Examination and report

Contents

1. Examination

The following parts are examined:

- Active participation in the Problem Based Learning (PBL) group (0.5 hp)
- Active participation in the laboratory exercises (0.5 hp)
- Signal Processing Task (SPT) on ECG: Group work. Approved seminar presentation, opposition, and written report (1 hp)
- Final individual report (4 hp)

When all parts are passed, the grade is determined by the grade of the final individual report.

2. Problem based learning group

Participation is mandatory in all four PBL meetings. If you for some reason are not able to attend a meeting, the absence must be approved by the examiner prior to the meeting, and an extra task is then provided. Furthermore, it is required that all group members are active in the discussions leading to the learning goals (first meeting), that all group members collect information regarding the agreed learning goals (between meetings), and that all members share their knowledge (second meeting).

3. Laboratory exercise

Prepare by reading the document describing the laboration. You have to actively participate in the laboratory exercises and make sure that you have proper prerequisites.

4. Signal processing task on ECG: Group work

This SPT shall be solved in assigned groups of 2-5 students and documented in a group report that shall be written in English. Details about the report content can be found in the document describing the task: *SPT1 stress test ECG*. References shall be handled properly in the report, see Chapter 6. The examination

of the group task will be in the form of a seminar. Each group shall present their report during the seminar as well as comment and discuss the solution and report from another group in a peer-review process. The course teachers will also be part of that discussion. The report should be handed in, via the course area in Lisam, no later than **Tuesday 2017-11-21**. The report, seminar presentation and the review/opposition are examined.

Group number *1 (A1, B1, ...) will present their work on Tuesday 201-11-28 8-10.

Group number *2 (A2, B2, ...) will present their work on Wednesday 2017-11-29 10-12.

You only have to attend one of the seminars, the one where your group will present and do the opposition.

The presentations should be in English and have a maximum length of 10 min per group. All group members are expected to participate in the presentation actively. During the presentation, you should focus on your algorithm rather than on the medical background. Try to describe how it functions and how well it is able to analyze the ECG. Give special attention to the extra feature that you have chosen, since that will probably differ between the groups. After the presentation, the next group will ask some questions concerning your work/algorithm (max 8 min). Please make sure that you have prepared some relevant questions.

About the opposition, please try to focus on questions regarding the implemented solution so that constructive discussions can arise, rather than on details in the report. In that way, there is a good possibility that everyone will earn deeper insights in the signal processing during the seminars and it will be much more interesting.

5. Final individual report

The rest of this document is about the final report. The report shall be written individually and contain the chapters described below. You may write the report in English or Swedish. A word count shall be included for each chapter and exceeding the maximal allowed word count will affect the grading. Note that the Matlab code for the Signal Processing Task (see below), must not be included in the word counting. Note that references shall be handled properly, see Chapter 6.

1.1. Deadlines and content

The chapters that shall be included in that report will differ between each examination:

First examination of final report (deadline 2018-01-13):

A report with two chapters covering:

1. PBL Situation 1 - Modelling bio-electrical signal propagation in nerves (max 2000 words). (See Section 1.2 for guidelines.)
2. Signal processing task (SPT) 2 – Evoked potentials (max 1800 words).

(See Section 1.3 for guidelines.)

Second examination (deadline 2018-04-06):

To be announced

Third examination (deadline 2018-09-01):

To be announced

Figure texts and references do not have to be included in the total word count.

Some students find the maximum word count limiting when writing the report. A general tip is to use figures, illustrations, flow charts etc. frequently in the report in order to explain complicated content without exceeding the word count.

1.2. PBL situation

The PBL situation should be treated in a relevant way, which means that you should identify, formulate and treat/solve a number of problems that are relevant for the situation and that lie within the main and thematic goals for the course (see separate document).

The thematic goals describe the knowledge you are supposed to obtain through the course. You should use the parts of this knowledge that are relevant for the problems you treat. It is emphasized that an important part of the task is to identify relevant topics in relation to the task and those course goals.

The following parts shall be included in the report:

1. Problem formulation based on the course goals that are relevant for the PBL-situation.
2. Problem treatment. Solve the problems from an anatomical, physiological, and/or technical point of view.
3. Conclusion with reference to the PBL-situation.
4. Avoid too much of basic descriptions of the anatomy.

1.3. Signal processing task

The problems within the task have already been formulated in contrast to the PBL-situation above.

In the report, you should present and discuss the results of your solutions, describe every step in the implementation (not only as comments in the code) and discuss pros and cons of the solutions. Please avoid references to the code in the report.

The report shall include the following parts

1. Present principles and the rationale of your solution.
2. Shortly describe the implementation of your solution, both in text and for example using a flow chart.
3. The results of applying your algorithm on appropriate signals. We encourage you to present and refer to graphs when applicable. However, choose the graphs carefully, make sure to describe what can be seen in the graphs, and avoid putting them into an appendix at the end.
4. In a discussion, relate your results to the relevant theory and explain the merits and deficits of your solution (which alternative solutions exist?). It is always better to discuss the deficits than to try to hide them.
5. Include the Matlab code as an Appendix.
6. Keep medical/physiological background short, focus should be on the signal processing.

1.4. Grading

Each report will usually be read and assessed by two teachers and those teachers will reach a consensus for the final grade based on both chapters. Each chapter will be graded as failed, 3, 4, or 5. In general, the final grade will be the average grade of the two chapters (rounded upwards). Failing one of the chapters will lead to fail on the entire report regardless the grade of the other chapter.

1.5. Individuality

The report must have a cover page with a signed declaration that the student has individually written the report, that the text is the student's own words, and that work of others is properly referenced. The declaration found at the course homepage should be used. Violation of an individually written report will result in the grade failed on the report and may be reported to the disciplinary board of Linköping University as suspected plagiarism.

What is meant by "individually written report" may be obvious for many of you, but by experience, we know that students often have questions about this and that the way to write reports differs between educations and countries. Therefore, to avoid any misunderstandings, we give examples of what is not allowed when writing the report and what is:

You are NOT allowed to:	You are allowed to:
Write the report together with anybody else nor discuss the actual contents of the report.	Discuss the PBL situations.
Replicate or translate text, word for word, from any source, including books, articles, student reports, internet sources, lecture slides etc.	*Occasionally* quote parts of or whole sentences or even short paragraphs. The quotations shall be placed within quotation marks and the source shall be properly referenced. Images copied from other sources shall also be referenced.
Use another student's code for the signal processing task or collaborate when writing the code.	Discuss the SPT algorithms and coding in general terms (on a flow chart level) with other students.

You will find a short description how to handle references at the end of this document.

1.6. Submitting the report

The report shall be submitted via the course area on Lisam, choose "Submissions" in the menu. The whole report should be sent as a single pdf-file. When submitting the report, it will also be sent to the system Urkund for controlling originality of the text. The printed cover page with the signed declaration that the report is written individually (see above) shall also be handed in to the examiner. Leave it in the mailbox at floor 12 at IMT or send by post, the cover page may be handed in up to one week after the report deadline. The cover page in the pdf-file does not have to be signed. Reports handed in after deadline will not be graded, extensions of the deadline will not be permitted.

6. Handling references

The list of references to other sources (books, articles, internet sources etc) is normally placed in the end of the report, before any appendices. Various formats of the reference notation in the text and of the reference list exist. According to the Oxford system, the references are sorted according to their appearance in the text, and the reference is given as a number within brackets [1, 2] or as superscript[1,2]. According to the Harvard system the references are sorted alphabetically and the reference is given in the text with last name and year of publication (Brown 1996). If one want to have the references more integrated in the text, they can be written according to the following examples:

According to Anderson (1996), the...	The Harvard system
According to Brown (1996a), the…	More than one from Brown the same year
According to Anderson [2], the…	The Oxford system
According to Anderson and Brown (1996), the…	Two authors
According to Anderson *et. al.* (1996), the…	More than two authors
According to Anderson [AND96], the…	Variant of the Harvard system

The reference list should contain the following fields:

for articles:

Name of the author(s), full title, name of the journal, publication year, volume (issue) and pages

for books:

Name of the authors(s) and editor(s) if not the same, full title (title of book and, if applicable, chapter), publisher, city, year, and ISBN-number

for internet sources:

Name of the authors(s), full title, year of publication or access date, and URL

Example of the reference list with various formats:

[1] Brown S, *Education in biomedical technology*. Journal of Biolearning 1996; 10(3) 102-110

[2] Anderson R *et. al*, *All about Biomedical engineering*. Department of Biomedical Engineering, Linköping, 1996, ISBN 12-45-4789-41

Anderson R *et. al*, *All about Biomedical engineering*. Department of Biomedical Engineering, Linköping, 1996, ISBN 12-45-4789-41

Brown S, *Education in biomedical technology*. Journal of Biolearning 1996; 10(3) 102-110