Course PM HT19

This document contains the syllabus and course PM for Course HE1040 (Electronic Design, Project Course), HE2032 (Sports Technology, Project Course) and HL2032 (Medical Engineering, Project Course).

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Background

The course is as a master course and also given at the end of the program, medical technology, BSc. As an engineer, you will need to integrate your knowledge of the various courses in education. You are expected to produce a product or prototype from a given, incomplete specification. Both as participants and project manager across multiple development projects. To do that, you must also acquire new information and knowledge, a process that continues throughout life.

Main goal

This course aims to give you an ability to participate in and actively manage a practical technical design project. In this project, you should be able to integrate and deepen your knowledge from several earlier alternative for parallel courses in a complex problem. Because the task will be selected within the medical/wellness field (in its broadest sense), you also need to apply your humanistic knowledge.

The result of the course will be a prototype that meets a specific specification, followed by a clear report that describes the product and implementation process and an oral presentation of the same.

Expected skills

- After completing the course, you should
- be able to participate in and lead project teams with similar problems
- show that you have analytical skills by dividing a problem into smaller subproblems
- demonstrate the ability to use relevant knowledge for the task
- demonstrate the ability to search alternatively ask for information pertinent to the task
- interpret data sheets and technical descriptions

Course content

The work involves producing a prototype that meets the requirements. The work is performed in groups of 3-5 participants and presented orally and in writing.

Course prerequisites

The student should be before the course to know how a project is carried out and be able to write a technical report and have basic knowledge of digital technology, microcomputer technology, electrical engineering, electronics, computing and telecommunications and control technology.

Literature

There is no particular textbook for this course. You'll probably have use for literature from earlier studies. Further, you will need to use manuals, articles and other literature that can not be identified in advance. You will have to ask and seek what is required to solve the task.

However, for the project part, I would recommend "SCRUM and XP from the trenches" by Henrik Kniberg ISBN 978-1-320-22427-8 is available for free on https://www.infoq.com/minibooks/scrum-xp-from-the-trenches-2

Resources

You will have access to our MakerSpace after an introduction (and some paper signing) with Linus Remahl remahl@kth.se. The MakerSpace currently consist of a crafting studio where you find traditional tools for crafting, an embedded studio for IoT and mechatronics, a software studio for software development and finally a 3D studio with 3D printers and PCB manufacturing.

For PCB manufacturing, we use a cutter and not liquids. You provide a basis for the production by Linus. A certain lead time is therefore needed. See also below regarding the software. PCB designers are in great demand in the market!

To gain access to the MakerSpace the group needs to book an appointment with Linus. Do this on one of the tutors scheduled almost every Friday morning.

For lab purposes and early prototypes used breadboard and experimental cards in the first place, but you can also make temporary boards.

Standard components such as resistors, capacitors, transistors and digital circuits will be available. Each group will get access to a box which includes some essential tools. Other components you may need to order yourself, as there are no books in this course think of budget for components of 500 kr per person.

Examination

PRO1 - Project, 9 credits, grade scale: A, B, C, D, E, FX, F
Approved prototype, project report and oral presentation of the project. (PRO1; 9 hp). The evaluation is done continuously during the course and the final account of the above the expected skills.

Schedule

Tuesday 27 Aug F1	Introduction and project administration
Friday 30 Aug F2	Project management (Agile development)
Friday 30 Aug	First project meeting
Tuesday 3 Sep F3	PCB editor
Thursday 5 Sep F4	Embedded programming in sports technology
Friday 6 Sep Exercise 1	Solder exercise
Tuesday 10 Sep F5	Project management II (Risk management)
Friday 13 Sep	Second project meeting
Tuesday 17 Sep F6	Physiology of sport and exercise
Friday 20 Sep	Project meeting
Friday 27 Sep	Project meeting
Tuesday 1 Oct F7	Writing technical reports
Thursday 5 Oct	Project meeting
Thursday 12 Oct	Project meeting
F8	KTH Innovation
Monday 11 Oct	First short paper
Friday 10 Jan	Final presentation

Evaluation criteria

The course is rated individually, but is group work.

To pass there are 7 criteria in the course description. Additionally, there are four criteria for higher grades.

1. Participate in and lead project teams
    Excellent
    Move the project forward according to project the instruction manual.
    Keeping schedules, convene meetings, prepare minutes and other documents.
    Work is performed independently and produced documents of good quality.
    Good
    Some assistance to work to work,
    Enough
    Work and documents ready in time, but with much supervision.
    Fail
    Lack of respect for agreements, severe lack of independence, or disregard for supervision.

2. Show analytical skills, divide into subproblems
    Excellent
    Find appropriate portions and specify functional requirements and the dependencies between parts.
    Identify shortcomings in the existing zoning and improvements thereof.
    Good
    Understand the agreed division and understand the pros and cons, but find they do not own.
    Enough
    Agrees to work with a small sub-task, but do not understand the meaning of it.
    Fail
    Lack of respect of fixing divisions. Rather work independently with their own complete solution or larger partial solution.
    The group may have agreed on a "sharing". Either you have been involved or at least discuss it, it's excellent. Then drops the understanding of the parts belonging and / or the willingness to share the problem.

3. Demonstrate the ability to use relevant knowledge
    Excellent
    Can assess the required skills and use them to solve subtask
    Can see several alternative solutions as the knowledge utilizing

Good
Can see and understand the need for prior knowledge of more than one previous course, but can not clearly define.
Enough
Can solve the problem by using knowledge for instructions on the relevant
Fail
Can not understand that the "prior knowledge" is used in this case

4. Demonstrate ability to search for alternatively ask for information relevant to the task
   Excellent
   Good identification, rapid insight, efficient acquisition and effective utilization.
   Good
   Realize after some time the necessary knowledge and acquire this satisfactory.
   Enough
   Waiting long to ask for information or to become enlightened by the supervisor, but embrace what was then presented.
   Fail
   Do not realize the need for new knowledge or information. Inability or unwillingness to acquire new skills.

5. Orally present a technical product and discuss the work
   Excellent
   Show a good ability to orally present with clear argumentation and analysis, and good ability to discuss work.
   Good
   Show a good ability to orally present and discuss work.
   Enough
   Some ability to orally present the report.
   Fail
   Substantial inability to orally present or discuss the project.

6. Able to produce a well structured technical report with good language processing and scientific accuracy
   Excellent
   Show a well disposed report, with clear indications of work and results, clear analysis, and well founded argumentation, as well as good language usage, format and scientific accuracy.
   Good
   Show a well disposed report, with clear indications of work and results, analysis and argumentation, as well as good language usage, format and scientific accuracy.

Enough
Show a written report with acceptable structure, format and language therapy
Fail
Remaining gaps in the written report despite the request.

7. Demonstrate the ability to assess their own and others' work
In order to meet the objective assessment of their own and others' work involves:
During the project, the student will continuously keep a diary notes and timesheet. These will be made available to the examiner at regular intervals depending on the course's degree, which means approximately after 15-20 hours of work or at least once per week, preferably every day. This is to avoid the risk of important data fall into oblivion.
The diary should include the following (not everything each time):
Project Progress and Project Work
- Actually performed work
- Partner, whom I have mostly worked with
- The progress the group has made?
- What problems I experience that we have in the group?
- We have solved some since last time?
Analytical skills
- Why have I done this? That is, where will this step in the group's work / finished product
- What problems are unresolved in this case?
Relevant knowledge, old and new
- What skills were used?
- What new knowledge has been acquired
- How I found this new knowledge?
Reflection and evaluation
- How have the other group members contributed to or worked against success?
- What do I know about the work of others?
- What I think about the ability to get the job done on time?
- What was the dumbest thing I've done in this period?
- What was the best thing I have done in this period?
These notes will also be the basis for discussions at follow-up meetings.

For higher grades will be criteria
- (H1) can find several alternative solutions to a given problem and choose it as the basis of certain criteria gives the best results
- (H2) can make an assessment of the performance or inaccuracy in the produced prototype
- (H3) propose improvements to the featured structure that can be implemented in a later version
- (H4) shown a great degree of independence

At the end of the course before the final exam each to make an assessment of the group's work at the individual level. It could look like this.
Assess all participants in the group on a scale, 1-5.
- Helps with much knowledge of project progress
- Have a willingness and ability to share their expertise.
- Utilizes knowledge in an exemplary manner
- Make trade-offs and priorities and come up with good ideas, well
- Quickly find new knowledge and information

	G1	G2	G3	G4	G5	G6	G7	H1	H2	H3	H4
A	3	3	3	3	3	3	3	1	1	1	1
B								0	0	0	0
C	2	2	2	2	2	2	2	1	1	1	1
D		1	1	1	1	1	1	0	0	0	0
E	1										
Fx	Summa(G1:G5) > 5							-	-	-	-
F	Summa(G1:G5) < 6							-	-	-	-

Weighting of grades
All the areas of assessment should be balanced based on an overall assessment. To assist in this assessment are used matrix below. For sake (sake) it is a translation made
Excellent - 3
Good -2
Enough - 1
Unacceptable - 0
For the higher the Grades assessment areas, H1-H4, only 1 and 0th
Apparently there are not all the possible combinations in the matrix. It is only a guide. One conclusion that can be drawn is that the criterion G1 has a high weight factor.