

Master Degree Programme Computer Science

current as of October 1st, 2016

Disclaimer: Note that this is an unauthorized English summary of the curriculum. The official German version is the basis for all study matters and released by the Senate of the University of Vienna.

1 Overview

The master programme computer science offers a wide range of courses to choose from and allows students to follow their areas of interest. The selection is based on eight different fields of expertise (also known as clusters):

- algorithms
- data analysis
- computer graphics
- information management & systems engineering
- internet computing & software technology
- multimedia
- networks
- parallel computing

Depending on the selected courses three variations of the master CS programme exist:

- Computer Science (breadth)
- Data Science
- Scientific Computing

The master CS programme is a 2-year full-time programme with 120 ECTS credits. To be admitted to the master's programme students must have completed an eligible bachelor's programme at a recognised post-secondary educational institution. The master CS programme is taught in English and requires English knowledge of level B2.

Graduates are awarded the academic degree "*Master of Science*" (MSc).

2 Structure of the Curriculum

The master programme computer science consists of mandatory courses and alternative courses chosen from 8 scientific core areas: algorithms, data analysis, computer graphics, information management & systems engineering, internet computing & software technology, multimedia, networks and parallel computing. In the German curriculum, these core areas are called "*Wahlmodulgruppen*" and will be referred to as *clusters* in the English version.

2.1 Structure of a Cluster ("Wahlmodulgruppe")

A cluster constitutes an area of expertise by a set of compliant courses. Each cluster consists of a *gatekeeper* which is a mandatory prerequisite for enrolling for other cluster courses. In the official German curriculum the gatekeeper is listed as the first cluster module with "*Teilnahmevoraussetzung: keine*", i.e. no prerequisite required. For all other modules the mandatory prerequisites can be found under "*Teilnahmevoraussetzung*" where usually the gatekeeper is listed. For computer science students from the University of Vienna it is very likely that they have already passed some gatekeepers in the Bachelor

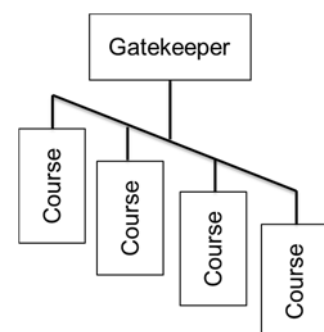


Fig.: Structure of a cluster.

programme. If you want to select courses from a cluster and the gatekeeper is missing, you have to select the gatekeeper first or show the evidence of competence (“*Nachweis von entsprechenden Vorkenntnissen*”), i.e. you passed an equivalent university course in your bachelor programme.

2.2 Course Overview

The curriculum consists of compulsory modules and electives chosen by students according to their preferences:

- (1) Compulsory modules foundations (12 ECTS)
 - a. PAP, Parallel Architectures and Programming Models 6 ECTS
 - b. ASE, Advanced Software Engineering, 6 ECTS
- (2) Compulsory modules practical courses (18 ECTS)
 - a. P1, Practical Course 1, 6 ECTS
 - b. P2, Practical Course 2, 12 ECTS
- (3) Compulsory module academic research and writing (6 ECTS)
 - a. MSE, Academic Research and Writing, 6 ECTS
(VU Academic Research and Writing, 3 ECTS and
SE Master’s Thesis Seminar, 3 ECTS)
- (4) Elective modules for (54 ECTS)
 - a. Scientific Computing
 - b. Data Science
 - c. Computer Science General
- (5) Master’s thesis 30 ECTS
 - a. Thesis, 27 ECTS
 - b. Defensio, 3 ECTS

2.3 Rules for Selecting Electives (54 ECTS)

Since the master CS programme offers a wide range of alternative courses, students are required to mail a proposal of their selected courses to the Directorate of Studies (SPL) beforehand (see curriculum paragraph 3a). Please use the forms provided electronically. It is important to keep in mind that it is not allowed to reuse courses which were relevant for admission, e.g. from a Bachelor degree programme, directly (same course has been passed at University of Vienna) or indirectly (an equivalent course has been passed at some post-secondary educational institution).

2.3.1 Scientific Computing

The selection of elective modules must follow the following rules:

- Cluster Parallel Computing: 4 modules with 6 ECTS each (total 24 ECTS)
- Cluster Algorithms: 3 modules with 6 ECTS each (total 18 ECTS)
- Cluster Data Analysis: 1 module, 6 ECTS
- Cluster Networks: 1 module, 6 ECTS

2.3.2 Data Science

The selection of elective modules must follow the following rules:

- Cluster Parallel Computing: 1 module, 6 ECTS
 - Cluster Algorithms: 2 modules with 6 ECTS each (total 12 ECTS)
 - Cluster Data Analysis: 4 modules with 6 ECTS each (total 24 ECTS)
 - Application module (“*Anwendungsfach*”), 12 ECTS
- A list of eligible courses is published in the online course directory.

2.3.3 Computer Science (breadth)

The selection of elective modules must follow the following rules:

- 9 modules (6 ECTS each) out of at least 6 clusters chosen from: algorithms, data analysis, parallel computing, internet computing & software technology, computer graphics, multimedia, networks, information management & systems engineering
- at most 4 gatekeepers can be chosen from: CNA, FDA, PC, DSE, GFX, SIP, CS, ISE

3 Overview of Clusters (“*Wahlmodulgruppen*”)

3.1 Algorithms
3.2 Data Analysis
3.3 Parallel Computing
3.4 Networks
3.5 Internet Computing & Software Technology
3.6 Computer Graphics
3.7 Multimedia
3.8 Information Management & Systems Engineering

A detailed description of the modules listed below can be found by searching the online course directory using [u:find](#) – just type the name of the module and choose the English page.

3.1 Cluster Algorithms

Gatekeeper:

- CNA Combinatorial and Numerical Algorithms

Modules:

- AAL Advanced Algorithms
- HPA Numerical High Performance Algorithms
- STL Software Tools and Libraries for Scientific Computing
- DPA Distributed and Parallel Algorithms
- AT-AL Advanced Topics in Algorithms

3.2 Cluster Data Analysis

Gatekeeper:

- FDA Foundations of Data Analysis

Modules:

- DM Data Mining
- CO Computational Optimisation
- NLP Natural Language Processing
- VIS Visualisation and Visual Data Analysis
- AT-DA Advanced Topics in Data Analysis

3.3 Cluster Parallel Computing

Gatekeeper:

- PC Parallel Computing

Modules:

- CC Cloud Computing
- DSE Distributed Systems Engineering
- HPC High Performance Computing
- POP Program Optimisations and Runtime Systems
- SDM Scientific Data Management
- DPA Distributed and Parallel Algorithms
- AT-PC Advanced Topics in Parallel Computing

3.4 Cluster Networks

Gatekeeper:

- CS Cooperative Systems

Modules:

- NTM Network Technologies for Multimedia Applications
- NCE Network-Based Communication Ecosystems
- SEC Network Security
- AT-NET Advanced Topics in Network

3.5 Cluster Internet Computing & Software Technology

Gatekeeper:

- DSE Distributed Systems Engineering

Modules:

- CC Cloud Computing
- IOP Interoperability
- BPM Business Process Management
- AT-ICS Advanced Topics in Internet Computing and Software Technology

3.6 Cluster Computer Graphics

Gatekeeper:

- GFX Foundations of Computer Graphics

Modules:

- CGA Cloud Gaming
- GAT Gaming Technologies
- IMS Image Synthesis
- RCG Real-Time Computer Graphics
- VIS Visualisation and Visual Data Analysis
- AT-GFX Advanced Topics in Computer Graphics

3.7 Cluster Multimedia

Gatekeeper:

- SIP Signal and Image Processing

Modules:

- IPA Image Processing and Image Analysis
- MCM Multimedia Content Management
- MRE Multimedia Representation and Encoding
- MRS Multimedia Retrieval and Content-Based Search
- MST Multimedia and Semantic Technologies
- NTM Network Technologies for Multimedia Applications
- AT-MM Advanced Topics in Multimedia

3.8 Cluster Information Management & Systems Engineering

Gatekeeper:

- ISE Information Management & Systems Engineering

Modules:

- BI1 Business Intelligence I
- BI2 Business Intelligence II
- KE Knowledge Engineering
- MCM Multimedia Content Management
- SDM Scientific Data Management
- AT-ISE Advanced Topics in Information Management & Systems Engineering

4 Master's Thesis and Defensio

The topic of thesis has to be chosen from one of the passed clusters and shall be accomplishable within six months. The Defensio includes an oral presentation of the thesis followed by a discussion of the broad scientific topic and thesis.

Appendix: Recommended schedule.

**Master Computer Science
Recommended Schedule for CS General**

	Module 1	Module 2	Module 3	Module 4	Module 5
1. Semester	Parallel Architectures (6 ECTS)	Cluster module (6 ECTS)	Cluster module (6 ECTS)	Cluster module (6 ECTS)	Cluster module (6 ECTS)
2. Semester	Advanced Software Engineering (6 ECTS)	Cluster module (6 ECTS)	Cluster module (6 ECTS)	Cluster module (6 ECTS)	Practical Course 1 (6 ECTS)
3. Semester	Academic Research and Writing (3 ECTS)	Master's Thesis	Cluster module (6 ECTS)	Cluster module (6 ECTS)	Practical Course 2 (12 ECTS)
4. Semester	Master's Thesis Seminar (3 ECTS)		Master's Thesis (30 ECTS)		

Master Computer Science Recommended Schedule for Data Science

	Module 1	Module 2	Module 3	Module 4	Module 5
1. Semester	Parallel Architectures (6 ECTS)	Application module (6 ECTS)	Cluster module Data Analysis (6 ECTS)	Cluster module Algorithms (6 ECTS)	Cluster module Parallel Computing (6 ECTS)
2. Semester	Advanced Software Engineering (6 ECTS)	Application module (6 ECTS)	Cluster module Data Analysis (6 ECTS)	Cluster module Algorithms (6 ECTS)	Practical Course 1 (6 ECTS)
3. Semester	Academic Research and Writing (3 ECTS)	Master's Thesis	Cluster module Data Analysis (6 ECTS)	Cluster module Data Analysis (6 ECTS)	Practical Course 2 (12 ECTS)
4. Semester	Master's Thesis Seminar (3 ECTS)		Master's Thesis (30 ECTS)		

Master Computer Science Recommended Schedule for Scientific Computing

	Module 1	Module 2	Module 3	Module 4	Module 5
1. Semester	Parallel Architectures (6 ECTS)	Cluster module Algorithms (6 ECTS)	Cluster module Parallel Computing (6 ECTS)	Cluster module Data Analysis (6 ECTS)	Cluster module Networks (6 ECTS)
2. Semester	Advanced Software Engineering (6 ECTS)	Cluster module Algorithms (6 ECTS)	Cluster module Parallel Computing (6 ECTS)	Cluster module Parallel Computing (6 ECTS)	Practical Course 1 (6 ECTS)
3. Semester	Academic Research and Writing (3 ECTS)	Master's Thesis	Cluster module Algorithms (6 ECTS)	Cluster module Parallel Computing (6 ECTS)	Practical Course 2 (12 ECTS)
4. Semester	Master's Thesis Seminar (3 ECTS)		Master's Thesis (30 ECTS)		