be of interest for cognitive science students interested in information systems and semantics, but also, for instance, social cognition. To the exam 1 student was registered and passed. Mean grade C. No course evaluation 2017.

INFO116 Semantic technologies, 10 sp

This is a course on the semantic web with a focus on techniques for adding semantic data to web resources and how to use that to retrieve data in more meaningful ways. The course can be useful for cognitive science students that either build linked data resources or those that want to use the web to collect data from ontologies. To the exam 2 students were registered and passed. Mean grade D. No course evaluation 2017.

INFO216 Advanced modelling, 10 sp

This is a more practical course on semantic modelling. It requires INFO116 and have the the same usefulness for cognitive science students but also with the addition of further implementation skills. To the exam 4 students were registered and passed. Mean grade B. No course evaluation 2017.

INFO381 Research topics in artificial intelligence, 10 sp

This is an advanced course where students carry out individual research projects under supervision. Highly relevant for cognitive science students with an interest in building intelligent agents. To the exam 1 student was registered and passed with grade B. No course evaluation 2017.

3.5.2 Informatikk

In Informatikk three courses had students from the cognitive science program.

INF102 Algoritmar, datastrukturar og programmering, 10 sp

This is an introductory course to 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 4 students were registered, 3 passed with mean grade C. There is no evaluation for 2017.

MAT111 Grunnkurs i matematikk I, 10 sp

This is a traditional calculus course. Can be interesting for some cognitive science students, but linear algebra would probably be more useful. To the exam 2 students were registered, 1 passed, and 1 did not show up. Mean grade C. No course evaluation 2017.

INF122 Funksjonell programmering, 10 sp

This is a programming course where the functional programming paradigm is introduced. Functional programming utilises a number of important programming concepts, such as recursion and lists. Of importance for cognitive science students interested in building intelligent agents. To the exam 4 students were registered, 2 passed, and 2 did not show up. Mean grade C. No course evaluation 2017.

4 Overall assessment of the program's content

Overall the cognitive science program, with only two years of courses, gives a good, logic biased introduction to cognitive science. During the first two years there are 14 compulsory courses that can be roughly grouped into five major areas:

- **Langauge and Philiosphy 30 sp**

  EXPHIL-PSSEM Examen philosophicum, 10 sp, EXFAC00SK Examen facultatum, LING122 Språg og kognisjon, 10 sp, FIL105 Innføring i sinnsfilosofi, 10 sp

- **Cognitive Science, 10 sp**

  KOGVIT101 Introduction to the Cognitive Sciences, 10 sp

- **Logic, 30 sp**

  LOG110 Introduksjon til formal logikk, 5 sp, LOG111 Deduksjon og metalogik, 10 sp, INFO102 Formelle metodar for informasjonsvitskap, 5 sp, INF227 Innføring i logikk, 10 sp

- **Computer Science, AI, 25 sp**

  INF100 Grunnkurs i programmering, 10 sp, INFO282 Knowledge Representation and Reasoning, 10 sp, INFO283 Problemløysing og søk i kunstig intelligens, 5 sp

- **Cognitive psychology, 15 sp**

  DASPSTAT Statistikk for kognisjonsforskning, 5 sp, PSYK120 Biologisk og kognitiv psykologi, 10 sp

As I pointed out already in my first evaluation the program has a huge bias towards courses in logic that I do not find motivated for studies of cognitive science. It is also pointed out by one teacher that the cognitive science students do not always have the mathematics needed for more formal studies of logic. Logic is important in order to understand symbolic cognition but this also means that there is no room for subsymbolic cognition, at least within the two years of compulsory courses. Subsymbolic cognition

is important in cognitive science and recently also in AI where machine learning nowadays mostly builds models based on recurrent neural networks. Courses on cognitive neuropsychology (PSYK120 gives an introduction), cognitive modelling and artificial neural networks (KOGVIT101 gives an introduction) would be a good complement to the courses offered within the program to cater for subsymbolic cognition. This gives a more balanced theoretical understanding of cognitive science.

With that said, it is obvious that the cognitive science students benefit from the emphasis on symbolic cognition as they, 2017, have decided to take courses on semantic modelling from various perspectives (INFO103, INFO115, INFO116, INFO216) for the fifth and sixth semester. The cognitive science program gives a very good basis for advanced studies in this, important, area. Cognitive science students can further benefit from their understanding of human cognition and the methods used in cognitive psychology to give unique contributions to, for instance, service design of linked data.

Cognitive Science students interested in various aspects of servive and interaction design have the elective course in interaction design. Interaction design is one area where cognitive science students have outstanding competence and I recommend a compulsory course and also further courses allowing for more advanced studies on human computer interaction.

Within the program there are no courses on cognitive engineering or human factors. This is another area where cognitive science students have unique competence in that they understand both humans and computers and can work with, for instance, autonomous vehicles, social robotics, advanced control rooms, and internet of things.

As I have pointed out in previous assessments I think two years is not enough to cover cognitive science. The program should comprise three years of cognitive science directed courses, many of the current elective could be included in such a three year program but I believe that the full potential of cognitive science will be better exploited with more cognitive science oriented compulsory courses. At the same time students must, of course, be allowed to study abroad during the third year.

Finally I would like to stress the lack of a larger individual project, e.g. a bachelor's thesis. For further studies, especially PhD studies, such experience is invaluable and should be part of any bachelor'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.

For the year 2017 only INFO102, INFO282, INFO283, INF227 and INFO125 had some form of course assessment, either done by the students or by the teacher. I still think that the cognitive science program committee should take this lack of evaluations serious. It is their main instrument for evaluating the courses from a student perspective and students very often know how the various courses contribute to their understanding of what cognitive science is and if courses overlap or do not provide enough knowledge in certain areas, especially since they, in the KOGVIT101 get an overview of what they should know as cognitive scientists. And, of course, teachers, in their assessment, can

provide valuable information on how cognitive science students receive their course.

6 Summary

The cognitive science program is a well established program that fills an important need. With the focus on formal methods the program in Bergen may have found its niche in the development of the semantic web. There are, however, areas not covered within the program where cognitive science plays an important role and where students in cognitive science may have unique competive advantages.

The year 2017 saw an incredible increase in students applying for, and being enrolled, to the program. This is hopefully something that will continue allowing for further development of the program and also allows for a masters program.