

Summer Study Abroad Course:

“Introductory course to embedded systems design”

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Summary

The aim of this course is to introduce the students into the design of embedded systems: microprocessor-based systems with some associated hardware (wired or reconfigurable) and possibly with real-time computer constraints.

The course is organized in lecture sessions and laboratory assignments in order to provide the students with an applied vision of these challenging fields. The students will design and simulate reconfigurable devices using hardware description language. Also, they will program microprocessors using both high and low level languages.

Course Description (3 weeks, 60 hours)

Lecture Contents (40 % of the course):

Theme 1: Digital design review: binary codes, combinatorial design, sequential systems (Mealy and Moore). Introduction to embedded systems: examples of application (digital communications).

Theme 2: Introduction to VHDL hardware description language. VHDL modelling of basic combinatorial and sequential blocs.

Theme 3: Microprocessors peripheral devices review.

Theme 4: Microprocessors programming. Intended infinite loop, timers & counters, polling & interrupts, watch dog timer, power saving modes, real time constrictions & tools.

Laboratory (60 % of the course):

#1: VHDL simulation and design of combinatorial and sequential systems.

#2: Simulation and design of a digital multifunction clock (2 sessions).

#3: Introduction to embedded systems design.

#4: Arduino hardware & IDE

#5: Peripheral access & control: sensors, flash card, LCD, communications.

#6: Project development: High level language programming of sensor data login and user interface. (2 sessions)

7: Results presentation.