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COMPUTER SCIENCE

MASTER PROGRAM

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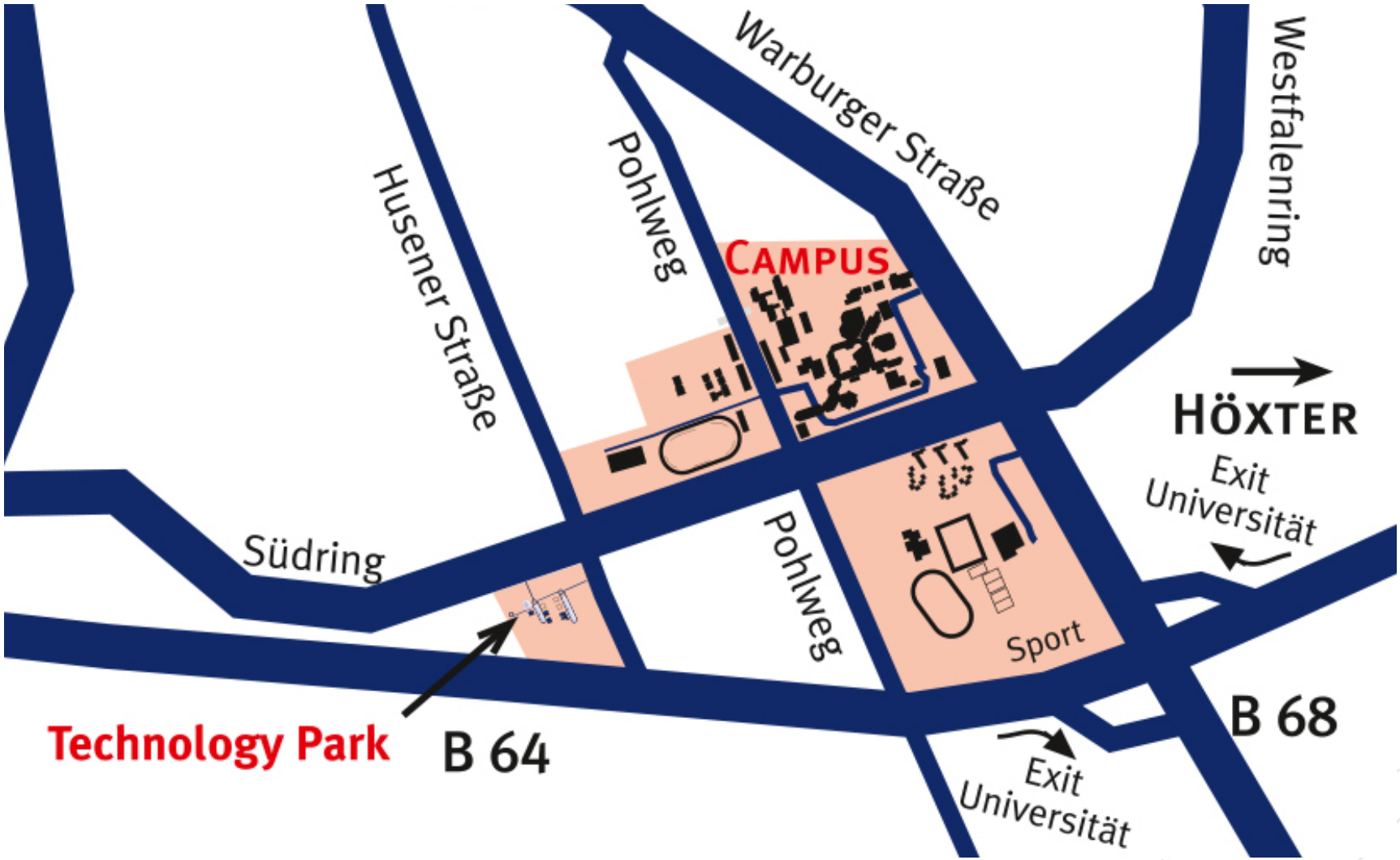
Where are we?



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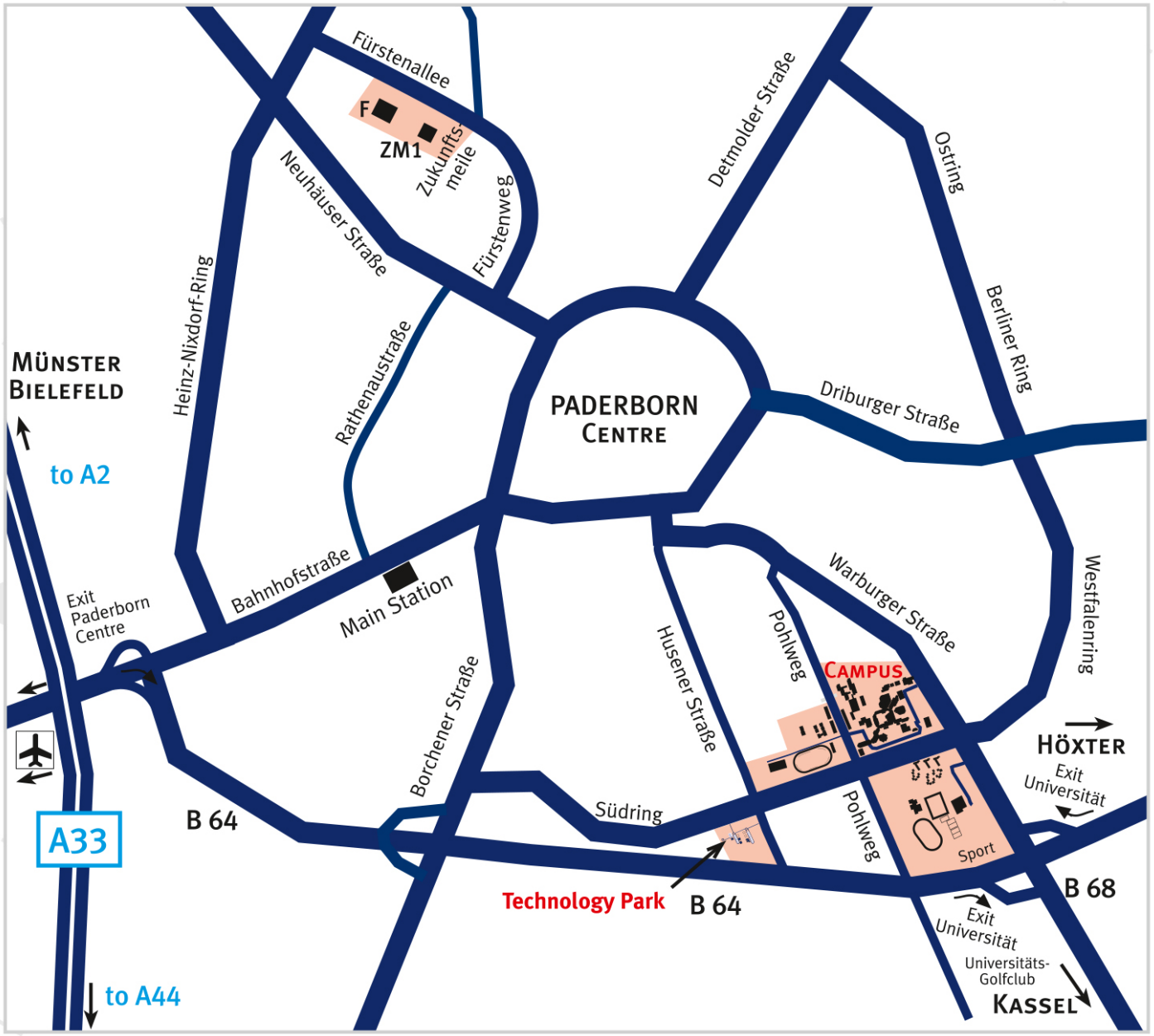
Where are we?



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Outline

- Prerequisites
- Elements of the Master Degree Program
- Structure of the Program
- Scope and Schedule
- Examinations

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Prerequisites of the Master Program

What you learnt in your Bachelor program …

- in India, Syria, Egypt, Pakistan, …

… must match (roughly) what Paderborn students learn in their Bachelor Degree studies.

- The teaching goals of the Paderborn Bachelor Degree Program match the necessary prerequisites.
  - mostly done in German
  - content organization comparable to Master program
  - same teaching staff

Bachelor and Master are designed as a consecutive study program.

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Prerequisites of the Master Program

Most important check has already been done before admission!

- We want you to succeed!
- Self-assessment:
  https://cs.uni-paderborn.de/en/studies/getting-started/information-for-international-students/

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Bachelor Degree Program in Paderborn

1	Programming Programming Languages	Modelling		Calculus for Computer Science	
2	Software Engineering Database Systems	Data Structures and Algorithms	Digital Design	Linear Algebra for Computer Science	
3	Software Engineering Project	Computability and Complexity	Computer Architecture	Stochastic for Computer Science	Minor Subject and Extracurricular Studies
4	Designing User Interfaces	Module from Algorithms and Complexity	System Software and System Level Programming		
5	Module from Software Engineering	IT Security	Module from Computer Systems	Proseminar Mentoring	
6	Module from Data and Knowledge	Specialization Module	**Bachelor's Thesis**		

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On a more abstract level

Ability to apply foundations of Computer Science

- usage of formal calculi to specify problems, structures, systems, languages, …
- formal methods to analyze algorithms
- formal methods to check solutions
- proving properties of algorithms (correctness, performance, …)

Experience in doing practical work

- application of methods and tools for software design and implementation
- solid background in object-oriented concepts
- substantial experience in at least one programming language
- ability to switch to a new programming language within a short time

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There’s more to it!

Ability to do scientific work

- searching for and investigating scientific publications
- writing scientific documents
  - adequate structure, clear descriptions and explanations, citations and references, correct English
- developing and giving presentations

- Check the self-assessments for courses before choosing them: https://cs.uni-paderborn.de/en/studies/getting-started/information-for-international-students/self-assessment-tests-for-master-lectures/

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Elements of the Master Program

- Lectures with Exercises/Tutorials – modules of 6 credits each
- Seminar – 5 credits each
- Project Group – 20 credits over one year
- Thesis – 30 credits
- Minor subject, general studies or German Language Course – 12 credits
- All done in English – except the last one …
- You always need to register for these elements as well as the exams plus sometimes additional things!
- Always – ALWAYS! – visit the first lecture in a semester where all necessary information about the course will be given!

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Master Degree Program in Paderborn (Example)

<table>
<tr><td>1</td><td>Module I</td><td>Module II</td><td>Module III</td><td>Module IV</td><td>Module V</td></tr>
<tr><td>2</td><td rowspan="2">Project Group</td><td>Module VI</td><td></td><td>Seminar I</td><td rowspan="2">Extracurricular Studies</td></tr>
<tr><td>3</td><td>Module VII</td><td>Module VIII</td><td>Seminar II</td></tr>
<tr><td>4</td><td colspan="5">Master’s Thesis</td></tr>
</table>

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Study Structure

Six Focus Areas

- Software Engineering
- Algorithm Design
- Networks and Communication
- Computer Systems
- Intelligence and Data
- Data Science

Every student has to choose one of these areas as specialization area when applying for a master's thesis. Plan ahead!

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Modules

Every module has 6 ECTS points

- belongs to one or more focus areas (of the six).
- consists of exactly one class (from that focus area).
- is described in the module handbook (Modulhandbuch).

Every student has to

- study three modules in the area of specialization,
- study one module in some other focus area,
- study four more modules in whatever area they like.
- Hence every student has to take 8 modules overall.

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Master Degree Program in Paderborn (Example I)

1	Advanced Computer Architecture (Computer Systems)	Cooperative Mobile Systems (N&C)	Interactive Data Visualization (Data Science)	Build It, Break It, Fix It (SE)	Machine Learning I (I&D)
2	Project Group	Future Internet (N&C)		Seminar I	Extracurricular Studies
3		Networked Embedded Systems (N&C)	Public-Key Cryptography (Algorithm Design)	Seminar II	
4	**Master's Thesis**				

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Master Degree Program in Paderborn (Example II)

1	Advanced Distributed Algorithms (N&C)	Cooperative Mobile Systems (N&C)	Mobile Communications (N&C)	Vehicular Networking (N&C)	Advanced Computer Architecture (Computer Systems)
2	Project Group	Future Internet (N&C)		Seminar I	Extracurricular Studies
3		Networked Embedded Systems (N&C)	Routing and Data Management in Networks (N&C)	Seminar II	
4	**Master's Thesis**				

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Master Degree Program in Paderborn (Example III)

<table>
<tr><td>1</td><td>Advanced Distributed Algorithms (N&C)</td><td>Cooperative Mobile Systems (N&C)</td><td>High-Performance Computing (Computer Systems)</td><td>Intelligence in Embedded Systems (Computer Systems)</td><td>Advanced Computer Architecture (Computer Systems)</td></tr>
<tr><td>2</td><td rowspan="2">Project Group</td><td>Future Internet (N&C)</td><td></td><td>Seminar I</td><td rowspan="2">Extracurricular Studies</td></tr>
<tr><td>3</td><td>Networked Embedded Systems (N&C)</td><td>VLSI Testing (Computer Systems)</td><td>Seminar II</td></tr>
<tr><td>4</td><td colspan="5">Master’s Thesis</td></tr>
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Seminars are special

- Count for 5 ECTS points
- 2 meeting hours per week or compact on two to three days
- Teacher proposes topics (Seminarthemen)
- Every student selects one topic to work on and then
  - prepares a talk with slides (Seminarvortrag)
  - submits a written elaboration (Ausarbeitung)
- You need to work scientifically and be aware of good practices and the problem of plagiarizing in particular!
- Seminars do not belong to specific focus areas. You are free to choose.
- https://cs.uni-paderborn.de/en/studies/study-elements/seminars-of-computer-science/

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Project Groups are even more special

- Workload: 20 ECTS points in one year – including semester breaks
- Presentation of all project groups in a public event (Projektgruppenvorstellung) in the last week of teaching season – you should participate to find a group that suits you.
- Interested students apply for a project group and 8 to 16 students are accepted.
  - Ranking by you as well as by the lecturers.
- Working for two semesters on a project
  (often: concept and implementation of some software)

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Project Groups are even more special

- Highly self-organized
- You have to contribute actively!
- All our project groups are in English!
- Project groups do not belong to specific focus areas. You can apply to any one.

- All details at https://cs.uni-paderborn.de/en/studies/study-elements/project-groups/

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Master's Thesis (Masterarbeit)

- Workload: Full-time for one semester (30 ECTS)
- What has to be done?
  - Literature review
  - Research: develop new results!
  - Obey rules of good scientific practice!
  - Often: implementation of some software
  - Writing a thesis (~ 80-120 pages) on scientific level
  - All of this: within 6 months (formally checked!)
- First a planning phase (typically 1 month)
- Then the real work (5 months)

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Master's Thesis (Masterarbeit)

- Finding an advisor (Betreuer)
  - talk to professors working in an area that interests you
  - talk to the organizer of your project group
  - ask friends
- Finding a topic (Thema) is an interactive process between student and advisor
  - own ideas?
  - project group topic?
  - discussion with the (potential) advisor!
- The Master's thesis defines your area of specialization – where you need to have three modules completed before you can register the thesis.

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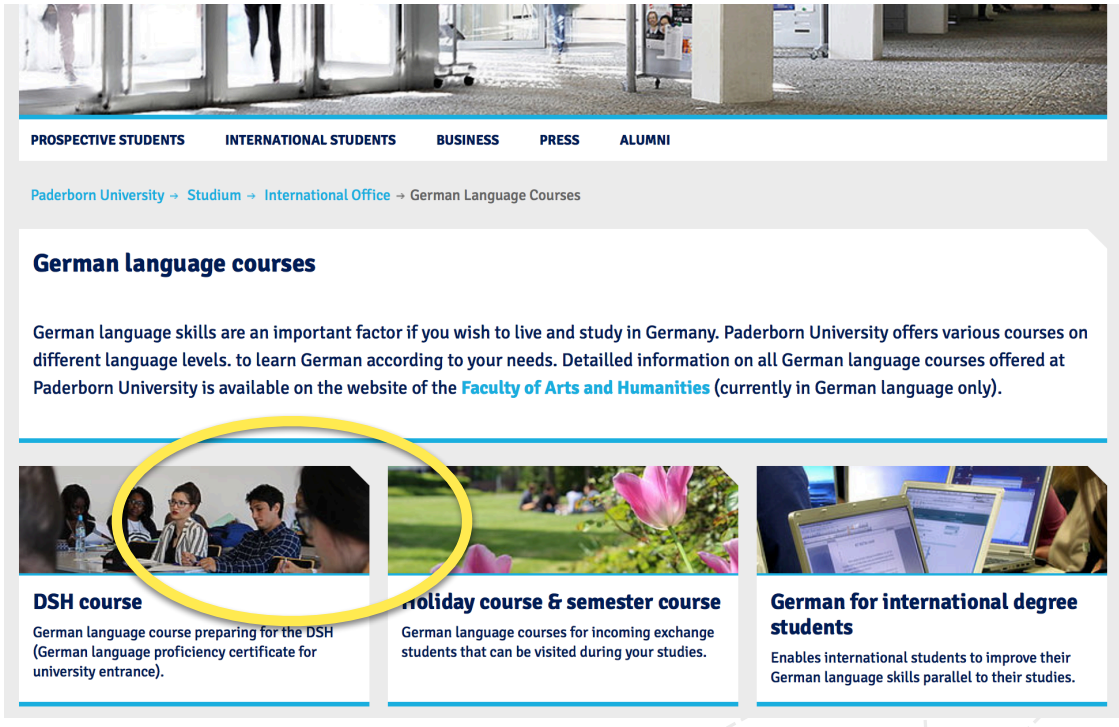
German Language Course (Deutschkurs)

- No Master's degree without German Level A2!
- Language Courses hosted by the International Office
- Typically covers the „General Studies" part (12 ECTS)
- Check https://www.uni-paderborn.de/en/studium/international-office/deutschkurse/



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What you need to do to get your degree

Every student has to…	ECTS credits
... take three modules from the area of specialization	18
… take one module in one other area	6
… take four modules in whatever area	24
… take two seminar modules	10
… take part in a project group	20
… write a Master's thesis (must be from your specialization area)	30
… take minor subject, do general studies or take the German language courses	12
Adding up to	120

It is your own responsibility to meet these criteria!

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Examinations: Normal modules

- Oral or written exam about the class
- Oral exams: individual date with the teacher
- Written exams: usually two dates offered in the semester breaks
- Class may include written homework or project work as pre-requisite
- You need to register for the exams!
  - All with PAUL – see next presentation
  - Registration for first exam period: 20th of April to 20th of May
  - Registration for second exam period: 31st of August to 4th of September
- De-register if you don’t want to take an exam! Otherwise you might be stuck with that module.

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Examinations: Other types

- Seminar
  - Evaluation of presentation and seminar paper
- Project group
  - Permanent evaluation throughout the project
- Master's Thesis
  - Evaluation by the advisor and a co-advisor
- Language Course
  - Language certificate after the course

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Examinations: Repetition

- Module exams can be repeated twice.
- Seminars can be repeated twice.
- Project group can be repeated twice (you really don’t want that!).
- Master’s Thesis can be repeated once.
- German Language Course can be repeated until the end of days.

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Examinations: Compensation

There are (limited) ways

- to shift aside („compensate“) exam failures
  - e.g. failure in one module
  - give up on that one and try another one instead
- to improve exam results
  - e.g. you succeeded in a module exam but with an unsatisfactory result, you can try a different module additionally.

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Final failure is possible! If …

You have no more option to use compensation and you are no more able to fulfill the requirements:

- 3 modules in the specialization area
- 5 more modules with at least one of them in another area

OR

- three attempts for a project group failed

OR

- one seminar failed three times

OR

- two attempts for a Master's thesis failed

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Common pitfalls

- Deadlines are important. Some things can be amended if you miss a deadline, some can’t or may result in delays of up to a year!
- You need to register for all sorts of things. Do it – and mind the deadlines!
- If you don’t want to finish a course, de-register it and everything associated with it – and mind the deadlines. Otherwise you may be blocked from taking other courses as there is an upper limit of courses you can take.
- Pay your semester fees as early as possible. Otherwise you might not be able to participate in the project group distribution – which will result in a delay of one semester at least.
- Never miss the first meeting of a course.

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Some more important things

- PAUL is your friend
  - Most important information is sent via the PAUL system or is shown there when you log in.
  - Check your university email address regularly!
- Many courses use the PANDA system for information and course material.
- Watch out for the project group presentation and attend it!
- Follow us on Twitter (or at least bookmark us in your browser and check regularly) – we will remind you of important deadlines.
  - @CompScience_UPB, @Study_CS_UPB

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Schedule

- You choose!
  - Which specialization area? One out of six.
  - Which modules with regular classes? Almost complete freedom!
  - Which project group? Each semester enough new project groups start so that every student who wants to participate can do so.
  - Which Master's thesis? Unlimited choice, but must be from your specialization area.

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Schedule

- Consider workload!
  - 30 ECTS points is the officially recommended average workload per term.
  - The first semester is tough! (for all the other reasons)

  - For your first semester:
    - Choose classes along your interests.
    - It is a good idea to plan for the specialization, but you don't have to stick with your choice.
    - You can not make any mistake as far as the area rules are concerned.

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Welcome in Paderborn!