FYD160   Embedded systems in FPGAs, 7.5 higher education credits

Inbyggda system i FPGA, 7,5 högskolepoäng
First Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2015-10-09 and was last revised on 2015-11-06 to be valid from 2016-07-01, autumn semester of 2016.

Field of education: Science 100%
Department: Physics

Position in the educational system

The course can be part of the following programme: 1) Computer Aided Measurements in Physics (N1DAF)

Main field of studies	*Specialization*
Physics with Specialization in Computer-Aided Physical Measurement Technology	G1F, First Cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

FYD150 or the equivalent

Learning outcomes

After having passed the course, the student should be able to design embedded systems based on a soft CPU for for downloading to an FPGA as well as be able to source files for these systems (in C) for communication with the most common I/O units as well as master the most common type of computer communication protocols (RS-232, I2C, SPI) with external sensors for acquisition of measurement data.

Knowledge and understanding

Having passed the course, the student should:

understand the difference between a soft CPU and a hard CPU
 be able to explain how an embedded system is built-up

Skills and abilities
On completion of the course, the student should be able to

design an embedded system in the form of a so-called sof file for downloading into an FPGA
 create new projects based on a given board support package
 write source files for a soft CPU in an FPGA
 troubleshoot and simulate the function of an embedded system
 write source files for communication with the most common hardware

Judgement and approach
On completion of the course, the student should

understand the consequence of different design strategies for the system's performance in terms of time and power
 understand the difference between a configurable hardware and a fixed hardware

Course content
The course treats implementation of embedded systems in FPGAs based on a soft CPU? where mainly Alteras tool is used together with development boards from Terasic. The course consist of design of computer systems for downloading into FPGAs as well as programming of these systems.

Form of teaching
The course consists of a number of lectures and laboratory sessions. No components.

Assessment
The final grade is based on an assessment of the completion of assigned design tasks and projects.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
For the grade Pass, it is required that a given number of assignments and projects are presented (satisfactory) before an in advance given date. To pass with distinction, a number of assignments and projects should further be presented.

Course evaluation

Course evaluation is made in the form of a questionnaire in GUL at the end of the course.

The results of and possible changes to the course will be shared with students who participated in the evaluation and students who are starting the course.

Additional information

The course is given in Swedish. The hardware in the course come from Terasic/Altera and the software from Altera. The software can be downloaded free from Internet.