



university of  
 groningen

faculty of mathematics  
 and natural sciences

**Appendices**  
**to**  
**Teaching and Examination regulations:**  
**Master's degree programme**  
**in**  
**Applied Mathematics**



## **Appendix I Teaching outcomes of the degree programme (art. 1.3)**

The learning outcomes consist of general learning outcomes with respect to both knowledge and skills (which are applicable for the Master's degree programme in Mathematics as well) which are supplemented with programme-specific learning outcomes. For each learning outcome a reference to the Dublin descriptors is given between brackets.

The master graduate in Applied Mathematics:

- A1. has an understanding of the most important concepts of the field, [applying knowledge and understanding]
- A2. is able to contribute to the scientific advancement of a subfield of mathematics, [applying knowledge and understanding]
- A3. is able to use abstract thinking and mathematical modelling to get to the root of a problem and thus recognize whether existing methods are applicable, or to ascertain that new methods must be developed, [applying knowledge and understanding]
- A4. is able to function in multidisciplinary teams, [applying knowledge and understanding]
- A5. is familiar with the social and ethical aspects of applying mathematics in practice, [judgement]
- A6. understands the scientific relevance of problem definitions and results, and the validity of the scientific method, [judgement]
- A7. is able to describe solutions in both general and formal mathematical terms, [communication]
- A8. is able to express him- or herself well both orally and in writing, [communication]
- A9. is able to evaluate the scientific literature so as to keep their knowledge up to date. [learning]

In addition, the master graduate in Applied Mathematics:

- T1. has general knowledge of the theories, methods and techniques in the field of applied mathematics, [knowledge and understanding]
- T2. has specialized knowledge in at least one of the following subfields of applied mathematics: [knowledge and understanding]
  - a. Computational Science and Numerical Mathematics
  - b. Systems, Control and Optimization,
- T3. has wide experience with the mathematical modelling of problems from actual practice, [applying knowledge and understanding]
- T4. has extensive experience with using the relevant mathematical tools. [applying knowledge and understanding]

## **Appendix II Specializations of the degree programme (art. 2.2)**

The degree programme has the following specializations:

- Computational Science and Numerical Mathematics
- Systems and Control



## Appendix III Content of the degree programme (art. 2.3)

The degree programme has the following specializations:

- Computational Science and Numerical Mathematics
- Systems and Control

The master programme comprises 120 ECTS.

The requirements on the programme are the following.

<i>Parts</i>	<i>Constraints</i>	<i>ECTS</i>
<b>Student colloquium</b>		5
<b>At least five modules from the list of modules given at the University of Groningen, the modules in the specialization area are compulsory</b>	<p><i>Specialization Computational Science and Numerical Mathematics :</i></p> <ul style="list-style-type: none"> <li>- Computational Fluid Dynamics (annual)</li> <li>- Computational Engineering (every two years , 2014-2015)</li> <li>- Boundary Layers (every two years, 2015-2016)</li> </ul> <p><i>Specialization Systems and Control:</i></p> <ul style="list-style-type: none"> <li>- Robust Control (annual)</li> <li>- Modeling and Identification (every two years, 2014-2015)</li> <li>- Modeling and Control of Complex Nonlinear Engineering Systems (annual)</li> </ul> <p><i>Specialization Algebra and Geometry (Mathematics):</i></p> <ul style="list-style-type: none"> <li>- Caput Algebra and Geometry (annual)</li> <li>- Geometry and Topology (every two years, 2015-2016)</li> <li>- Geometry and Differential Equations (every two years, 2014-2015)</li> <li>- Caput Differential Geometry (annual)</li> </ul> <p><i>Specialization Dynamical Systems and Analysis (Mathematics):</i></p> <ul style="list-style-type: none"> <li>- Dynamical Systems and Chaos (annual)</li> <li>- Caput Dynamical Systems (every two years, 2014-2015)</li> <li>- Caput Mathematical Physics (every two years, 2015-2016)</li> <li>- Hamiltonian Mechanics (annual)</li> </ul>	≥ 25



	<i>Specialization Statistics and Probability (Mathematics):</i> - Contemporary Statistics with Applications (every two years, 2014-2015) - Statistical Genomics (every two years, 2015-2016)	
<b>At least three modules from the Mastermath programme</b>	From these modules at least two have to be in the specialization area and at least one has to be outside the specialization area.  For information on the modules of the Mastermath programme see: <a href="http://www.mastermath.nl">www.mastermath.nl</a>	$\geq 18$
<b>Advanced modules of programmes taught at the University of Groningen other than the master programmes mathematics and applied mathematics</b>	These modules have to be of at least third year bachelor level, and have to be relevant for the master Mathematics (at the discretion of the exam committee).	$\geq 10$
<b>Free choice</b>		$\leq 5$
<b>Final Research Project</b>	Research project in the specialization area. An internship of at least 15 ECTS is part of this project.	50



The Mathematics and Applied Mathematics modules given at the University of Groningen are

<b>module</b>	<b>offered</b>	<b>ECTS</b>	<b>assessment</b>	<b>practical</b>
Caput Algebra and Geometry	annual	5	Take home exam followed by an oral discussion of the problems	
Geometry and Topology	every two years	5	Written examination, homework assignment	
Geometry and Differential Equations	every two years	5	Assignment with oral presentation	
Caput Differential Geometry	annual	5	Assignments, paper, oral presentation	
Boundary Layers	every two years	5	Oral examination or written exam (if #students >5), assignment	x
Caput Dynamical Systems	every two years	5	Oral presentation, essay	
Caput Mathematical Physics	every two years	5	Oral presentation, essay	
Computational Engineering	every two years	5	Homework assignments, assignments, written exam	x
Computational Fluid Dynamics	annual	5	Assignments, oral examination	x
Contemporary Statistics with Applications	every two years	5	Homework, examination	
Dynamical Systems and Chaos	annual	5	Oral presentation, essay	
Hamiltonian Mechanics	annual	5	Homework assignments, Oral presentation, essay	
Final Research Project (P-variant only)	annual	50	Assessment of performance, report, oral presentation	
Mathematical Research Project (M-variant only)	annual	30	Assessment of performance, report, presentation	
Modelling and Identification	every two years	5	Take home exams followed by an oral discussion of the problems	
Modeling and Control of Complex Nonlinear Engineering Systems	annual	5	Homework assignments, written examination	
Robust Control	annual	5	Take home assignments, written exam	
Statistical Genomics	every two years	5	homework assignments, assignments, examination	
Student Colloquium	annual	5	Oral presentation, article	

For information on the modules of the Mastermath programme see <http://www.mastermath.nl>.

For information on the modules of programmes of the University of Groningen other than the master programmes mathematics and applied mathematics see the teaching and examination regulations of the corresponding programme.



## **Appendix IV Optional modules (art. 2.4)**

See Appendix III.

## **Appendix V 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 VI 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 VII

### Application deadlines for admission (art. 4.7.1)

<b>Deadline of Application</b>	<b>Non-EU students</b>	<b>EU students</b>
Nanoscience	February 1st 2015	February 1st 2015
Behavioural and Cognitive Neurosciences	April 1st 2015	May 1st 2015
Biomolecular Sciences (topprogramme)	April 1st 2015	April 1st 2015
Evolutionary Biology (topprogramme/EM)	January 15th 2015	January 15th 2015
Remaining FMNS Masters (amongst which Applied Mathematics)	April 1st 2015	May 1st 2015

### Decision deadlines (art. 4.7.3)

<b>Deadline of Decision</b>	<b>Non-EU students</b>	<b>EU students</b>
Nanoscience	June 1st 2015	June 1st 2015
Behavioural and Cognitive Neurosciences	June 1st 2015	June 1st 2015
Biomolecular Sciences (topprogramme)	June 1st 2015	June 1st 2015
Evolutionary Biology (topprogramme/EM)	June 1st 2015	June 1st 2015
Remaining FMNS Masters (amongst which Applied Mathematics)	June 1st 2015	June 1st 2015