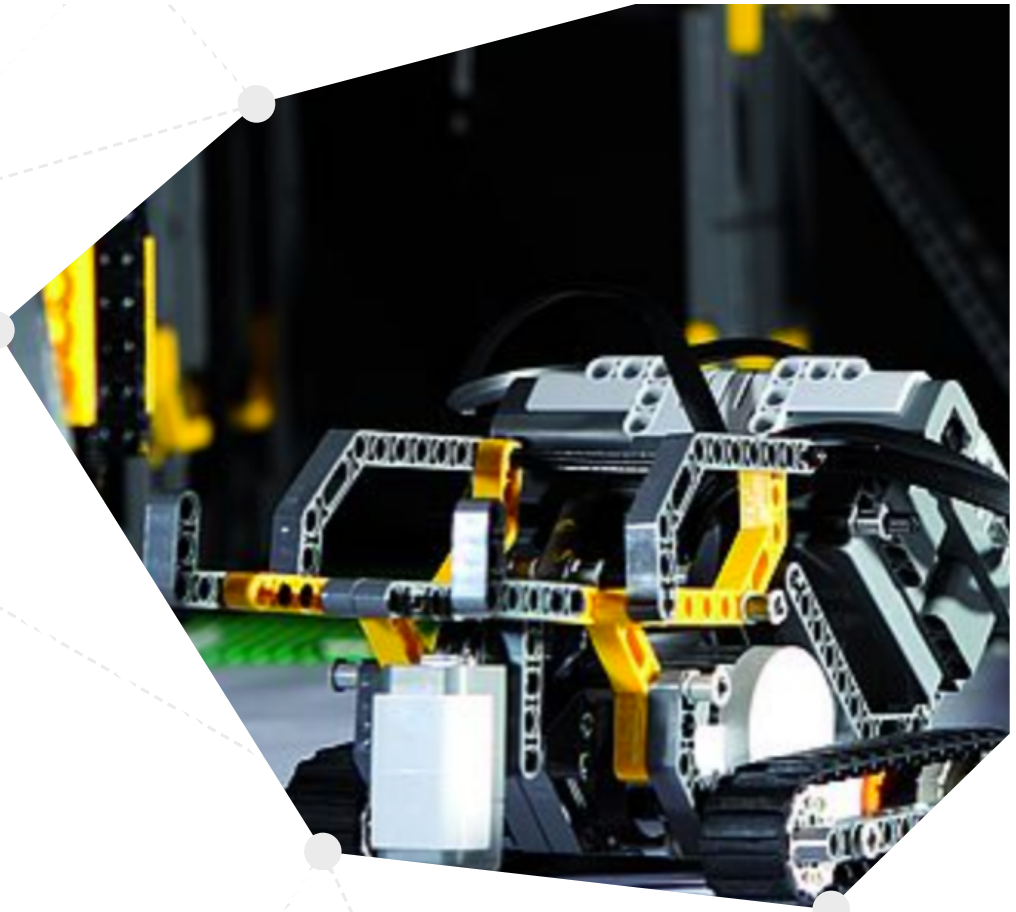
PADERBORN UNIVERSITY



WELCOME SUMMER 2020

INTRODUCTION TO COMPUTER ENGINEERING

SYBILLE HELLEBRAND AND MARCO PLATZNER
Study Advisors for CE

Outline

- Computer Engineering and Information Technology
- Prerequisites
- Master Computer Engineering
  - Structure
  - Study elements
  - Building your schedule
  - Exams
- Sources of Information and Tips

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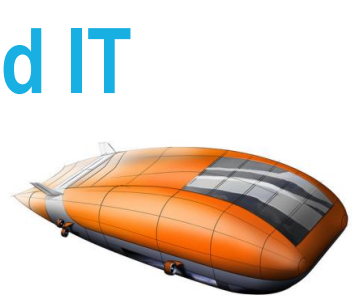
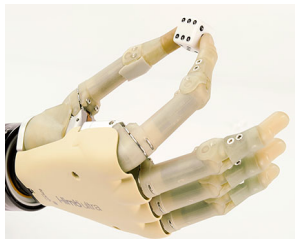
WELCOME
SUMMER 2020

Computer Engineering and IT

… timely and entertaining infotainment



… modern and energy-efficient mobility



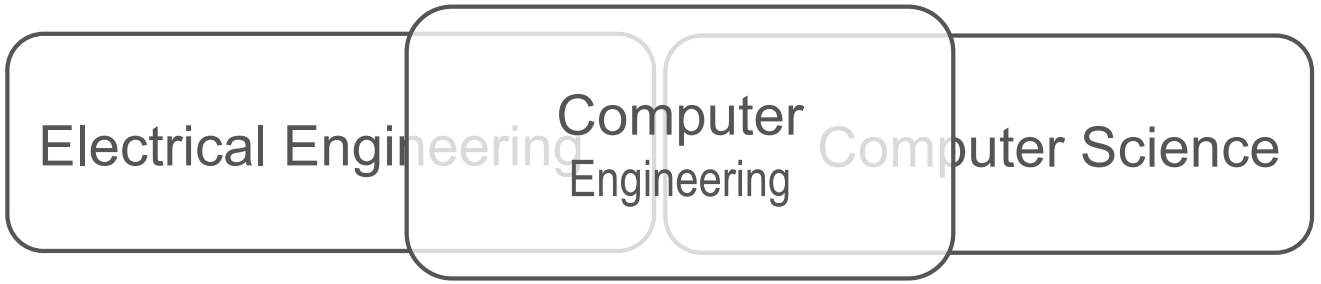
… networked and secure business

… progress in medicine

… and many more

What is Computer Engineering?

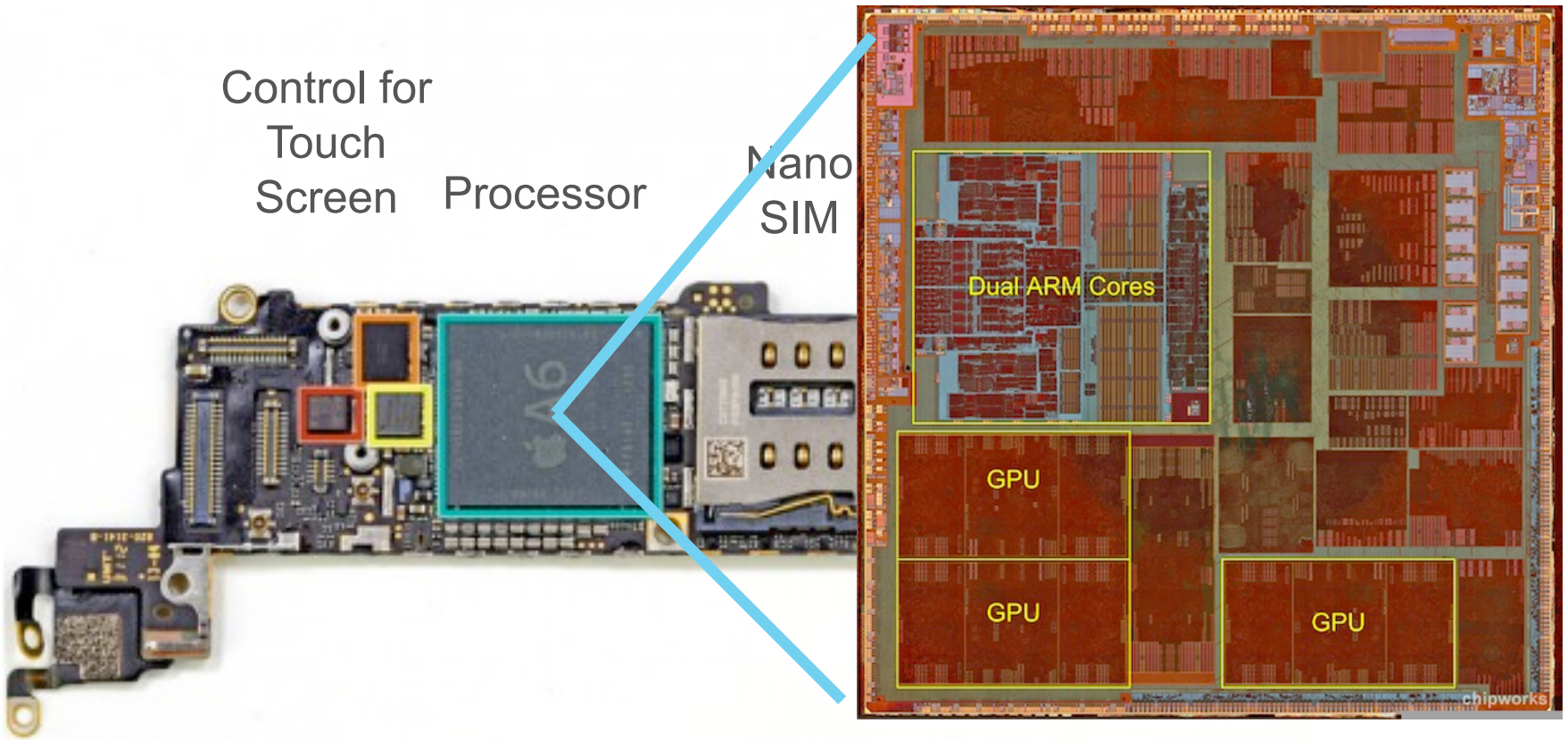
- Construction, analysis and evaluation of computers and computer-controlled systems
  - Such systems consist of hardware AND software
  - Knowledge and skills from Electrical Engineering AND Computer Science required
  - Key discipline of information technology with great demand for graduates



Example iPhone 5

Building an iPhone needs expertise from both
Electrical Engineering
AND
Computer Science

Example ctd.



The instructions of the processor constitute the hardware/software interface.
By the way: Where is the software in the picture?

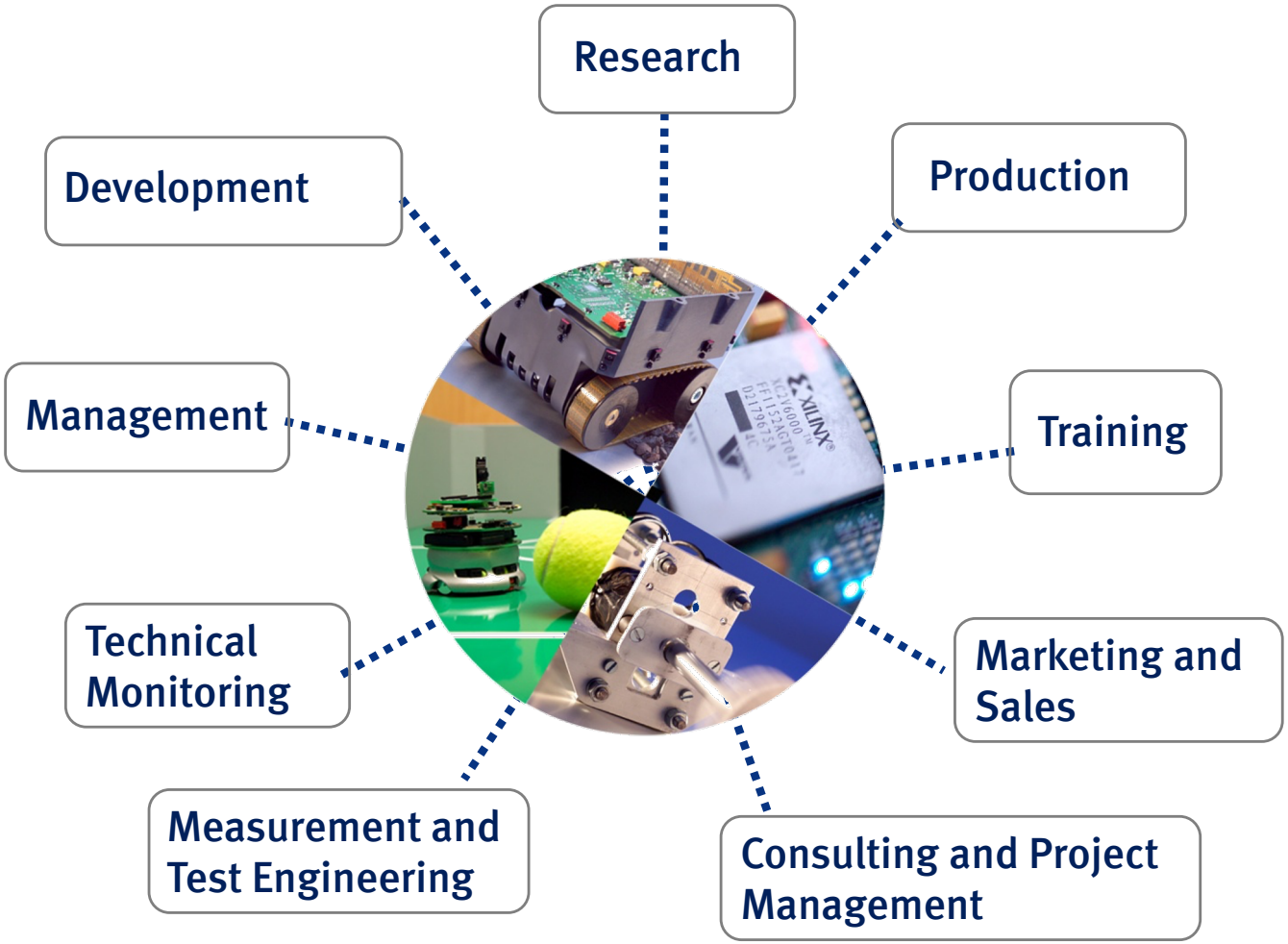
Computer Engineering @ UPB

- Internationally accepted profile (IEEE/ACM curriculum guidelines)
- Developed and operated by the Institutes of Computer Science & Electrical Engineering and Information Technology

Computer Science | Computer Engineering | Electrical Engineering

Bachelor	Bachelor	Bachelor
Master	Master	Master

Where Do We Find Computer Engineers?



Prerequisites

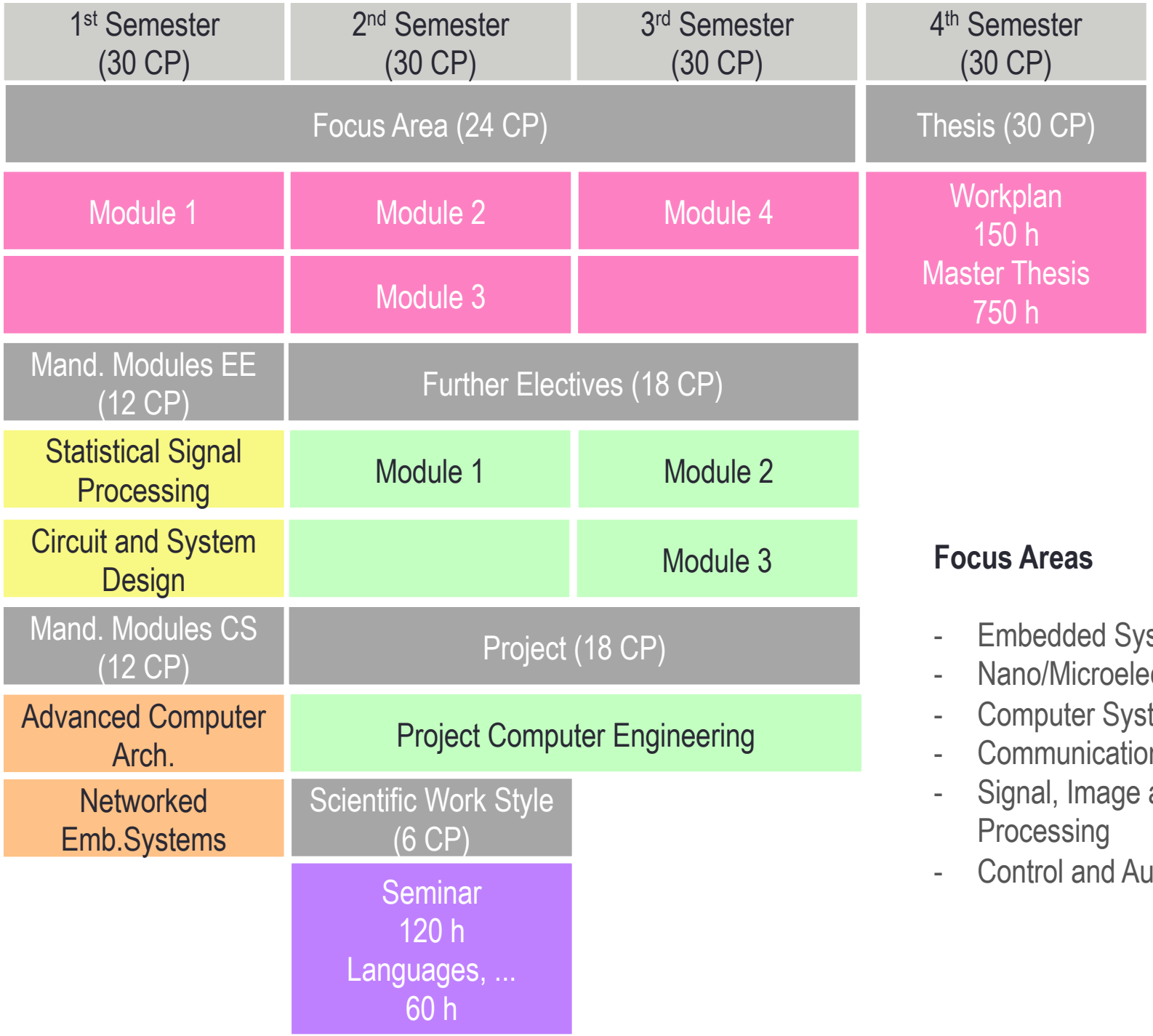
- What you have learned in your Bachelor program must match (roughly) what Bachelor students in Computer Engineering at Paderborn University have learned
  - Because Bachelor CE and Master CE are designed as consecutive study programs
- What we expect
  - Ability to apply foundations of CS and EE
  - Experience with practical work in hardware/software systems
  - Initial training in scientific work

Prerequisites

- This has been checked before admission, but in case there are individual deficits ...
  - Work on your own to compensate deficits
  - Discuss CE Bachelor courses with local students
  - Ask lecturers for suitable material for self-study

Master CE – Key Facts

- Master Computer Engineering
  - (Nominal) duration of 4 semesters including the Master's thesis
  - Degree "Master of Science (M.Sc.)"
  - Deepens expert knowledge and methods
  - Qualifies for advanced jobs in industry and academia (e.g. PhD studies)

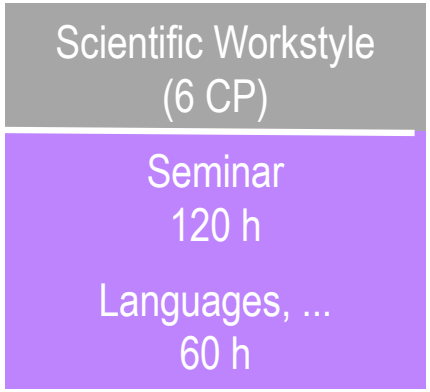


Focus Areas

- Embedded Systems
- Nano/Microelectronics
- Computer Systems
- Communication and Networks
- Signal, Image and Speech Processing
- Control and Automation

Modules

- Basic building blocks of the study program
- Mandatory or elective modules
- May combine several courses (in CE mostly 1:1)
- Associated with exams
- Have an assigned workload (credit points / CP)
- Details are described in the “module handbook”



- CP or ECTS-Credits
  - 1 Point = 30 hours workload
  - 30 credits per semester
  - Master has 120 CP in total

Example

- 1 CP = 30 h workload
  6 CP = 180 h workload
- We have 15 weeks per semester
- 1 CP = 2 h per week
  6 CP = 12 h per week (1 – 2 days per week)
- 30 CP (overall workload of semester) = 60 h per week (more than 8 full workdays)
- What's wrong with this computation?

Courses

- Lectures
  - Typically with exercises
  - May require “Studienleistung” to register for exam
- “Languages, Writing and Presentation Techniques“
  - You can choose any course offer from Paderborn University in above topics
  - Individually strengthen your professional skills

Seminar

- Lecturers offer seminars
- Each registered student selects a topic
  - Performs literature search
  - Reads, analyzes and compares selected literature
  - Prepares and gives a presentation with slides
  - Submits a written report
- Variations exist
  - Meeting frequency
  - Presentations in form of a mini-seminar, simulated peer review process
  - Include evaluation of tools

Project Group

- Workload is 18 CP (!)
- A team of typically 6-10 students works on a larger project over two semesters
- Concept and implementation of a hardware/software system
- Project management (including documentation) is part of the task
- Topics for project groups are announced, interested students can apply
- Variations exist
  - A seminar can be included within a project group (mixed CS and CE groups)
  - Can be formally two consecutive project groups with 9 CP each (in EE)

Master's Thesis

- Workload 30 CP (!) = one semester full-time
- Duration of 6 months is formally checked
- Master's thesis (advisor) must be related to chosen focus area
- Typical tasks
  - Literature search
  - Conceptual work, formal work, hw/sw prototype implementation, experiments
  - Write report with ~80-120 pages on a scientific level
  - Present thesis work (defend your decisions and solutions/results)

Master's Thesis

- Finding an advisor
  - Address professors working in the area of your interest
  - Address project group organizer
  - Check out research groups' web pages and boards
  - Ask colleagues
- Defining a topic is often an interactive process between student and potential advisor, you can bring also own ideas for discussion

Building Your Schedule

- You have the choice!
- Ideal schedule (not always possible)
  - Do mandatory modules as soon as possible
  - Start with courses in your intended focus area
  - Do a project group in your focus area + remaining courses
  - Do the master's thesis
  - "Grow" into your favorite subject
- Invest sufficient time for your studies during the lecture period
  - Attend lectures and exercise sessions, study handouts
  - Do not wait until a few weeks before the exam

Exams

- Exams
  - Must registered and (if necessary) cancelled in PAUL
  - Typically oral exams
  - One exam per module
  - Exams can be repeated twice (three attempts)
  - Master's thesis can only be repeated once (two attempts), but you do not want to do that …
  - For registration of a master's thesis you need to have passed 45 CP already
  - Passed exams cannot be repeated

Exams

- Grading scheme
  - 1.0, 1.3 very good
  - 1.7, 2.0, 2.3 good
  - 2.7, 3.0, 3.3 satisfactory
  - 3.7, 4.0 sufficient
  - 5.0 unsatisfactory = failed

Exams

- Mandatory modules must be passed
  - Fail in 3rd attempt = failed the overall master program (!)
- For elective modules, compensation is possible: The “container”
  - A failed exam (failed in 1st, 2nd or 3rd attempt) can be moved into a container and another course / module can be selected instead from the same module / focus area
  - Also, passed exams from courses that were not required (e.g. taken out of interest) go into the container
  - All passed courses in the container are listed in the Transcript of Records as “extra achievements”
  - BUT: the container size is limited to 16 CP,
    exceeded = failed the overall master program (!)
- => failing the overall program is possible (and happens occasionally),
  so be careful and do not waste examination attempts

Sources of Information

- CE Website: www.eim.upb.de/ce/en
  - Module hand book
  - Examination regulations
- Campus management system: paul.upb.de
  - Shows actually offered courses for current semester
  - Registration for courses and exams
- Websites of research groups
  - Eg. cs.uni-paderborn.de/ceg/
  - Often, more information about offered courses

Sources of Information

- Study advisors CE
  - Prof. Sybille Hellebrand: sybille.hellebrand@uni-paderborn.de
  - Prof. Marco Platzner: platzner@upb.de
- Important
  - Use your official mail-account (“IMT-account”)
  - Or install a “forward” to your favorite account

EE

CS

Tips

- You need to plan your study program
- Form learning groups
  - Learn for understanding, not for repetition of materials
- Team up with other international students
  - You are faced with the same situation

Tips

- Team up with local students
  - In learning groups, project groups, etc.
  - They likely have done their Bachelor studies here and know the ropes, diversity is also interesting for them
- Approach professors and research associates if you have questions
  - That is ok and wanted (!)
- Learn some German or at least pick it up on the go
  - This will strongly increase your later job prospects in Germany

Welcome to the CE Master @ Paderborn !

- We wish you a successfull and enriching study experience!
- Questions?
  - Now!
  - Anytime: study-advice.ce@upb.de

Welcome to the CE Master @ Paderborn !