Qualifikation Objectives
Master Applied Computer Science
(Angewandte Informatik / Infotronik)

Faculty Applied Computer Science (AI)
Deggendorf Institute of Technology (DIT)

Author: Prof. Dr. Peter Faber, Study program coordinator for the Master‘s Program
Angewandte Informatik / Infotronik
(Applied Computer Science / Infotronics)

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1 Program Objectives

The program aims to deepen students' knowledge of computer science by focusing on formal, scientifically relevant methods and concepts. Building on prior knowledge from a relevant bachelor's degree, students acquire competences in:

- Understanding the theoretical foundations of computer science and applying them to solve formal, practical, and scientific problems,
- Solving complex software development challenges,
- Mastering advanced topics in the development of embedded software systems,
- Applying formal/mathematical methods, analyzing problems in a well structured way, and developing solutions systematically.

Elective courses in areas such as electronics, internet technologies, artificial intelligence, and quantum computing allow students to tailor their specialization according to their interests. This enables them to acquire the competencies needed to solve complex computer science problems.

Graduates of the Master’s program are equipped for scientific work and prepared for doctoral studies.

The program prepares students for careers in software-related fields, including:

- Development (conception, design, creation, and testing of complex software and systems),
- Software, hardware, and system quality assurance,
- Planning and execution of related projects,
- Fundamental and applied research at universities and research institutions.

The program also includes aspects of electronic system development, which is reflected in the "Infotronics" designation—connecting computer science and electronics. Additional interdisciplinary subjects, such as foreign languages, are integrated through general science electives. Communication skills are fostered through seminars, while teamwork is strengthened through projects and practical experience.

The goal is to train advanced computer engineers according to German and international standards.

2 Learning Objectives

The Master's program in Applied Computer Science deepens students' technical and subject-specific knowledge and the ability to apply and expand it in a wide variety of challenging tasks. Students' scientific and technical qualifications are achieved through the teaching of formal, mathematical, computer science, and electrical engineering topics. The option to select from numerous electives allows students to tailor the content of their studies to their personal interests.

The program can be started in either the summer or winter semester. The first summer semester consists of a curriculum that is identical for all students. The first winter semester consists of only a few fixed courses and offers students the opportunity to individually shape the content of the semester according to their own interests from a comprehensive range of electives at an advanced level.

3 Study and Qualification Objectives

Table 1 below assigns learning outcomes to the study objectives of the program.

Table 1: Learning Objectives for Master Applied Computer Science	
1. Theoretical Computer Science	Knowledge: Students understand fundamental models of programming language semantics, computability and complexity theory, formal languages, and compiler design.
	Skills: Students can prove program properties using formal methods, evaluate different programming approaches, assess problem complexity and solvability, analyze programming languages, and develop related compilers.
	Competences: Students apply these skills to evaluate and solve computer science problems in research and development contexts.
2. Practical Computer Science	Knowledge: Students are familiar with agile development methods, object-oriented modeling languages, testing procedures, and review methodologies.
	Skills: Students can apply advanced software development techniques in practice.
	Competences: Students can analyze complex professional problems and develop appropriate solutions.
3. Embedded Systems	Knowledge: Students gain advanced knowledge of embedded system development, including security, communication, and FPGA programming.

	Skills: Students can assess complex tasks and apply methods to solve them.
	Competences: Students can analyze and evaluate technical challenges in embedded system development and innovate new solutions.
4. Mathematics	Knowledge: Students develop precise mathematical and logical thinking and structured analytical approaches.
	Skills: Students recognize engineering problems that can be solved using mathematical methods and apply appropriate strategies to address them.
	Competences: Students can analyze and solve problems using various mathematical techniques.
5. Electives	Students can gain additional or advanced knowledge in electronics, electrical engineering, and computer science through specialized electives, expanding on their foundational studies. The specific knowledge, skills, and competencies for each elective are detailed in the respective module descriptions.

4 Learning outcomes of Modules / Module Objectives

The detailed objectives and competences of individual modules are described in the module handbook for the Master's program in Angewandte Informatik/Infotronik (Applied Computer Science / Infotronics), available on the program's website. The modules are listed according to their module numbers in the respective study and examination regulations. Each module aims to enhance students' competencies.

Table 2 below links the program's objectives to specific modules:

Tabelle 2: Module Objectives for the Master's program Angewandte Informatik/Infotronik (Advanced Computer Science/Infotronics)

1. Study Objective: Theoretical Computer Science				
Module Nr.	**Module**	**Knowledge**	**Skills**	**Competences**
MAI-01	Theoretische Informatik (Theoretical Computer Science)	xx	x	xx
2. Study Objective: Software Development				
	Module	**Knowledge**	**Skills**	**Kompetenzen**
MAI-02	Praktische Informatik (Practial Computer Science)	x	xx	x
3. Study Objective: Embedded Systems				
	Module	**Knowledge**	**Skills**	**Kompetenzen**
MAI-03	Ausgewählte Themen der Embedded Software Entwicklung	xx	xx	x

	(Selected Topics of Embedded Software Development)			
MAI-11	FPGA-Programmierung	xx	xx	x
4. Study Objective: Mathematics				
	Module	**Knowledge**	**Skills**	**Kompetenzen**
MAI-04	Spezielle Mathematische Methoden	xx	x	x
5. Study Objective: Electives (Fachspezifische Wahlpflichtfächer [FWP])				
	Module	**Knowledge**	**Skills**	**Kompetenzen**
MAI-05 – MAI-10	FWPs	-[1]	-[1]	-[1]

Legend:
xx strong correlation
x moderate correlation

Electives can be selected from various Master's programs, including Artificial Intelligence and Data Science, High-Performance Computing / Quantum Computing, Life-Science Informatics, and Electrical and Information Engineering. The list of electives is regularly updated, and restrictions (e.g., avoiding topic duplication) are published accordingly.

Electives offered in Winter Semester 2024/25:

- C in der automobilen Softwareentwicklung
- Imaging Physics
- Mobile and Wireless Networks
- Quantum Computing
- Special Devices and Circuits/Spezielle Bauelemente und Schaltungen
- Advanced Automation/Fortgeschrittene Automatisierungstechnik
- Selected Topics in Micro and Nano Electronics/Ausgewählte Themen der Nano- und Mikroelektronik
- Signals and Systems in Communication Technology/Signale und Systeme der Nachrichtentechnik
- Modern RF and Radio Systems/Systeme der Hochfrequenz- und Funktechnik
- Applications of Artificial Intelligence and Machine Learning
- Networks for HPC / QC
- Advanced Software Engineering
- Cybersicherheit
- Programming in C++ [VHB]

[1]Closer descriptions of knowledge, skills, and competences covered by the respective subjects can be found in the corresponding sections of the module handbook.

- Machine Learning for Engineers I [VHB]

Electives may be offered in German, English, or both languages. The possibility of completing the program entirely in English is ensured.