

Note:

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The legally binding versions are found in the University of Innsbruck Bulletins (in German).

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Curriculum for the
Master's Programme in Computer Science
at the Faculty of Mathematics, Computer Science and Physics
at the University of Innsbruck

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§ 1 Allocation of the study programme

According to §54 par. 1 Universities Act 2002, the Master's Programme in Computer Science is allocated to the group of engineering studies.

§ 2 Qualification profile

- (1) The Master's Programme in Computer Sciences offers based on the Bachelor's Programme in Computer Science advanced knowledge and skills that enable the practice of highly qualified, independent and innovative research and development work in the field of systematic and automated information processing. In addition, computer science students are taught problem-solving strategies as part of their studies, which make them attractive as graduates for many responsible positions in all industries with a focus on technology. This is achieved through an in-depth study of selected current sub-areas of computer science together with an integration into modern research.
- (2) Graduates typically work in addition to university-related research in the implementation and conception of research and development projects in industry, the service sector and public institutions. Computer scientists find attractive employment relationships, for example in the field of software development in industry, information and telecommunications companies, system houses, application companies and media providers. Activities in consulting businesses and the founding of start-ups are also possible career steps for graduates who want to use their knowledge to solve problems in the natural sciences, technology, medicine, business and society.
- (3) To prepare for these tasks, the students of the master's programme advance their knowledge of both, the basics and the methods of computer science in the first phase, while in the second phase a research-oriented, independent profile formation takes place embedded in the Department of Computer Science at the University of Innsbruck. An increased offer of research-based teaching, which is based on the university's main research areas, is intended to encourage creative thinking and to enable the students to pursue a doctoral study programme. This is done in particular through the offer of three innovative specialisations, which are based on the central research foci of the Department of Computer Science.

§ 3 Scope, duration and structure

- (1) The Master's Programme in Computer Science covers 120 ECTS-Credits; this corresponds to a duration of the study programme of four semesters. One ECTS-Credit corresponds to a workload of 25 hours..
- (2) The Master's Programme in Computer Science offers the opportunity to choose one of the specialisations of (i) "Logic and Learning", (ii) "Secure and Distributed Computing" or (iii) Perception, Interaction and Robotics", in which (i) methods of deductive and inductive reasoning, the (ii) construction of safe and reliable systems as well as (iii) computational and data-driven methods for physical and virtual worlds are examined.

§ 4 Language of tuition

The Master's Programme in Computer Science is offered in English. In justified exceptional cases, exams and the Master's Thesis can be taken or written in German.

§ 5 Admission

- (1) Admission to the Master's Programme in Computer Science requires a relevant Bachelor's degree awarded by a university or a university of applied sciences ("Fachhochschule") or a relevant degree acquired at a recognised post-secondary educational institution home or abroad.
- (2) In any case, the Bachelor's Programme in Computer Science at the University of Innsbruck is relevant Bachelor's programme. The rectorate decides on study programmes in question or on the equivalence of a study programme passed at a post-secondary educational institution home or abroad for the admission to the master's programme based on the regulations of the Universities Act 2002.

- (3) In the event that equivalence has been established in principle but with certain qualifications missing for full equivalence, supplemental examinations may be required by the rectorate. These examinations must be passed during the master's programme.

§ 6 Types of courses and maximum number of students per course

- (1) Types of courses without continuous performance assessment:

Lectures (VO) are courses held in lecture format. They introduce the research areas, methods and schools of thought for a given subject. Maximum number of participants: no maximum number of participants

- (2) Courses with continuous performance assessment:

1. Introductory seminars (PS) introduce students interactively to scientific literature through the treatment of selected issues. They convey knowledge and methods of academic work. Maximum number of participants: 20
2. Seminars (SE) provide in-depth treatment of scientific topics through students' presentations and discussion thereof. Maximum number of participants: 15
3. Lectures with integrated practical parts (VU) focus on the practical treatment of concrete scientific tasks that are discussed during the lecture parts of the course. Maximum number of participants: 25

§ 7 Allocation of places in courses with a limited number of participants

In courses with a limited number of participants, course places are allocated as follows:

1. Students for whom the study duration would be extended due to the postponement are to be given priority.
2. If criterion no. 1 does not suffice for regulating the admission, then first, students for whom the course is part of a compulsory module are to be given priority, and second, students for whom the course is part of an elective module.
3. If the criteria in no. 1 and 2 do not suffice for regulating the admission, then the available places are raffled.

§ 8 Compulsory and elective modules

- (1) The following compulsory modules covering 12.5 ECTS-Credits must be passed:

1.	Compulsory Module: Current Topics in Computer Science	h	ECTS-Credits
a.	VO Current Topics in Computer Science	1	2
b.	PS Current Topics in Computer Science	3	5.5
	Total	4	7.5
	Learning Outcomes: This module enables students to describe a selection of current research topics in computer science and to understand some of their fundamental research questions. In addition, the ability is acquired to classify new questions and problems as well as one's own interests in these topic complexes.		
	Prerequisites: none		

2.	Compulsory Module: Preparation of the Master's Thesis	h	ECTS-Credits
	Agreement on the topic, scope and form of the Master's Thesis on the basis of a brief description of the content (synopsis) as well as agreement on the work processes and the course of study; planning a corresponding time frame for the implementation of the Master's Thesis	-	2.5
	Total	-	2.5
	Learning Outcomes: Having successfully passed this module, the students are able to write a brief description of the content of the planned Master's Thesis (synopsis) and to outline a schedule.		
	Prerequisites: none		

3.	Compulsory Module: Defence of the Master's Thesis	h	ECTS-Credits
	Final oral defence of the Master's Thesis in front of an examination committee	-	2.5
	Total	-	2.5
	Learning Outcomes: Reflection on the Master's Thesis in the overall context of the study programme; The main focus lies the theoretical understanding, the methodological basics, conveying the results of the Master's Thesis and presentation skills.		
	Prerequisites: positive evaluation of all other compulsory and elective modules as well as the Master's Thesis		

- (2) Three elective modules covering altogether 82.5 ECTS-Credits must be passed as follows:
1. Three of the elective modules acc. to §8 par. 3 no. 1 to 6 covering 22.5 ECTS-Credits must be passed.
 2. The following specialisations covering 30 ECTS-Credits and further elective modules covering 30 ECTS-Credits may be passed:
 - a) Logic and Learning: passing of the elective modules acc. to §8 par. 3 no. 7, 8 and 9
 - b) Secure and Distributed Computing: passing of the elective modules acc. to §8 par. 3 no. 10, 11 and 12
 - c) Perception, Interaction and Robotics: passing of the elective modules acc. to §8 par. 3 no. 13, 14 and 15
 3. If no specialisation is chosen acc. to §8 par. 2 no. 2, elective modules (§8 par. 3 no. 7 to 20) covering 60 ECTS-Credits in total must be chosen and passed.
 4. Instead of the elective modules "Interdisciplinary Skills" acc. §8 par. 3 no. 19 and the "Individual Choice of Specialisation" acc. to §8 par. 3 no. 20, a Minor (Complementary Subject Area) for master programmes may be passed, provided the availability of places. Minors are fixed modules from other disciplines covering 30 ECTS-Credits; They have been published in the University of Innsbruck Bulletin.

1.	Elective Module: Automata and Logic	h	ECTS-Credits
a.	VO Automata and Logic	2	4.5
b.	PS Automata and Logic	2	3
	Total	4	7.5
	Learning Outcomes: In-depth understanding of finite automata and logic; Students have a full command of the concepts and theoretical tools on which the computer-aided verification is based and can, if necessary, develop them further independently.		
	Prerequisites: none		

2.	Elective Module: Constraint-Solving	h	ECTS-Credits
a.	VO Constraint Solving	2	4.5
b.	PS Constraint Solving	2	3
	Total	4	7.5
	Learning Outcomes: In-depth understanding of constraint solving. Students are proficient in concepts that are used in current SAT, SMT and similar solvers and can also develop these independently if necessary. In addition, they can select suitable solvers for applications in order to solve problems effectively.		
	Prerequisites: none		

3.	Elective Module: Cryptography	h	ECTS-Credits
a.	VO Cryptography	2	4.5
b.	PS Cryptography	2	3
	Total	4	7.5
	Learning Outcomes: In-depth understanding of cryptography; Students master the concepts and theoretical basics for the construction of current cryptographic procedures. They know elementary security terms and typical attacks on cryptography. They can analyse the secure use of selected cryptographic procedures in practical systems and, if necessary, familiarise themselves with similar procedures independently.		
	Prerequisites: none		

4.	Elective Module: High-Performance Computing	h	ECTS-Credits
a.	VO High-Performance Computing	2	4.5
b.	PS High-Performance Computing	2	3
	Total	4	7.5
	Learning Outcomes: After successfully completing the module, students can describe and classify complex parallel computer architectures and programmes, and select and adapt them according to requirements.		

	Common analysis and optimisation methods are understood and can be implemented. The students are able to solve larger computing problems independently and efficiently on parallel computers.
	Prerequisites: none

5.	Elective Module: Optimisation and Numerical Computation	h	ECTS-Credits
a.	VO Optimisation and Numerical Computation	2	4.5
b.	PS Optimisation and Numerical Computation	2	3
	Total	4	7.5
	Learning Outcomes: After successfully completing the module, students understand current, complex algorithmic methods in the field of interactive systems. They are able to solve corresponding problems through the targeted use of the methods and to develop similar content themselves. Central methods such as numerical computations, optimisation, computer-aided physics and the basics of control theory are understood by the students. They can describe, classify, select, implement and adapt these according to requirements.		
	Prerequisites: none		

6.	Elective Module: Signal Processing and Algorithmic Geometry	h	ECTS-Credits
a.	VO Signal Processing and Algorithmic Geometry	2	4.5
b.	PS Signal Processing and Algorithmic Geometry	2	3
	Total	4	7.5
	Learning Outcomes: After successfully completing the module, students understand current, complex algorithmic methods in the field of visual computing. They are able to solve corresponding problems through the targeted use of the methods and to develop similar content themselves. Central methods such as signal processing, algorithmic geometry and coordinate transformations are understood by the students. They can describe, classify, select, implement and adapt these according to requirements.		
	Prerequisites: none		

7.	Elective Module: Logic and Learning	h	ECTS-Credits
a.	VU Logic and Learning A:	3	5
b.	VU Logic and Learning B:	3	5
	Total	6	10
	Learning Outcomes: Advanced understanding of current topical areas in logic and learning; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

8.	Elective Module: Selected Topics in Logic and Learning	h	ECTS-Credits
a.	VU Selected Topics in Logic and Learning A:	3	5
b.	VU Selected Topics in Logic and Learning B:	3	5
	Total	6	10
	Learning Outcomes: Advanced understanding of selected advanced areas of specialisation in logic and learning; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

9.	Elective Module: Advanced Topics in Logic and Learning	h	ECTS-Credits
a.	VU Advanced Topics in Logic and Learning	3	5
b.	SE Research Seminar in Logic and Learning	2	5
	Total	5	10
	Learning Outcomes: Advanced understanding of a specialised area in logic and learning; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

10.	Elective Module: Secure and Distributed Computing	h	ECTS-Credits
a.	VU Secure and Distributed Computing A:	3	5
b.	VU Secure and Distributed Computing B:	3	5
	Total	6	10
	Learning Outcomes: Advanced understanding of current topics in secure and distributed computing; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

11.	Elective Module: Selected Chapters in Secure and Distributed Computing	h	ECTS-Credits
a.	VU Selected Chapters in Secure and Distributed Computing A:	3	5
b.	VU Selected Chapters in Secure and Distributed Computing B:	3	5
	Total	6	10
	Learning Outcomes: Advanced understanding of selected advanced areas of specialisation in secure and distributed computing; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

12.	Elective Module: Further Topics in Secure and Distributed Computing	h	ECTS-Credits
a.	VU Further Topics in Secure and Distributed Computing:	3	5
b.	SE Research Seminar in Secure and Distributed Computing:	2	5
	Total	5	10
	Learning Outcomes: Advanced understanding of selected advanced areas of specialisation in secure and distributed computing; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

13.	Elective Module: Perception, Interaction and Robotics	h	ECTS-Credits
a.	VU Perception, Interaction and Robotics A:	3	5
b.	VU Perception, Interaction and Robotics B:	3	5
	Total	6	10
	Learning Outcomes: Advanced understanding of current topics in perception, interaction and robotics; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

14.	Elective Module: Selected Chapters in Perception, Interaction and Robotics	h	ECTS-Credits
a.	VU Selected Chapters in Perception, Interaction and Robotics A:	3	5
b.	VU Selected Chapters in Perception, Interaction and Robotics B:	3	5
	Total	6	10
	Learning Outcomes: Advanced understanding of selected advanced areas of specialisation in perception, interaction and robotics; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

15.	Elective Module: Further Topics in Perception, Interaction and Robotics	h	ECTS-Credits
a.	VU Further Topics in Perception, Interaction and Robotics	3	5
b.	SE Research Seminar in Perception, Interaction and Robotics:	2	5
	Total	5	10
	Learning Outcomes: Advanced understanding of selected advanced areas of specialisation in perception, interaction and robotics; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

16.	Elective Module: Specialisation A	h	ECTS-Credits
a.	VU Special Topics 1:	3	5
b.	VU Special Topics 2:	3	5
	Total	6	10
	Learning Outcomes: Advanced understanding of current topics in computer science; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

17.	Elective Module: Specialisation B	h	ECTS-Credits
a.	VU Special Topics 3:	3	5
b.	VU Special Topics 4:	3	5
	Total	6	10
	Learning Outcomes: Advanced understanding of selected advanced areas of specialisation in computer science; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

18.	Elective Module: Specialisation C	h	ECTS-Credits
a.	VU Special Topics 5:	3	5
b.	SE Research Seminar:	2	5
	Total	5	10
	Learning Outcomes: Advanced understanding of selected advanced areas of specialisation in computer science; acquisition of the ability to independently educate themselves in the field.		
	Prerequisites: none		

19.	Elective Module: Interdisciplinary Skills	h	ECTS-Credits
	Providing the availability of places, courses from the master and/or diploma programmes offered at the University of Innsbruck can be selected. It is recommended to pass a course in the field of Gender Studies, Women and Gender Research.	-	10
	Total	-	10
	Learning Outcomes: Expansion of the study programme by acquiring additional qualifications		
	Prerequisites: The prerequisites specified by the respective curricula must be met.		

20. Individual Choice of Specialisation

For individual specialisation, modules corresponding to a maximum of 20 ECTS-Credits can be freely selected from the master's programmes offered at the Faculty of Mathematics, Computer Science and Physics at University of Innsbruck. The prerequisites specified in the respective curricula must be met.

§ 9 Master's Thesis

- (1) In the master's programme a Master's Thesis amounting to 25 ECTS-Credits must be written. The Master's Thesis is a scientific piece of work that proves the ability to work on a scientific topic independently and in a justifiable way in terms of content and methodology.
- (2) If a specialisation acc. to §8 par. 2 no. 2 is selected, the Master's Thesis must be allocable to the topical field of the specialisation, otherwise from the field of computer science.
- (3) Students have the right to suggest the topic for their Master's Thesis or to select from a number of suggestions.

§ 10 Examination regulations

- (1) Modules are evaluated by module examinations. Module examinations are examinations that proof the knowledge and skills acquired in a module. With successful completion of all parts of the module examination, the respective module is passed.
- (2) Courses of modules – with the exception of compulsory modules 2 and 3 – are evaluated by course examinations. Course examinations are
 - a. examinations that assess the knowledge and skills covered in the lectures in which course assessment is based on a single examination at the end of the course. The course instructor has to determinate the examination method (written or oral) before the start of the course.
 - b. courses with continuous assessment, for which course assessment is based on regular written and/or oral contributions by participants.
- (3) Before the start of the courses, the course instructors have to inform the students in a suitable manner about the objectives, the content and the methods of their courses as well as the contents, the methods, the evaluation criteria and standards.
- (4) The module "Preparation of the Master's Thesis" is evaluated by the supervisor based on a synopsis. Positive evaluation reads "successfully completed", negative evaluation reads "unsuccessfully completed".
- (5) Compulsory module "Defence of the Master's Thesis" is evaluated by an oral exam before an examination board. The examination board consists of three persons.

§ 11 Academic degree

Graduates of the Master's Programme in Computer Science are awarded the academic degree "Master of Science", abbreviated as "MSc".

§ 12 Coming into force

This curriculum comes into force as of 1 October 2021.

§ 13 Transitional provisions

- (1) This curriculum applies to all students commencing the Master's Programme in Computer Science from the winter semester of 2021/22 onwards.
- (2) Regular degree students, who have started the Master's Programme in Computer Science acc. to the curriculum of 2007, University of Innsbruck Bulletin of 23 April 2007, Issue 33, No. 197 at the University of Innsbruck before 1 October 2021, are entitled to finish this programme within a maximum of six semesters from this time onwards.

- (3) If the Master's Programme in Computer Science is not completed in time, the students are subject to the curriculum for the Master's Programme in Computer Science, University of Innsbruck Bulletin of 11 May 2021, Issue 63, No. 748 (curriculum of 2021). In addition, the students are entitled to subject to the curriculum of 2021 on a voluntary basis.
- (4) The recognition of examinations acc. to §78 par. 1 Universities Act 2002 is specified in the appendix.

Appendix: Recognition regulations acc. to §78 par. 1 Universities Act 2002

The successfully passed examinations within the scope of the Master's Programme in Computer Science (curriculum in the version of the University of Innsbruck Bulletin of 23 April 2007, Issue 33, No. 197) listed below are recognised for the Master's Programme in Computer Science at the University of Innsbruck (curriculum in the version of the University of Innsbruck Bulletin of 11 May 2021, Issue 63, No. 748) acc. to §78 par. 1 Universities Act 2002 as follows:

Curriculum in the version of the University of Innsbruck Bulletin of 23 April 2007, Issue 33, No. 197		Curriculum in the version of the of the University of Innsbruck Bulletin of 11 May 2021, Issue 63, No. 748	
§6 (1) PM1a	VO Compiler Construction (2 hrs./3 ECTS-Credits)	§7 (3) WM4a	VO High-Performance Computing (2 hrs. /4.5 ECTS-Credits)
§6 (1) PM1b	PS Compiler Construction (1 h/2 ECTS-Credits)	§7 (3) WM4b	PS High-Performance Computing (2 hrs. /3 ECTS-Credits)
§6 (1) PM2a	VO Formal Language and Automata Theory (2 hrs./3 ECTS- Credits)	§7 (3) WM1a	VO Automata and Logic (2 hrs. /4.5 ECTS-Credits)
§6 (1) PM2b	PS Formal Language and Automata Theory (1 hrs. /2 ECTS-Credits)	§7 (3) WM1b	PS Automata and Logic (2 hrs. /3 ECTS-Credits)
§6 (1) PM3	SE Master's Seminar 1 (2 hrs /5 ECTS-AP)	§7 (3)	1 SE Research Seminar from EM 9, 12, 15 or 18 (2 hrs./5 ECTS-Credits)
§6 (1) PM4	SE Master's Seminar 2 (2 hrs./5 ECTS-Credits)	§7 (3)	1 SE Research Seminar from EM 9, 12, 15 or 18 (2 hrs. /5 ECTS-Credits)
§6 (1) PM5	Individual, positively evaluated course examinations of the "Specialisation Module" (20 ECTS-Credits)	§7 (3) Z 20	Individual Choice of Specialisation (20 ECTS-Credits to a corresponding extent.
Elective modules that have already been successfully completed shall remain unaffected.			