



# STUDY GUIDE

Neurotechnology, T7, 2021  
ELA411, 7.5 hp

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# 1 INTRODUCTION

Welcome to Neurotechnology, ELA411. This study guide contains all information that you need to take this course. You will find the purpose of the course, the learning objectives, the examination and course literature on the course website:

<https://www.mdh.se/en/malardalen-university/education/courses?kod=ELA411>

This study guide is thus a complement to the information available in the course plan.

## 2 IMPLEMENTATION AND EXAMINATION

### 2.1 Planning

This course is divided in two parts: a theoretic and a practical part. The theoretic part consists of lectures, literature and seminars. The practical part consists of a project that is performed in larger groups. For details about the dates of the different course modules, see the course Canvas site and the schedule on the MDH website. You should follow these sites regularly in the case of changes occurring throughout the course.

### 2.2 Communication

Communication between students and teachers will be carried out through discussions during lectures and seminars as well as digitally via Canvas. Changes throughout the course (for example changes in dates/times) will be posted on Canvas.

### 2.3 Course modules

The course is composed of 3 modules that are explained here below.

#### 2.3.1 *Theory: Lectures and course literature*

The theory will be covered through lectures and scientific review articles. State-of-the-art neurotechnology relies on real-time intelligent signal analysis and control, the core of which can be applied to a wide range of both industrial and health-related applications. The theoretic part of this course will cover the methods, requirements, limitations and frontier research regarding state-of-the-art neurotechnology; one of the most promising research fields within future health robotics.

#### 2.3.2 *Theory-practice: Seminars*

The course is composed of 3 seminars with the aim of going deeper into the challenges in the field by discussing predefined themes related to module 1, as well as project-related preparations and challenges. Before each seminar, you should study the material in advance

and depending on the seminar, different requirements will apply. Further information on tasks and requirements will be distributed via Canvas.

All seminars will be conducted and during the seminar, course participants will be divided randomly into smaller groups. Within these groups, you will discuss the theme of the seminar and in the end, you will present your ideas for all participants.

### **2.3.3 Practice: Project**

The course is composed of a collaborative project in which course participants will each be having different tasks to develop a real-time neurorobotic system. The project will enable you to fully understand the extent of the real-time system, while deepening your knowledge and skillset regarding the implementation of one of the neurorobotic system components (depending on your task).

Two project meetings, each related to different milestones in the project, are planned to follow up and present the status of the project. During these meetings, each system component group should give a presentation of their status and encountered and foreseeable issues/challenges. In addition to the project meetings, two project labs are planned with predefined tasks that are crucial for the success of the project. Teachers designated to each component of the system will be available to support the students throughout the project (via zoom and/or onsite). At last, the project will be presented both orally and in written form. Specific instructions for the project will be described during seminar 1 and distributed via Canvas.

## **2.4 Reading instructions**

Course literature will be distributed via Canvas.

## **2.5 Examination**

Students will be examined on seminars and the project.

### **2.5.1 Seminars (SEM1)**

The seminars will be part of the examination of the course; SEM1. The examination of the seminars is individual, and an active participation is therefore required. Grade for SEM1 is Pass (G) or Fail (U). In order to pass, the student must:

1. fulfill all requirements (e.g. written reflection etc.) communicated in advance by seminar material published on Canvas, and
2. participate in the discussions during each seminar and thus show an understanding of the theoretic and practical parts of the course.

If you are sick and cannot attend the seminar, contact the course responsible for a substitutive task prior to the seminar. Absence without valid reason and/or notification after the seminar will not be accepted and to pass, the student will be referred to next year's course instance.

### **2.5.2 Project (PRO1)**

The examination of the project (PRO1) will be carried out through the project report and oral presentation. A real-time demonstration of the system will be carried out after the presentation.

The grade for PRO1 is U, 3, 4, or 5. The examination is individual, so it is important to actively participate in the presentation and reference (explicit indication) your work within the report.

The following criteria will be used for the assessment of your work within the project:

For grade 3, the student should:

- show an understanding of the role of his/her system component with the full system,
- show an understanding of the real-time requirements and challenges of the component, and
- be able to implement a basic\* functioning solution in real time of the component.

For grade 4, the student should in addition to grade 3 also:

- be able to implement a more advanced\* functioning solution in real time of the component, and
- be able to validate the functioning of the component on a statistical basis.

For grade 5, the student should in addition to grade 3 and 4 also:

- position the chosen/implemented technique (of the component) with respect to other scientific work.

Depending on the work that you have conducted during the project, supplemental work might be possible for obtaining grade 3. For insufficient work, you are referred to next year's course instance.

\*Basic and advanced solutions for each system component will be defined and distributed via Canvas prior to project start

### **3 RESPONSABILITY OF THE STUDENT**

You are expected to take responsibility for your own studies and actively participate in the course's various learning activities. You are expected to be well prepared for the various parts of the course. You are also responsible for receiving information about the course via the information channels that are available. As a student, you also have an obligation to know the rules for examination.

You are expected to notify the course coordinator if any problems arise for you to participate in the course activities and if you need to cancel the course.

More information about rules and rights for you as a student can be found on MDH's website ([www.mdh.se](http://www.mdh.se)).

#### **3.1 Cheating and plagiarism**

Cheating on examination means that the student tries to pretend to have done an assignment or part of an assignment without having done it himself. It can be about using unauthorized aids in an exam, such as a cheat sheet, mobile phone or the like. It can also be about plagiarism. Plagiarism means that the student in his work uses someone else's ideas, but describes them as his own. Reusing one's own previously examined work in a way that is not permitted for the task also means plagiarism. Copying text from the Internet, course literature, other students' work, own previously submitted examination assignments or by doing direct translations without referring to the source are examples of plagiarism.

To detect plagiarism, Mälardalen University uses "Urkund", which is a program for plagiarism control. Urkund's source material is extensive and consists of both published and unpublished texts, such as previous students' work.

A teacher who suspects cheating or attempted cheating is obliged to report this to the university's disciplinary committee. In the disciplinary committee, the student risks suspension for a period that is normally 6 weeks. During the suspension period, the student is not entitled to a student loan from CSN. Students at all Swedish universities have an obligation to take part in the current rules on cheating. The Disciplinary Board therefore normally does not take into account the student's alleged ignorance of the rules that apply.

#### **3.2 Course evaluation**

After completing the course, you will be given the opportunity to answer a course evaluation. It is of great importance that you answer this assessment so that we can get good material on which this and other courses can be improved.

### **3.3 Disability**

For those of you who have a disability, the university offers different types of support and help so that you can study on the same terms as all other students. The university's website ([www.mdh.se](http://www.mdh.se)) contains information on how you can access this support. When you have a certificate of support measures, you must show it to the course coordinator and inform him or her of what special measures need to be taken during the course. It is the examiner who decides which adjustments can and should be made during the course examination.

## **4 RESPONSABILITY OF THE TEACHER/TEACHERS**

The teachers take the overall responsibility for planning the course's activities and create conditions for its implementation and follow up both the students' learning (examination) and the implementation of the course (course analysis). The teacher and course coordinator set up a framework for which theoretical knowledge is relevant to the course. Overall responsibility also means that the teacher states which practical skills and attitudes the student is expected to develop in different activities, and which practical skills and attitudes he or she is expected to demonstrate, which is described in the course's learning objectives.

The teacher / teachers are responsible for:

- Giving students the opportunity for relevant examination that is linked to the course's learning objectives
- informing the students about the course conditions and implementation
- following up the course implementation and results in a course analysis where results from course evaluation are an important part

## **5 TEACHERS**

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