Course Plan Autumn 2021

Medical Information and Communication Systems (HI2010)

Welcome to Medical Informatics and Communications (MI&C) Course!
Here you find all information you need for the course.

Course information

Number of credits: 6 credits (HP)
Grading scale: A, B, C, D, E, FX, F

Contact information

- Martin Jacobsson (MJ), martin.jacobsson@sth.kth.se, room 6306, examiner

Course Content

The course is broad introduction to the field of biomedical and health informatics as well as standards and regulations in medical technology. The application areas include healthcare, preventive care, elderly care, well-being, sports, mHealth, home care, etc. The focus is on the use of modern information and communications technology (ICT) solutions in these areas. The course also contains an in-depth part, where a narrower topic within the field is studied.

The practical parts of the course consist of labs covering the processing of physiological signals and the construction of software systems for wireless sensors and mobile applications in health and sports.

It is mandatory to attend the lab presentations and the seminars. In addition, it is strongly recommended to attend the lectures and exercises during the entire course. The written exam is based on the course material on the course web page as well as the lectures and exercises.

Learning Outcomes

By the end of the course the students should be able to:

- describe and discuss health informatics and biomedical technology
- find, analyse, synthesise and present scientific articles in the subject area
- use common ICT requirements methods to identify, reason, and analyse the medical and care needs of ICT solutions
- implement simple ICT systems with applications in the subject area
- apply basic signal processing algorithms to biomedical signals

Course literature

The reference book for the course is

- *Handbook of Medical Informatics*, Editors: J.van Bemmel, M.A. Musen, Springer Berlin Heidelberg, 2002

Complementary Source

- *Biomedical Informatics. Computer Applications in Health Care and Biomedicine*, Editors: Shortliffe, Edward H., Cimino, James J. Springer Berlin Heidelberg

edX course eHealth – opportunities and challenges - from Karolinska Institute

- You can find several short video lectures from the edX course eHealth – opportunities and challenges - from Karolinska Institute in a folder in Canvas.
- It gives a broad and inspiring introduction to health informatics. We recommend that you listen to the online lectures during the course, especially for the fulfilment of the student independent work.

Extra material

- Laurel Riek, "Healthcare Robotics", Communications of the ACM, Volume 60 Issue 11, November 2017, Pages 68-78. https://doi.org/10.1145/3127874 (Available through KTH Library)
- Chapter 3 and 4 from "Systems Engineering Fundamentals", Defense Acquisition University Press, 2001. Available at: https://web.archive.org/web/20110722184431/http://www.dau.mil/pubscats/PubsCats/SEFGuide%2001-01.pdf
- Alexander Cowan, "Your Best Agile User Story", https://www.alexandercowan.com/best-agile-user-story/
- and more material …

Course Content

This course is mainly a self-study course. Recorded lectures are provided. See Canvas.

For each recorded lecture, you need to create two questions and upload to the KTH online teaching platform Canvas. One question must have been covered and answered by the lecture. The other question can either be a question that you still have after the lecture or be a question related to the lecture, but not covered by the lecture. These questions will be shared among all students and there are deadlines for each of the recorded lectures for when the questions need to be uploaded.

For each recorded lecture, you must also provide answer to at least one question posed by someone else. There is a deadline for when all the answers need to be uploaded.

Assignment

There is a mandatory assignment in the beginning of the course. In pair, you will work with requirement analysis and stakeholder analysis for a fictive IT system for healthcare. You need to write a report and upload to Canvas.

Labs

- Lab 1 is about **programming a wireless sensor**. The task is to make a complete system consisting of an analog medical sensor, data acquisition, and rudimentary data processing and presentation. The lab is examined by handing in the solution and demo it to the teacher.

- Lab 2 is about using online material and basic programming, and do some exercises in **digital filter design** and implement them. More details to be communicated later.

The labs will take place together with the course *CM2015 Project Carrier Course, part 1*.

Poster Presentation

You will be divided into pairs (in exceptions: groups of three) and together pick a topic in the area of medical ICT.

Your task is to find literature (including scientific literature) that discuss the chosen topic and then compile the work into an abstract and a poster.

The poster will be presented during a special session (on Thursday 14 Oct. 10:15-12:00), where your fellow students and others may interact and ask you questions about your poster. You will also get the chance to see the other posters and interact with them as well.

Grading of the poster presentation is based on the following criteria:

- For the production of a satisfactory poster and presentation, you will be awarded a E. You also need to pass the seminar and the lecture questions assignment.
- Grade D and C can be given for posters that are clearly better than level E, but do not fulfil the requirements for a B or A.
- If your poster mentions and discuss several research and other types of articles, you will be awarded a B. Both the number of articles and the quality and diversity of articles will be considered.
- If your poster also is able to compare some of the articles to each other in an interesting way, you will be awarded an A.

Examination and final grade

To pass the course you have to comply with:

- RED2 (grade A-F)
    - Assignment
    - Poster production and presentation
    - Lecture Questions
- TEN1 (grade A-F)
    - Written exam
- LAB1 (grade Pass/Fail)
    - Two labs

Grade criteria

Final grade is based on the lower grade of RED2 and TEN1, given the grade Pass on LAB1.

To obtain grade E, the student must fulfil all learning outcomes.
To obtain grade C, the student must also be able to:

- describe and discuss **some topics in** health informatics and biomedical technology
- find, analyse, synthesise, and present **several** scientific articles in the subject area

To obtain grade A, the student must fulfil the criteria for grade C, and also be able to:

- describe and discuss **several topics in** health informatics and biomedical technology

- find, analyse, synthesise, **compare** and present **several** scientific articles in the subject area

The grades D and B can be obtained if the student does not quite fulfil the objectives for grade C or A respectively, but fulfil with distinction the objectives for grade E or C respectively.

The exam

The course includes a written exam. No aid besides pen and eraser is allowed.

The exam questions will be divided into two parts. Both parts are taken at the same time. The first part is about health informatics and the second is about biomedical technology. To pass the written exam, you will need to score at least 40% of the points of the first part and at least 40% of the points of the second part. The total score of the exam will give you the grade of TEN1 as follows (you need to fulfil both requirements above):

Grade	**Minimum Total Exam Score**
E	
D	60%
C	70%
B	80%
A	90%

If the Covid-19 pandemic mandates it, the written exam might take place online using our online teaching platform Canvas. Both the questions and the answers will be handled through Canvas. The exam may then also be complemented with an oral part.