Neuroscience course (DD2401)

The course is offered to the second cycle students, but from a neuroscience perspective the course content is rather introductory. Historically, this course has been taught by teachers from Karolinska Institute, which ensured that active experimentalists taught the course. However, in recent years the computational neuroscience community at KTH has grown and therefore, to exploit that potential, since 2016 we have been progressively making the course more and more quantitative are also introducing topics in theoretical neuroscience. This change in the course contents was partially successful in attracting more students and also inspired several changes in the new edition of the course. Since the progressively, the course has become more and more quantitative and conceptual. In addition, every year we bring in some exciting topics from latest research.

Teachers in 2020

From KTH Arvind Kumar, Alexander Kozlov, Erik Fransén
From KI Lennart Brodin, Marie Carlen, Gilad Silberberg, Andreas Kardamakis

Course material

The experimental part of the course was covered by the text book 'Neuroscience' by Purves et al. Vth edition. Additional reading material was provided for the computational and theoretical components of the course. Students were also provided jupyter notebooks for tutorial work and were given a series of videos to get a feel for the anatomy of the brain.

Migration to online teaching

In 2020 we were forced to teach online given the covid-19 outbreak. This led a number of changes in the course such as

- All the lectures were delivered via zoom

- Video recording of each lecture was made available to the students

- We did not convert to flipped classroom. As a course responsible teacher I do not think that approach is useful in teaching this course. In stead lectures were delivered as if they were being delivered in person. The students had a chance to interrupt the teachers to ask questions either verbally or by chat.

- We introduced an online hangout session every week where students could ask their questions in a more relaxed setting. This was much appreciated.

- A big change was that we held the exam online and we converted it to an open book, open notes exam. This removed the need for invigilation but it meant that questions were open ended.

Positive changes in the course because of online teaching

- Student grade distributed improved a lot (see Figure below)

- Students were much more active as they asked many more question using the chat box

- Availability of videos of the lectures was useful as they could revisit lecture – especially in some cases when course material was not easily available at one place

- Many more students were online

- Weekly hangout session was very useful and popular

- Open book/notes examination removed the emphasis from memorisation to understanding

Negative changes in the course because of online teaching

- It was difficult to deliver lectures when student faces were not visible

- There was also a learning curve to using zoom

- Online teaching meant that students could not participate in live demo of brain tissue – videos could not really give the real experience of touching a brain

Significant change in the course material

- In 2019 we provided three Python Notebooks for hands on tutorials on neuron and network models. These tutorials were done in Tutorial/Demo hours or by the students outside the formal class rooms. These tutorials were generally appreciated. But these tutorials were not graded so some of the students felt frustrated!

- For the first time we managed to. change the course structure such that each lecture hour was consisted of 2 slots of 45 min. This was considered to be a positive change.

- The final lecture was designed to give the student a sense of historical experiments in neuroscience. This created a lot of interest and active participation of students.

Schedule

Lecture hours : 42
Lab hours : 12

Student participation

No. of students who registered: 92
Approx. no. of students in zoom lectures: $\approx$50
No. of student who took the exam: 63
No. of students who passed: 60
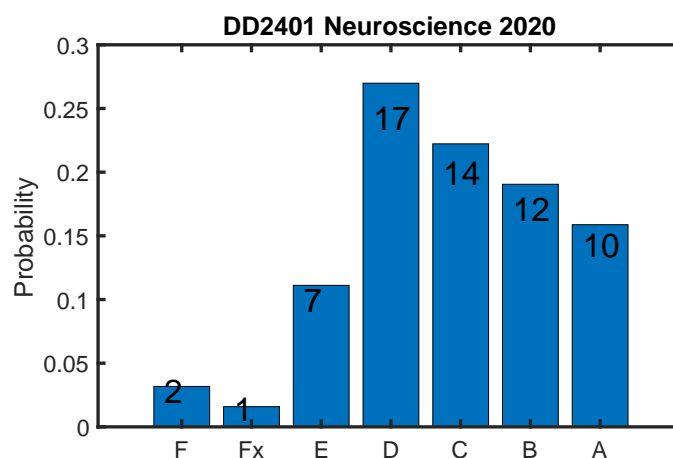
Grades since 2019

Figure 1: Summary of grades in 2019.

What changes to expect in the 2021 edition of the course

- We will provide you stand alone python notebooks so you will not have to install NEST

- Hangout session will continue and we will invite more faculty members to the hangouts

- The lectures on visual system and reinforcement learning will be delivered by two invited guests from University of Tokyo and Charite University, Berlin.