Appendices Master's degree programme Applied Mathematics

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

The degree programme aims to train the students in such a way that they acquire the insight, skills and knowledge that allows the recipient of the degree to establish a professional career in the field of Applied Mathematics.

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

The degree programme has the following specializations:

- Computational Science and Numerical Mathematics
- Systems, Control and Optimization

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

The local Mathematics and Applied Mathematics modules are

module	offered	ECTS	assessment	practical
Algebra and Geometry	Yearly	5	Take home exam followed by an oral discussion of the problems	
Applied Geometry	Yearly	5	Assigment, oral presentation, report	
Boundary Layers	Every two year	5	Oral examination	x
Caput Dynamical Systems	Every two year	5	Oral presentation, essay	
Caput Mathematical Physics	Every two year	5	Oral presentation, essay	
Computational Engineering	Every two year	5	Assignments, oral presentation	
Computational Fluid Dynamics	Yearly	5	Assignments, oral examination	x
Contemporary Statistics with Applications	Every two year	5	Homework, final project, examination	
Dynamical Systems and Chaos	Yearly	5	Oral presentation, essay	
Final Research Project	Yearly	50	Assessment of performance, report, presentation	

Introduction to Optimization	Every two year	5	Take home exam followed by an oral discussion of the problems	
Modeling and Identification	Every two year	5	Take home exam followed by an oral discussion of the problems	
Robust Control	Yearly	5	Take home exam followed by an oral discussion of the problems	
Statistical Genomics	Every two year	5	Homework, final project, examination	
Student Colloquium	Yearly	5	Oral presentation	

From the total of 120 ECTS of the master programme at least 24 ECTS and at most 32 ECTS have to be chosen from the Mastermath programme.

For information on the modules of the Mastermath programme in 2009-2010 see http://www.mastermath.nl. The Mastermath programme of 2010-2011 will be announced in the spring of 2010. The programme of 2008-2009 gives an indication of the programme in 2010-2011.

For information on the modules of Physics, Applied Physic s, Astronomy, Chemical Engineering, Computing Science, Econometrics and Industrial Engineering and Management see appendix C or D of the corresponding programme.

Specialization Computational Science and Numerical Mathematics

Core component (29-31 ECTS)

For students in the specialization Computational Science and Numerical Mathematics the following local modules are obligatory:
- Computational Fluid Dynamics (5 ECTS)
- Computational Engineering (5 ECTS)
- Boundary Layers (5 ECTS)

In addition, two modules have to be chosen from the modules in the specialization Computational Science and Numerical Mathematics of the Mastermath programme. In 2009-2010 Mastermath offers
- Numerical Linear Algebra (8 ECTS)
- Applied Finite Elements (6 ECTS)
- Numerical Methods for Time-dependent PDE's (8 ECTS)

The Mastermath programma of 2010-2011 will be announced in the spring of 2010.

Enrichment Component

(34-36 ECTS, the Core and Enrichment Component must have a total of 65 ECTS)

The following local module is obligatory:

- Student Colloquium (5 ECTS)

Approximately 15 ECTS to be chosen from the Mathematics and Applied Mathematics (outside the specilization Computational Science and Numerical Mathematics) modules offered locally or by Mastermath. In case a student did not pass the courses Stromingsleer and Numerieke Wiskunde 2 in the bachelor programme, these modules have to be chosen here.

Approximately 15 ECTS to be chosen from the modules of the master programme of Physics, Applied Physics, Astronomy, Chemical Engineering, Computing Science, Econometrics, and Industrial Engineering and Management, on individual approval of the Board of Examiners. At most 10 ECTS of these master modules can be replaced by advanced bachelor modules. Recommended modules are

- Physical Transport Phenomena 2 (5 ECTS)
- Solid Mechanics (5 ECTS)
- Computational Physics (5 ECTS)
- Dynamics of Galaxies (5 ECTS)
- Strategic Management of Technology (5 ETCS)
- Introduction to Computational Science (5 ECTS)
- Scientific Visualization (5 ECTS)

Free Choice (5 ECTS)

Optional module in any field taught at the university, on individual approval of the Board of Examiners.

Final Research Project (50 ECTS)

Research project in the specialization area Computational Science and Numerical Mathematics. An internship of at least 15 ECTS is part of this project.

Specialization Systems, Control and Optimization

Core component (27 ECTS)

For students in the specialization Systems, Control and Optimization the following local modules are obligatory:

- Robust Control (5 ECTS)
- Introduction to Optimization (5 ECTS)
- Modeling and Identification (5 ECTS)

In addition, two modules have to be chosen from the modules in the specialization Systems, Control and Optimization of the Mastermath programme. In 2009-2010 the Mastermath offers

- Systems and Control (6 ECTS)
- Nonlinear Systems Theory (6 ECTS)
- Continuous Optimization (6 ECTS)
- Discrete Optimization (6 ECTS)
- Advanced Linear Programming (6 ECTS)
- Scheduling (6 ECTS)

The Mastermath programma of 2010-2011 will be announced in the spring of 2010.

Enrichment Component (38 ECTS)

The following local module is obligatory:

- Student Colloquium (5 ECTS)

Approximately 17 ECTS to be chosen from the Mathematics and Applied Mathematics (outside the specilization Systems, Control and Optimization) modules offered locally or by Mastermath. In case a student did not pass the courses Optimalisering van Regelsystemen and Signalen en Systeemtheorie in the bachelor programme, these modules have to be chosen here.

Approximately 16 ECTS to be chosen from the modules of the master programme of Physics, Applied Physics, Astronomy, Chemical Engineering, Computing Science, Econometrics, and Industrial Engineering and Management, on individual approval of the Board of Examiners. At most 10 ECTS of these master modules can be replaced by advanced bachelor modules. Recommended modules are

- Mechatronics (5 ECTS)
- Robotics (5 ECTS)
- Neural Networks (5 ECTS)

Free Choice (5 ECTS)

Optional module in any field taught at the university, on individual approval of the Board of Examiners.

Final Research Project (50 ECTS)

Research project in the specialization area Systems, Control and Optimization. An internship of at least 15 ECTS is part of this project.

Appendix D Optional modules
(art. 2.4)

See Appendix C.

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

For students admitted to the programme there are no entry requirements for the individual modules.

Appendix F Admission to the degree programme and different specializations
(art. 4.1.1 + art. 4.2)

Holders of the following Bachelor's degree from the University of Groningen are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Applied Mathematics:
- BSc Mathematics
- BSc Applied Mathematics

Appendix G Application deadlines for admission
(art. 4.5)

Deadlines for application are:
- June 1st 2009 for EU student
- April 15th 2009 for non-EU students