

Embedded Software/System in the SOC Master Program

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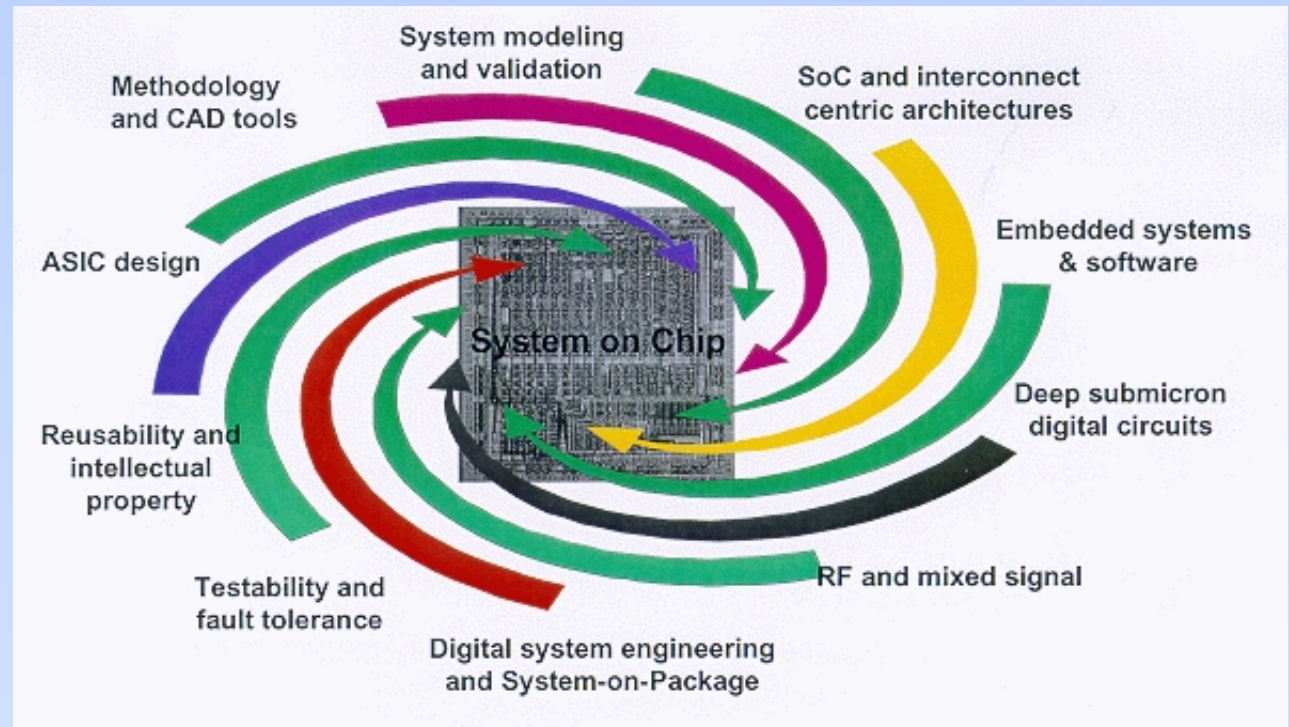
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Issues

- HW/SW Interfaces
- HW Architecture from SW Perspective
- Operating System
- SW Compilation Process
- Dealing with Concurrent Tasks
- System Design and Validation



Courses

Mandatory Courses

- Embedded Systems
- Digital Circuit Design
- Hardware Modelling
- SoC Architectures
- Digital Systems Engineering
- Design Documentation and IPR Issues
- Master thesis

Elective Courses

- Design of Fault Tolerant Systems
- System Modelling
- Radio Electronics
- Anatomy of CAD Tools
- Low Power Analog and Mixed Signal ICs
- System ASIC Design
- Special Topics in SoC



Embedded Systems

Course Book: Wayne Wolf, *Computer as Components*, Morgan Kaufmann.

Design Methodology: Design flow, Architecture-Function Codesign

Instruction sets: ARM7, DSP Sharc

CPUs: I/O mechanism, memory hierarchy, CPU-SW interface

Designing with a CPU: memory system, I/O devices, drivers, debugging

Program analysis and optimization: Compiler, assembler, linker, optimization, validation

Operating systems: Tasks, communication, scheduling

Networks: Topologies, communication protocols, protocol layers (OSI)



SoC Architectures

Course Book: D.A.Patterson and J.L. Hennessy, *Computer Organization and Design*, Morgan Kaufmann.

Instruction set architectures

Arithmetic: Addition, subtraction, logic operations, multiplication, division, floating point

Datapath and control in RISC

Pipeline: Hazards, stalls, performance prediction

Memory hierarchies: Cache, virtual memory, distributed memory

Processor I/O: I/O devices, buses, interrupts

Parallel computer models: Processor arrays, systolic arrays, VLIW, memory, control and communication management, interconnection networks



System Modelling

Course Book: Course compendium

Basics: I/O behaviour, state, continuous and discrete models, time

Modelling behaviour: Finite state machines, languages, grammar

Modelling concurrency: Petri nets

Untimed dataflow models: Static and dynamic dataflow, Buffer optimization, scheduling

Synchronous models: Reactive real-time systems, digital circuits

Timed, discrete event models: Hardware modelling, performance modelling



Issues and Courses

- HW/SW Interfaces ⇒ Embedded Systems, SoC Architecture
- HW Architecture from SW Perspective ⇒ Embedded Systems, SoC Architecture
- Operating System ⇒ Embedded Systems
- SW Compilation Process ⇒ Embedded Systems
- Dealing with Concurrent Tasks ⇒ Embedded Systems, System Modelling
- System Design and Validation ⇒ Embedded Systems, System Modelling

