MSc in Embedded Systems
Intro to Programme and Courses

August 23, 10:15, room 2446
Outline for today

- To get started: Things to organise over the next days/weeks
- The Swedish/Uppsala/Bologna academic system
- Programme overview
Questions upfront?
Least but not last: BBQ

- Today from 16:00, Polacksbacken
MSc in Embedded Systems at Uppsala University

• Young **Master's Degree** programme
  • Started in 2010
  • Currently approx. 35 students enrolled
  • First students graduated 2012
• Hosted by **IT Dep.** and **Ångström lab.**
• **Goal:** train professionals in Embedded Systems design
What is an Embedded System?
Embedded Systems

- Computer systems **integrated** into a larger device
- **Hardware + software** tailored to a particular purpose
- About **99%** of all computers are embedded
- **Applied**, but also leads to foundational research questions

**Pervasive:**
Cell phones, cameras, trains, airplanes, traffic lights, home appliances, robots, industrial machines, etc.
Many Directions ...

- Software design, modelling, implementation
- Real-time aspects
- Electronics/hardware design (VHDL, Verilog, etc)
- Computer architecture
- Control theory
- Signal processing
- Networks, distributedness, wireless communication
- Concurrency, multicore computing
- Compiler design
- and more
Embedded Systems ...

- have huge industrial importance
- in Sweden, Europe, and all the rest
- In Sweden: companies like Ericsson, Volvo, Saab, Skanska, ABB, SKF, ENEA, ...

- is a large, well-funded academic area
- spans various fields of basic research
- numerous projects in Sweden, Europe, USA, and ...

→ Good career opportunities on either side
Things to organise ...
Student accounts

- Central web page for all course-related activities: www.studentportalen.uu.se
- You have to visit the IT Division to get your account details (building 3 ITC) http://uadm.uu.se/it/?languageId=1 (take some id/passport with you)

- Enrolment/registration is happening as we speak ...
Unix accounts

- Used for lab rooms
- Account details will be handed out beginning of next week (when courses start)
Access card/Campus card

- New procedure in 2016

- You first need to get account details/activate the student account ...

- ... then upload a photo of yourself, and set a pin code ...

- ... then pick up the card at the reception (?)
Swedish Personal Numbers

- “Temporary” numbers: 123456-T123
- “Proper” number: 123456-1234
- Administered by the tax authorities
  http://www.skatteverket.se
- Once you have a “proper” number, tell the student office about it

- (also needed for a bank account)
- Apply soon!
Courses in Basic Swedish

- Application form included in your welcome package; deadline Aug 29
- If you do not speak Swedish yet, participation is **highly recommended**

- Other possibilities for learning Swedish:
  - Folkuniversitetet
  - SFI, [https://www.uppsala.se/sprak/english/](https://www.uppsala.se/sprak/english/)
The Academic System ...
The Year in Uppsala

- 1 year = 2 terms = 4 periods
- Autumn term: periods 1 + 2
- Spring term: periods 3 + 4
- Courses cover 1 or 2 successive periods
- Summer: vacation, summer courses, time for individual studies or projects
- 1 period = 10 weeks = 8 weeks courses + 2 weeks exams
Credits (högskolepoäng, hp)

- Master degree = 120hp (90hp courses, 30hp thesis)
- 1.5hp = 1 week full-time studies
- 1 term = 30hp
- 1 period = 15hp
Courses

• Most courses: 5hp, or 10hp

• Various formats: Lectures Assignments, labs Projects Flipped classrooms Seminars
Choosing Master's Courses

• Talk to Liselott or Philipp!
• Courses have to complement your Bachelor; no courses that overlap too much with your Bachelor courses
• For your degree, you need:
  • 120hp of courses altogether
  • including 30hp thesis (also possible: 45hp)
  • including at least 60hp ES courses
  • including at most 30hp basic courses
Student counsellor

Liselott Dominicus
studievagledare@it.uu.se
https://www.timecenter.com/uthenheten/

Thursday, 10:30 – 12:00, room 4213
(other times by appointment, use webpage)
Course registration (“regular”)

- **Step 1**: Attend **course fair/course information meeting**  
  (normally: end of March, end of Sept.)

- **Step 2**: **Apply** for courses  
  (deadlines: April 15, October 15)  
  antagning.se, universityadmissions.se

- **Step 3**: At beginning of period, **register** for courses that you were admitted to; on studentportal.uu.se
Course registration ("regular")

- Important:
  If you do not apply in time, you might not get a place in your favourite courses!
Dropping courses

Can be done within 3 weeks of course start (then course credits will not be counted)

After 3 weeks, in general it is not possible to remove courses

Contact the student office, or talk to Liselott or Philipp if you want to drop a course (as early as possible)
Tuition fees

• Fee-paying students can always apply for courses, but registration is only possible once tuition fees for a term have been received by the university

• For all questions about fees, contact: feemaster@uu.se
Exams

- Many courses end with a written exam
- Registration deadline is always 2 weeks before the exam (link on student portal) → Important to register in time!
- At least two re-examination options per year
Grades

- U, 3, 4, 5
- Sometimes: U, G
Course registration
Autumn 2016

- Courses are discussed at individual meetings later this week
- Outcome: “individual study plan” for the first term
- We then directly register the courses
Changing courses
Autumn 2016

● There will be a drop-in day next week for changing the study plan (probably: September 2)

● More information via mail!
Information and Offices ...
Student office (IT Kansliet)

Building 4, floor 2

Monday – Thursday, 10:00 – 12:30

Dealing with: course registrations, exams, study results
Admissions Office
Important webpages

- **Main page of the programme**, 
  http://www.it.uu.se/student/programmes_and_courses/master_programmes/embedded_systems/

- **Detailed programme syllabus**, 
  http://www.uu.se/en/admissions/master/selma/studieplan/?planId=968&pKod=TIS2M

- **Education pages** of the IT department 
  (including list of all courses offered), 
  http://www.it.uu.se/education

- **TimeEdit**, https://se.timeedit.net/web/uu/db1/

- **Studentportalen**, https://studentportalen.uu.se/portal/portal/uusp

- **Admissions**, https://www.antagning.se/se/start
  (English, https://www.universityadmissions.se/intl/start)
Course levels

- G1N
- G1F
- G2N
- G2F
- A1N
- A1F
Dependencies, entry requirements
Courses and Topics ...
Programme outline

M.Sc. Thesis Work

- Embedded Computer Systems
- Wireless Communication & Networked Embedded Systems
- Advanced Computer Architectures

Real Time Systems

- Model-Based Design of Embedded Systems

Embedded Systems Software

Signal Processing & Automatic Control

- Hardware and Software Co-Design
- Digital Design Techniques

Applied Mathematics
The introductory course

- Recap in C programming, parallelism/concurrency
- Technical/scientific writing and presentation
- Professional competency
- Working in teams and on projects
- Inter-cultural communication
- and some more
The introductory course (2)

- 5hp, period 1

- After today, most of you will be registered for this course!
Area: programming/software

- Real-time systems
- Micro-controller programming
- Programming Embedded Systems
- Model-based design of ES
Area: programming/software

- Software engineering
- Functional programming I
- Software testing and maintenance
Area: hardware

- Accelerating Systems with Programmable Logic Components
- Previously, now optional: Digital electronics design with VHDL
- Project in Digital Electronic Constructions
Area: parallelism/concurrency

optional

- Language Abstractions for Concurrent and Parallel Programming
- Low-level parallel programming
- Parallel and Distributed Programming
Area: control

- Introduction to computer control systems
- Automatic control II
- Embedded Control Systems, Project
Area: signal processing

**optional**

- Spectral Processing of Signals (quite advanced)

- *Further courses available in Swedish*
Area: networking

- Wireless Communication and Networked embedded systems (requires “Computer networks”, or equivalent!)
- Computer networks (optional, basic)
- Computer networks II (optional)
- Computer networks III (optional)
- Parallel and Distributed Programming (optional)
Area: language design

*optional*

- Compiler design I
Area: AI, HCI

optional

- Human Computer Interaction (many instances)
- Artificial Intelligence
- Machine Learning
- Intelligent Interactive Systems
Foundational courses

- Applied mathematics
Area: architecture

optional

- You should already have:
  basic Computer Architecture
  As possible complement:
  Computer architecture I

- Advanced computer architecture
Individual projects 

*optional*

- “Advanced Course on Topics in Embedded Systems”

- Interesting for later terms, and next summer

- 5hp or 10hp

- Topic chosen individually

- Similar to a small Master's thesis
Master thesis

- Usually done in the last term (i.e., in spring 2018)
- Detailed information on http://www.it.uu.se/student/thesis_project/master
- Mandatory start-up meeting!
Remark

• Already now, think about courses that you find most interesting, and check their prerequisites!

• You might have to choose specific courses early on, to have prerequisites for later courses
Main courses this autumn

- Introduction to studies in ES
- Real-time systems
- Microcontroller programming
- Programming Embedded Systems
- Wireless communication and Networked embedded systems
Enjoy your studies in Uppsala!

Questions?