UNIVERSITÉ DE FRIBOURG SUISSE
FACULTÉ DES SCIENCES

UNIVERSITÄT FREIBURG SCHWEIZ
MATHEMATISCH-NATURWISSENSCHAFTLICHE FAKULTÄT

Curriculum leading to the Degree of

Master of Science in Mathematics

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Contents

1 General Remarks

This curriculum describes the regulations concerning the course of studies in mathematics at the University of Fribourg. It is based on the regulations of the Faculty of Science as defined in the ***Règlement du 2 février 2004 pour l'obtention des Bachelor of Science et des Master of Science de la Faculté des sciences* [*Regulations of 2 February 2004 for the Obtainment of the Bachelor of Science and Master of Science*]** (subsequently called *the Regulations* for short).

1.1 Academic Titles and Programme of Study

The Faculty of Science of the University of Fribourg awards the following official academic titles to students who have successfully completed the corresponding course of studies:

- **Bachelor of Science in Mathematics**, subsequently called **BSc**.
- **Master of Science in Mathematics**, subsequently called **MSc**.

The **programme of the MSc** in mathematics represents a scientific course of studies giving access to various professional activities in research, education, industry, commerce, and administration. In addition, the MSc is the entry requirement for the scientific work and deepened scientific education leading to a doctorate. When accompanied by an adequate subsidiary subject (biology, chemistry, geography, mathematics, or physics), the MSc allows one to enter a complementary didactics programme leading to a qualification as a high-school teacher (*Diplôme d'Aptitude à l'Enseignement Secondaire II* / *Lehrdiplom für die Sekundarstufe II*).

Persons in possession of a BSc in Mathematics of the University of Fribourg or any other Swiss university are admitted without further requirement to the MSc course of studies (art. 7 of the Regulation). Persons in possession of equivalent degrees may also be admitted to the MSc study programme by a decision of the Faculty of Science to be made in each individual case. Provisional admission may be granted subject to the fulfilment of additional requirements (cf. Section 3.1).

1.2 Course Structure

The degree courses leading to the MSc are subdivided into **course units**[1] **(UE)** comprising lectures, seminars, etc. To each UE, a number of **ECTS**[2] **points** is assigned, which by assessment (e.g. successful exams) is converted into ECTS credits (see Section 1.4). The MSc degree course requires 90 ECTS credits (corresponding to a duration of study of 3 semesters).

The programme consists of a one-year taught programme comprising lectures and seminars, and the **MSc thesis**. Examinations of the UE of the MSc are only possible after all the requirements for the BSc have been completed. (cf. 1.4).

The purpose of the different forms of UE is as follows:

- **Lectures** give an introduction to the scientific methods in mathematics and advanced scientific thinking. They provide the fundamentals of various mathematical fields and their applications.
- **Seminars** give the opportunity for working more deeply on a mathematical subject and presenting it orally as well as in written form.

[1] UE is an abbreviation of the German term Unterrichtseinheit.

[2] ECTS stands for *European Credit Transfer System*. One ECTS point corresponds to an amount of work of approximately 30 hours.

- The **master's thesis** is an autonomous scientific work under the supervision of an experienced researcher.

1.3 Acquired skills

The aim of the studies leading to the award of an MSc in Mathematics is to deepen knowledge and perfect competence in the chosen field. Thus, at the end of the programme, a student will have shown that he/she can apply their knowledge to accomplish a research project and will have learned how to work independently or how to integrate into an interdisciplinary research team. The award of the degree requires creative and self-critical talents as well as the ability to communicate ideas.

1.4 Assessment of Course Units (UE) and Acquisition of ECTS Credits

The UE of the MSc programme are grouped into two validation packages, MSc1 and MSc2. The acquisition of ECTS credits occurs in two steps: the assessment of the UE and the awarding of the credits for completed validation packages.

Admission to the exam corresponding to a course can be subject to meeting the requirements of the corresponding exercise class. The **assessment** of lectures is made by an oral exam, whose type and duration are regulated in this curriculum. Exams normally take place during the official exam periods (sessions) scheduled by the Faculty of Science. Students register in GestEns within the time stipulated for each exam according to the on-line procedure. When the semester during which the student has taken a UE on which he/she wants to be examined does not show up in the list of examinable UE, he/she should mention it in time to the Department of Mathematics to have it added. The grades range from 6 (highest) to 1 (lowest). An exam with a grade below 4 can be repeated once at the earliest at the next exam session.

The **validation package MSc1** comprises multiple, separately assessed UE.

ECTS points are credited if

- the weighted average of the exam grades of a validation package is at least 4. The weighting is given by the number of ECTS points assigned to a UE.
- the assessment criteria of the not examined UE (seminars, etc.) are met.

Under these prerequisites, the validation package is successfully completed and the ECTS points of its UE are converted into ECTS credits for the validation package.

The validation package **MSc2** consists of the master's thesis and a presentation of the latter. The validation occurs according to 3.5 below.

When both packages are completed and by request, the Dean's office issues confirmations acknowledging exam results and awarded credits (Art. 22 of the regulations) after payment of the exams' fee.

1.5 Teaching Languages

Courses are taught in French, German or English. The students may choose the language of their seminar talks, written works and exams (French, German or English).

1.6 Ethics and Science

Ethical principles are an integral part of a scientific education. Accepted international conventions must be respected during research and upon the writing up of any scientific work whether it be a lecture, a thesis or a report. In particular, every external source of information (articles, lectures, web pages, etc.) must be adequately and correctly cited.

1.7 Regulations and additional Information

Detailed information about studying Mathematics can be found in the following documents, which may be obtained from the Office of the Department of Mathematics, chemin du Musée 23, CH-1700 Fribourg or from the internet (www.unifr.ch/math,www.unifr.ch/science):

- Regulations concerning the admission to the University of Fribourg [Réglement d'admission de l'Université de Fribourg / *Zulassungsreglement der Universität Freiburg (*www.unifr.ch/admission*)*
- Regulations of February 2, 2004 for obtaining the Bachelor of Science and of the Master of Science
- Curriculum for the major and minor disciplines of the Faculty of Science of the University of Fribourg
- Study guide of the University of Fribourg
- University calendar of the University of Fribourg
- Regulations for obtaining the Diploma of teachinig the Secondary Level II
- Up-to-date information may also be obtained from the web site of the Department of Mathematics, *ww.unifr.ch/math*.

Finally, each student obtains a personal and secure internet space that can be reached using an individual university e-mail password. This space can be reached through the link "Connexion" on the web page www.unifr.ch/science/gestens and, among other things, allows registration to courses and exams, access to exam results and the initiation of the confirmation procedure.

3 Master of Science (MSc) in Mathematics

[Version 2005, validation package: MSc1-MA.0011, MSc2-MA.0012]

The MSc degree programme consists of course work corresponding to 90 ECTS credit points and usually requires 3 semesters. It is concluded with a master's thesis.

Course units for the MSc programme can be assessed and validated only after the BSc certificate has been obtained.

3.1 Admission to the MSc programme

Admission to the MSc programme in Mathematics requires a Bachelor of Science degree in Mathematics obtained at the University of Fribourg, or a title deemed equivalent by the Faculty of Science. The Faculty provides a list of equivalent degrees. Candidates in possession of such a degree are admitted without further requirements. Other cases will be decided upon by the Faculty of Science that may impose further conditions.

It is possible to participate in courses and seminars belonging to the master's programme before completing the BSc. However, assessment and validation of these courses can take place only after the BSc certificate has been obtained.

3.2 Course units of the MSc programme

The MSc programme comprises six lecture courses[3], two seminars, a master's thesis and its presentation in a lecture. The following table lists a possible schedule for each semester.

1st semester

Code	Course unit	hours	ECTS
	Mathematics *)		
	4 lecture courses	16	24
MA.480x	Seminar	2	3
			27

*) see section 3.3

2nd semester

Code	Course unit	hours	ECTS
	Mathematics *)		
	2 lecture courses	8	12
MA.480x	Seminar	2	3
and	with		
MA.4809	Seminar paper		3
MA.4810	Preparation for master's thesis		12
			30

*) see section 3.3

[3] A lecture consists of a 4-hours a week semester class, a two-hours a week yearly class or two 2-hours a week semester classes.

3rd semester

Code	Course unit	hours	ECTS
MA.5801	Master's thesis		30
MA.5802	Presentation of master's thesis		3
			33

It is possible to choose some course units that are not part of the university's normal course programme, notably courses given in the *3ème Cycle Romand de Mathématiques*, the *3ème Cycle Romand de Statistique et Probabilités appliquées* as well as lecture courses offered at the Universities of Bern and Neuchâtel as part of the BeNeFri convention or the collaboration with the University of Bern. This requires the prior consent of the student advisor.

Of the six lecture courses chosen, at least one each must belong to the fields of **Analysis, Algebra-Geometry-Topology** and **Applied Mathematics** (Numerical Analysis, Stochastics, Biomathematics). It is recommended to study the course announcements in time and to discuss the programme with the student adviser.

3.3 Continuation of the minor field and practical work

Students that had **computer science**, **physics** or **one of the three existing options in economics** as a minor in their BSc curriculum may extend their knowledge in the same discipline during their MSc programme. In this case, 12 ECTS points in Mathematics are replaced by 12 ECTS points in the corresponding discipline. Suitable courses are chosen in agreement with the student advisers of the major and minor disciplines. Only one of these minors can be pursued. The 12 ECTS points obtained for the minor are counted towards Applied Mathematics in the sense of the preceding section.

Six ECTS points may also be obtained, in agreement with the student adviser, from a practical project in cooperation with the *Ecole d'ingénieurs et d'architectes de Fribourg* or the industry.

3.4 Examinations in the MSc programme

The course units of the first two semesters of the MSc programme comprise the validation package **MSc1**.

These courses are assessed independently of one another. Each lecture course offered by the Department of Mathematics is assessed through a 20 minutes oral exam. Dates of these exams are fixed by the Department of Mathematics. External courses are assessed by the school or faculty offering them.

3.5 Master's thesis

The master's thesis is written under the supervision of a professor or lecturer of the Department of Mathematics. The subject of the thesis is usually related to the courses and seminars of the first year of the MSc programme. Students should contact a supervisor early in their programme in order to choose a topic for their thesis. The master's thesis is to be completed within 6 months and then presented in the form of a lecture that should be accessible to fellow students. It may also be written under the direction of a teacher of another university if a colleague of the University of Fribourg oversees its realization.

The master's thesis is graded on a scale of 6.0 (best) to 1.0 (worst). If the grade obtained is below 4.0, a second thesis may be written on a different topic.

The validation package **MSc2** consists of 33 ECTS points. These points are transformed into ECTS credits if the master's thesis has obtained a grade of 4.0 or better and if its presentation in the required lecture has been accepted.

The degree **Master of Science in Mathematics, University of Fribourg (MSc)** is conferred after successful completion of the validation packages MSc1 and MSc2.