

**Appendices Master's degree programme Computing Science
2011-2012**

Appendix A Teaching outcomes of the degree programme (art. 1.3)

The Master graduate in Computing Science

- is fully acquainted with the basic terms and techniques used in Computing Science, and is familiar with a number of classical problems and their solutions;
- is experienced in the effective use of the tools available in solving Computing Science problems, such as compilers, theorem proofs, visualisation software, case-tools and domain specific software and hardware;
- is familiar with Computing Science applications in several other scientific fields of study;
- is capable of clear communication (both oral and in writing) on the subject of Computing Science and its applications;
- is capable of working in a team and in various projects;
- is sensitive to the social aspects of Computing Science applications and his/her own responsibilities therein;
- has specialized knowledge of theories, methods and techniques in one of the following subfields of Computing Science:
 - Intelligent Systems
 - Software Engineering and Distributed Systems
 - Computational Science and Visualisation
- is able, by using scientific data and assessments, to analyse problems in Computing Science or a related scientific field of study, to provide specified solutions to the problem, and – if possible – to materialise these solutions (in the shape of an algorithm or program or an implementation in software or hardware);
- is able to critically read professional literature and to assess its correctness, usability and relevance;
- has a proper understanding of the scientific relevance of problem definitions and results, and of the validity of the scientific method used.

The first six learning outcomes are similar to those of the Bachelor programme in Computing Science. Some subfields in the Computing Science master degree have the following additional learning outcomes:

The Master in Computing Science graduated in the subfield of Intelligent Systems or Computational Science and Visualisation

- is able to contribute to the enhancement of scientific understanding in a subfield of Computing Science.

The Master in Computing Science graduated in the subfield of Software Engineering and Distributed Systems

- is capable of systematically designing and implementing software systems in cooperation with interested parties;
- is capable of integrating existing and new software components into a system that meets the quality criteria that were agreed upon.

The Master in Computing Science graduated in the subfield of Management and Industry (BBI)

- has a full understanding of the way in which businesses and policy organisations are functioning (governments and nongovernmental organisations, NGO's);
- understands the connections between natural science research, trade and industry and governmental policies;
- is able to integrate aspects of natural science, business and management;
- is able to translate a concrete problem definition in business or management into a natural science problem definition;
- is able to connect problem aspects of natural sciences to other relevant subject fields;
- is able to put research data and conclusions into a business or policy context;

- has developed his/her **social** and communicative skills;
- is able to write texts that are effective and to the point;
- is able to draw up an innovation plan or management plan for either a business or a government organisation;
- is able to give convincing oral presentation;
- is able to deliver an active contribution to plenary discussions;
- familiar with techniques used in business meetings and is capable of chairing a meeting;
- is able to work on a project as part of a team;
- is able to give and receive feedback concerning his/her way of functioning in a team;
- can work in a project;
- is able to fully consider the interests or objectives of the ordering customer;
- is able to plan a project independently;
- is able to cooperate with the relevant parties involved in the project;
- is able to adequately deal with limitations in time, information and means;
- is able to prepare the implementation of a project result;
- is capable of taking professional responsibility;
- is able to take responsibility on behalf of the organisation;
- is able to recognize the strategic aspects of his/her own project;
- is able to provide practical solutions in matters concerning the ethical and professional codes of his/her own field of expertise and of the professional **organisation**.

Appendix B Specializations of the degree programme (art. 2.2)

The Master Computing Science has four specialisations:

- Intelligent Systems (IS)
- Computational Science and Visualisation (CSV)
- Software Engineering and Distributed Systems (SEDS)
- Science in Business & Public Policy (partly in Dutch only) (BBI)

Appendix C Content of the degree programme (art. 2.3)

Below, the name of the module is followed by the load of study and the form of examination (p=practical, t=written exam).

The compulsory programme for **IS** is:

- Automated Reasoning (5 EC, pt);
- Advanced Web Technology (5 EC, pt);
- Machine Learning (5 EC, pt);
- Student Colloquium (5 EC, p);
- Neural Networks (5 EC, pt);
- Pattern Recognition (5 EC, pt);
- Image Processing (5 EC, pt);
- Multi-Agent Systems (5 EC, t);
- Internship (15 EC, p);
- Computer Vision (5 EC, pt);
- Final project (30 EC, p).

The compulsory programme for **CSV** is:

- Advanced Web Technology (5 EC, pt);
- Scientific Visualisation (5 EC, p);
- Introduction Computational Science (5 EC, p);
- Student Colloquium (5 EC, p);
- Advanced Computer Graphics (5 EC, p);
- Computer Vision (5 EC, pt);
- Image Processing (5 EC, pt);
- Geometric Algorithms (5 EC, p);
- Internship (15 EC, p);
- Modeling and Simulation (5 EC, pt);
- Final Project (30 EC, p).

The compulsory programme for **SEDS** is:

Advanced Web Technology (5 EC, pt);
Software Architecture (5 EC, p);
Student Colloquium (5 EC, p);
Software Patterns (5 EC, pt);
Ubiquitous Computing (5 EC, p);
Image Processing (5 EC, pt);
Software Maintenance and Evolution (5 EC, p);
Internship (15 EC, p);
Mobile Software (5 EC, p);
Distributed Systems (5 EC, p);
Final project (30 EC, p).

The compulsory programme for **BBI** is:

Advanced Web Technology (5 EC, pt);
Student Colloquium (5 EC, p);
Image Processing (5 EC, pt);
Internship (15 EC, p);
Science in Business & Public Policy (20 EC, p) (in Dutch only);
Final project (40 EC, p).

Appendix D Optional modules (art. 2.4)

Below, the name of the module is followed by the load of study and the form of examination (p=practical, t=written exam).

Optional modules in the programme for **IS** are:

15 EC are free choice

15 EC are chosen from:

- 0 Dynamic Logic (5 EC, p);
- 1 Natural Language Processing (10 EC, p);
- 2 Scientific Visualisation (5 EC, pt);
- 3 Handwriting Recognition (5 EC, p);
- 4 Robotica (5 EC, p);
- 5 Business Intelligence (5 EC,p);
- 6 Ubiquitous Computing (5 EC,p);
- 7 Applied Signal Processing (5 EC, pt).

Optional modules in the programme **CSV** are:

15 EC are free choice

15 EC are chosen from:

- 0 Numerical Mathematics I (5 EC, pt);
- 1 Numerical Mathematics II (5 EC, pt);
- 2 Probleemoplossen met Mathematica (5 EC, pt);
- 3 Pattern Recognition (5 EC, pt);
- 4 Machine Learning (5 EC, p);
- 5 Neural Networks (5 EC, pt);
- 6 Computational Physics (5 EC, pt);
- 7 Computational Cognitive Modeling (5 EC, pt).

Optional modules in the programme **SEDS** are:

15 EC are free choice;

15 EC are chosen from Master modules in Computing Science, Artificial Intelligence and Industrial Engineering and Management.

Optional modules in the programme **BBI** are:

Modules for 30 ECTS are chosen from one of the three specializations above.

Appendix E Entry requirements and compulsory order of examinations (art. 3.2)

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| No requirements |
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Appendix F Admission to the degree programme and different specializations (art. 4.1.1 + art. 4.2)

The candidate is admitted to the programme in a specific specialisation after completing a matching bridging programme.

Appendix G

Application deadlines for admission (art. 4.5.1)

| Deadline of Application | Non-EU students | EU students |
|---|-----------------------------|-----------------------------|
| Nanoscience | February 1st 2012 | February 1st 2012 |
| Behavioural and Cognitive Neurosciences | February 1st 2012 | June 1st 2012 |
| Biomolecular Sciences (topprogramme) | February 1st 2012 | April 15 th 2012 |
| Evolutionary Biology (topprogramme/EM) | February 1st 2012 | February 1st 2012 |
| Remaining FMNS Masters | April 15 th 2012 | June 1st 2012 |

Decision deadlines (art. 4.5.3)

| Deadline of Decision | Non-EU students | EU students |
|---|----------------------------|----------------------------|
| Nanoscience | June 1st 2012 | July 1st 2012 |
| Behavioural and Cognitive Neurosciences | June 1st 2012 | July 1st 2012 |
| Biomolecular Sciences (topprogramme) | June 1st 2012 | July 15 th 2012 |
| Evolutionary Biology (topprogramme/EM) | June 1st 2012 | June 1st 2012 |
| Remaining FMNS Masters | June 15 th 2012 | July 1st 2012 |