SYLLABUS

SUBJECT: EMBEDDED SYSTEMS

TEACHER: Prof. UR LUCYNA LENIOWSKA, PhD, DSc

COURSE DESCRIPTION:
Embedded systems have become the next inevitable wave of technology, finding application in diverse fields of engineering. Microprocessors, together with sensors and actuators, have become embeddable in almost everything. The purpose of the course is to provide the students with the basic information about embedded systems which can be defined as a control system or computer system designed to perform a specific task. The course consists of two parts being closely interconnected. The aim of the course, in its first half, is to introduce students to the theory and practice of control system engineering. The second part is devoted to the basis of microcontrollers architecture and programming of embedded systems.

LECTURE:
Introduction to embedded systems. Basis of discrete control theory with practical examples. Transfer functions and block diagrams. Control system specifications: sampling time, delay time, phase margin, gain margin, bandwidth etc. Commonly employed compensators. Logic-based control. Embedded system architecture. Processor examples: AVR, ARM, DSP. Peripherals on chips. Real-time operating systems. Software for embedded systems design.

CLASSES:
Practical exercises concerning real time operating systems installation and AVR/ARM programming.

LEARNING OUTCOMES:
Students will acquire a basic knowledge about fundamentals of microprocessors programming and system control to perform a specific task.

GRADING POLICY:
LECTURE: Written test.
CLASSES: Reports and short questions before classes.

TIMETABLE:
LECTURE: 1h x 15 weeks = 15 hours (1 semester)
CLASSES: 1h x 15 weeks = 15 hours (1 semester)

TEXTBOOK AND REQUIRED MATERIALS:

1. Peter Marwedel, Embedded System Design, Kluwer Pub. 2004.
2. Dorf R.C., Bishop R.H. Modern control systems, Addison Wesley, 1995.
3. A. Pawluczuk, Sztuka programowania mikrokontrolerów AVR – podstawy, Wydawnictwo BTC, Warszawa 2006 (in Polish).
4. R. Bryndza Mikrokontrolery z rdzeniem ARM w przykładach, Wydawnictwo BTC, Warszawa 2009 (in Polish).

PREREQUISITES:
Programming in C is recommended but not mandatory.