

# Course Information: 2B1445 Embedded Systems

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## Course Web Page

The web page for the course is located on [www.imit.kth.se/courses/2B1445/](http://www.imit.kth.se/courses/2B1445/)

## Course Staff

### Course Leader

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## Objectives

The overall goal of the course is that the students should have an overview knowledge of the design and implementation of embedded computer systems. More specifically this means knowledge in:

- Microprocessor architecture for embedded systems including instruction set architecture, instruction pipelining, memory systems and power consumption
- Embedded computing platforms including bus interfaces, memory devices and I/O devices in embedded systems
- Embedded system's program design and development tools; performance and energy models
- System software for embedded systems including operating systems overview and real-time programming and systems

## Prerequisites

Knowledge of high-level language programming in imperative languages such as C, C++, Java or Fortran is required.

## Requirements

In order to pass the course you have to pass the *final exam* (TEN1; 3p) and to complete the *laboratory course* (LAB1; 2p) consisting of five labs.

The grade of the exam will also be the grade for the course. There is no possibility to re-write a passed exam to improve the grade.

**Exam** The written exam is scheduled for October 18, 2004 at 9.00-13.00. There will be two re-exams during the course year 2004/05.

**Laboratories** Since laboratories and assistants are expensive resources, they should be used with care. Please read these rules carefully in order to allow for a good course.

- Two students form a laboratory group. Though cooperation inside a group is supported, each student has to understand all parts of the laboratory!
- In order to attend a laboratory session students have to carefully complete the preparation tasks.
- You have to use the software on the computers in the Forum-laboratory.
- The laboratory course is concentrated to period 1 (until 2004-10-22). Please complete the laboratory course during this period. If you have not finished the course during P1, you may complete your labs individually and show them to the lab assistants during two re-examination periods in the course year 2004/05. These periods will be announced later.
- If you do not complete the laboratory course during 2004/05 (until 2004-08-30), you cannot count your labs anymore and have to take the whole laboratory course from the following year.
- There is a laboratory registration form, which the assistants shall sign when you complete a lab. Please keep this form safely, since in case of problems with registration, we will ask you to show us the form.

## Material

The course uses chapter 1 to 6 of the book *Wayne Wolf: Computers as Components (W)*. Parts of the book will also be used in the course *2B1447 SoC Architectures*. The book is available in the bookshop in Electrum.

## Schedule

The course schedule consists of 11 lectures (11x2 hours), 5 seminars (5x2 hours) and 5 labs (5x4 hours).

	<b>Contents</b>	<b>Ref.</b>
L1	Introduction, Embedded systems design process	W:1
L2	Instruction sets and ARM Architecture	W:2.1-2.3, 2.5
S1	Exercises and preparations for lab 1	
L3	CPUs: I/O and Interrupts	W:3.1-3.3
L4	CPU:s Cache memories and pipelining	W:3.4-3.6
S2	Exercises and preparations for lab 2	
L5	CPUs: Pipelining and power consumption	W:3.6-3.8
L6	Platforms: Buses, memories and simple I/O devices	W:4
S3	Exercises and notes on lab 3	
L7	Program design and analysis 1	W:5.1-5.5
L8	Program design and analysis 2	W:5.5-5.10
S4	Exercises and preparations for lab 4	
L9	Processes and OS	W:6
L10	Processes and OS	W:6
S5	Exercises and preparations for lab 5	
L11	Trends in embedded systems designs	
S6	Before the exam...	

**Note:** Lecture slides will in general be available for download after the lecture. *These slides do not cover the whole contents of the lecture. You should come to the lecture!*

## Registration

You have to register for the course. This can either be done in the lecture or by sending an e-mail to [ingo@imit.kth.se](mailto:ingo@imit.kth.se). Please provide your e-mail and person number.