

FRIEDRICH-SCHILLER-
UNIVERSITÄT
JENA

Study Guide

for the M.Sc. Mathematics

August 9, 2022

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1 Your Studies

1.1 Content and Structure

The modules in the M.Sc. Mathematics program are taught in English. You can freely choose among a wide variety of mathematics modules. Usually, your studies follow the standard study plan (which you can find at the very end of this document).

A total of 120 ECTS credits must be collected according to the following subcategories:

- 18-51 ECTS credits in pure mathematics
- 18-51 ECTS credits in applied mathematics and stochastics
- 30 ECTS credits for the master thesis
- 21 ECTS credits in your minor subject and key qualifications (ASQ)

This must amount to 90 credits of coursework and 30 credits for the thesis. Since the typical duration of studies is two years (three semesters of coursework and 6 months allotted to the master thesis) a typical workload for a semester is approximately 30 credits. Note that students may take up to 6 semesters of modules before incurring penalties. This may be, for example, three 9 ECTS credit courses and a 3 ECTS seminar. The exact amount is chosen by the student, and there is no minimum or maximum to the number of modules a student may choose to participate in. Modules typically fall into the following credit amounts, though this is not strict:

- 3 ECTS credit courses: usually seminars. Typically take place once a week, often project oriented.
- 6 ECTS credit courses: usually take place two or three times a week, often do not have required assignments.
- 9 ECTS credit courses: usually take place three times a week, plus a once a week exercise course oriented toward assignments. These courses often have required assignments.
- 3 or 6 ECTS credit lab courses: usually taken electively in conjunction with a 6 or 9 ECTS credit course as a practical approach to related topics.

If you do not already have knowledge of German of at least CEFR level A2, then you are required to choose "German as a foreign language" as your minor subject. You can collect all 21 ECTS credits required for you minor subject by attending German classes at the Language center (see also Section 4).

You can choose the following mathematical subject areas:

- Counting for Pure Mathematics:
  - Algebra
  - Analysis
  - Geometry
- Counting for Applied Mathematics:
  - Numerical Analysis / Scientific Computing
  - Optimization
  - Probability and Statistics
  - Theoretical Computer Science

You have to choose at least 1 and at most 2 seminars. The topics of those seminars can be chosen freely.

You are permitted to take modules totaling at most 18 ECTS credits from the B.Sc. Mathematics program, as long as you have not taken them previously during your bachelor studies. Be aware that most of these courses will be taught in German.

A list of all modules available for the M.Sc. Mathematics program is provided at the module catalogue.

1.2 Course format

In the Mathematics M.Sc., is typical for professors to provide students directly with scripts for the course (reading and problems specifically written to follow the course content) and relevant resources. In rare cases, students may be asked to obtain or purchase specific books on their own. Otherwise, books are often available as PDFs online or only listed as suggested reading. Students can therefore expect expenses for course materials to be low during the program.

Professors vary in terms of course structure: some may have mandatory exercise modules, required assignments and projects, or presentations. Others may expect nothing from students except for participation in the exam. Course details will typically be outlined in the first week of courses.

All modules in the program are available in English, though not all modules are taught in English by default. Students may have to email a professor in advance or ask on the first day of lectures for English instruction. This is because many German-speaking students attend courses in the English M.Sc., so a module might be taught in German until it is requested otherwise. All courses may be requested in English at any time by a registered student, even after the first day. (Note that this is not necessarily true for Bachelor modules, even though M.Sc. students may attend up to 18 ECTS credits of Bachelor courses. You may still request that a Bachelor course be taught in English, but professors will not be obligated to accommodate).

The Mathematics department provides a number of resources, including the computer rooms (pools) on the 4th floor of the department building. Here, students have unlimited access to computers during regular university hours, as well as access to printers. Upon enrollment, students will receive credentials for accessing department computers.

Furthermore, there are student-run tutoring services provided and a student lounge on the 3rd floor. Students are encouraged to speak with professors and lecturers directly regarding additional questions; some professors also provide office hours (*Sprechstunden*) to assist students throughout the semester. All students have access to the University library for resources and a place to study.

Course times follow one of the two following formats:

- *Sine tempore (s.t.)*: A lecture which is listed *s.t.* begins and ends at the listed times exactly. For example, a class from 10:00-12:00 *s.t.* begins at 10:00 and ends at 12:00.
- *Cum tempore (c.t.)*: A lecture which is listed as *c.t.* begins and ends with a 15 minute discrepancy between the listed times and the actual times. For example, a class from 10:00-12:00 *c.t.* begins at 10:15 and ends at 11:45. This is for historical reasons, and allows students reasonable time to get from one lecture to the next.

Unless otherwise specified, modules are assumed to be *cum tempore* and therefore start 15 minutes after the listed time, and finish 15 minutes earlier.

1.3 Examinations and Grades

With the exception of Section 1.3.4, this section does not apply to the master thesis. Please see Section 2 for more information about the master thesis.

1.3.1 General Information

In order to receive credit for taking a module, you must pass an examination. Here are some general notes to keep in mind:

- You must register for a module examination within 6 weeks after the beginning of the lecture period.
- Different professors may have different examination formats: examintions may be an oral or a written test, an oral presentation, writing a seminar paper, or something else depending on the course.
- After the examination, you will receive a grade. German grades range from 1,0 to 5,0, where 1,0 is an ideal score. Any grade better than (below) or equal to 4,0 is a passing grade and earns you the course's full ECTS credits.
- Failing an examination (i.e. receiving the grade 5,0) for the first time automatically registers you for a re-examination. If you fails this re-examination, special rules apply (see Section 1.3.5).
- If you pass, your final grade is the grade you received on your last attempted examination. It is unaffected by previously failed attempts.

1.3.2 Registering for an Examination

You need to register for a module examination within 6 weeks after the beginning of a semester. This is done using Friedolin (see Section 4) via the link labeled "Apply for exams" after logging in. Within these 6 weeks you can withdraw from an examination via Friedolin without any problems.

Within 10 weeks of the beginning of the semester you can withdraw from an examination by handing in a request to the examination office providing adequate reasons for your withdrawal. Otherwise, your registration is seen as binding, and you will receive a grade in the course. This is true whether or not you are physically present in the exam.

However, it is impossible to withdraw from an examination after taking it, e.g. if you take an examination early in the semester (e.g. this can happen in a seminar).

If you cannot register for a module via Friedolin, then please check the module description to see if you fulfill its requirements. You can also register for modules that belong to the B.Sc. program as outlined in Section 1.1. For these modules you may need to make a request to the examination office. You should also consult the examination office if there are any other problems with the registration for modules.

1.3.3 Types of Examinations

There are different kinds of examinations, including those listed below. An examination can also be appropriately separated into multiple parts.

Oral test In an oral test, you may be asked to write down definitions, proofs, calculations etc. It is conducted with you individually by two examiners or an examiner together with an observer. A record of the exam will be written. An oral test commonly takes between 20 and 60 minutes.

Written test A written test may include mandatory questions only, but can also partially consist of obligatory chosen questions. Different kinds of questions are possible, including multiple choice questions. A written test commonly takes between 60 and 180 minutes. After the examination has been graded, it is possible for you to review your test and appeal against the exam result, if this is justified.

Oral presentation An oral presentation is usually, but not exclusively, required in seminars. It can incorporate different forms of media, e.g. black boards, white boards, written handouts, and projectors. Make sure you are properly prepared for using a required medium before giving your presentation. This includes bringing the necessary equipment and checking beforehand whether everything works as desired. The duration of an oral presentation may vary, but is commonly between 30 and 90 minutes.

Writing a seminar paper When writing a seminar paper, you are will analyze and present a topic according to scientific standards within a specified time frame using established literature and possibly other sources, which must be cited correctly.

1.3.4 Grades

This section applies to the grades of examinations as well as the grade of your master thesis.

The examiner decides which grade you will receive based on your examination(s) (or thesis). The following integer grades are possible:

1	very good	an outstanding result
2	good	a result which heavily exceeds average results
3	satisfactory	an average result
4	adequate	a result which despite indicating a flawed performance is still adequate for passing the examination
5	failed	a result representing a failed examination, i.e. not a passing grade

Other possible grades are integer grades ± 0.3 excluding $0.7, 4.3, 4.7$ and 5.3. Some modules can only be taken as **pass/no pass** and therefore no grade is given; therefore these modules are not considered when calculating your grade point average. Additionally you will receive an ECTS grade according to the ECTS grading scale.

Generally, grades correspond to the following percentages of completed assignments and/or earned scores on exams or projects:

Percentage	**Grade**
$91 - 100\%$	1.3 - 1.0
$81 - 90\%$	2.3 - 1.7
$66 - 80\%$	3.3 - 2.7
$50 - 65\%$	4.0 - 3.7
$0 - 49\%$	5.0 (failed)

If you received multiple grades pertaining to a single module, then the final grade will be their average, unless specified otherwise. In this case, your grade will be rounded down after the first decimal place.

1.3.5 Repeating an Examination

Failing an examination Failing an examination for the first time automatically registers you for a re-examination. In case there are multiple partial examinations for the same module, you are only required to repeat the failed ones; this counts as a single re-examination. The type of re-examination may differ from the original examination. It may be impossible to repeat an examination without repeating the entire module. Details for re-examination requirements will be specified in the module description.

An examination is considered failed in the following cases:

- a passing grade is not achieved,
- if you do not take part in an examination you are registered for without properly withdrawing from it,
- you attempt to cheat or interfere with the examination.

Withdrawing from an examination You can ask to postpone an examination if exceptional circumstances hinder you to prepare or attend the examination. If you can not attend an exam because of physical or mental health problems, make sure to bring a doctor's certificate. In all cases, the Examination Committee will decide about how to proceed in your specific case.

Second re-examinations A second re-examination will be allowed for up to *two* modules upon request to the Examination committee within one month after being informed about the failed re-examination. After two requests, a second re-examination is only possible in the case of a submitted hardship, which needs to be comprehensively justified. In all cases, a request for a second re-examination needs to specify all previous second re-examinations.

In the case of multiple partial examinations for the same module, it counts as a single re-examination if some of them are retaken.

If a second re-examinations is failed or not allowed in the first place, then a module is failed definitely and cannot be retaken.

2 Your Master thesis

2.1 General Information

The master thesis is where you demonstrates that you are able to work independently on a mathematical topic, produce some amount of individual content, work within a given time frame, and to present the results according to scientific standards.

Starting with your Master thesis The topic of the master thesis may be suggested by a lecturer or other chosen staff members of your study program. The Examination Committee can allow other supervisors. The topic can be changed *once* during the first two months after registering that you are writing the thesis, and the elapsed time will be refunded.

You can register for your master thesis once you acquire at least 75 ECTS credits total. This is done via a written request to the Examinations office, which specifies the desired topic and supervisor. After the Examination committee approves the registration, the topic of the thesis will be formally assigned. This process usually takes no longer than two weeks.

It is possible to write a master thesis as a group if one can clearly evaluate the contribution of each group member to the master thesis. The evaluation of the contribution of a single group member is unaffected by possible issues/shortcomings of the contributions of other members.

Furthermore, one does not have to be a registered student during the entire duration of writing the master thesis. After finishing all modules, if you have already registered for the thesis, you no longer have to maintain active student status. Students may exmatriculate from the university before turning in the thesis.

Finishing your master thesis After registering for the thesis, you will be allowed no more than six months to work on it, reaching a total workload of 900 hours. Under reasonable circumstances, the deadline may be extended up to three months via a request to the Examination Committee. The request must contain a statement by your supervisor and has to be handed in up to four weeks before the deadline. Illness needs to be proven with a doctor's certificate.

You must submit *three* printed copies of your thesis to the Examination Committee and send an additional electronic copy (as a PDF file) to studienamt_fmi(at)listserv.uni-jena.de.

Please use an 11pt or better 12pt font. You should also use borders of approximately 40mm on the left, 20mm on the right and 30mm on the top and bottom.

The printed copies need to be bound (do not use coil binding!) and in DIN A4 format. You may choose to use one- or two-sided page printing.

If necessary, students may attach digital media to the printed copies using electronic media storage.

Your thesis must include a statement that all content has been written yourself, and that all sources have been appropriately cited.

After handing in your master thesis Your master thesis will be independently reviewed and graded by your supervisor and an additional examiner chosen by the Examination Committee. Under normal circumstances, you will receive the average of the grades these individuals determine.

In the exceptional case that their evaluations differ greatly, to ensure a fair grading, a third examiner will review your thesis once more and your final grade will be the median of all three grades.

Shortly before or after the completion of your thesis, your advisor may ask you to give a talk presenting a summary of the results.

For more information on grades see the corresponding section.

2.2 Content and Structure

The following general notes are important to keep in mind:

- It is discouraged to write an unnecessarily long thesis.
- The quality of your writing, i.e. your usage of language matters greatly.

The master thesis must consist of the components specified below. Each component must start on a new page. The components marked with an asterisk (*) need to have the specified heading.

1. Title page

2. Abstract The abstract summarizes the content of the thesis in less then half a page and contains the main terms (keywords) used in the thesis.

3. Contents * The table of contents includes all section headings and their corresponding numbering, as well as the titles of components 4, 6 and 7. It may be followed by an index of symbols or abbreviations.

4. Preface The preface is not numbered and may be omitted. It discusses the purpose of the thesis and how the results influence the subject matter. It may also include acknowledgments.

5. Body This is the main part of the thesis. The different levels of subsections are numbered using decimal numbers separated by dots (i.e. 2., 2.13., 2.13.1. etc.). Quoted content needs to be marked and cited in the bibliography or the foot notes. Annotations can be made in the foot notes or in an additional component directly after the body.

6. Bibliography * You need to list all sources that were used in any way for writing your thesis in lexicographical order without making the individual items unnecessarily comprehensive. You can make individual sections for different kinds of literature, like monographs, journals etc.
The body of your bibliography should look similar to the following example:

(1) S. Axler. Down with determinants! *American Mathematical Monthly*, 102:139–154, 1995

(2) F. W. Lawvere. An elementary theory of the category of sets. *Proceedings of the National Academy of Sciences of the U.S.A.*, 52:1506– 1511, 1964

(3) S. Mac Lane. *Mathematics: Form and Function*. Springer, New York, 1986

Transliterations are used in place of Cyrillic writing (ask in the library).

7. Appendices * The appendices can contain various additional content including tables, graphics, programs and software documentations. The content should be numbered accordingly.

8. Statutory Declaration You must finish your master thesis with a statutory declaration:
"I declare that I have developed and written the enclosed Master Thesis completely by myself and have not used sources or means without declaration in the text. Any thoughts from others or literal quotations are clearly marked. The Master Thesis was not used in the same or in a similar version to achieve an academic grading or is being published elsewhere."

3 Completing the master program

After achieving 120 ECTS credits according to the rules specified in Section 1.1, you have successfully completed the master program. You will receive a grade certificate within approximately four weeks of the completion of your studies.

The grade certificate includes the topic of your master thesis, the name of all completed modules with the corresponding ECTS credits and grades earned in each (transcript of records).

In addition, you will receive a document (Master certificate) certifying that you are awarded the degree of a Master of Science. The Master certificate and transcript of records are issued in German and English. Moreover, you will obtain an EU diploma supplement in both languages.

4 Links

- Friedolin - the Campus Management System of the FSU Jena. It provides module descriptions and schedules of classes. You have to use it for registering for modules and examinations
- Language Center

valid starting winter term 2020/21

Standard Study Plan: M.Sc. Mathematics

Sem.	Area I: Pure Mathematics	Area II: Applied Mathematics	Area III: Minor Subject, German, Key Qualifications (ASQ)	Area IV: Master thesis	CP / Sem.
	69 CP		21 CP	30 CP	
1.	Pure Mathematics 18-51 CP (incl. 1 or 2 seminars)	Applied Mathematics 18-51 CP	Minor Subject 12-18 CP		30
2.			German (for international students) 0-21 CP		30
3.			ASQ 3-9 CP		30
4.				Master thesis 30 CP	30
CP	**18-51**	**18-51**	**21**	**30**	**120**

The allocation of modules is individual. More information on possibilities can be found in the "Allgemeine Bestimmungen" (German) and the "Study Guide" (English).

Area			
	I: Pure Mathematics	Topics are: Algebra/Number Theory; Analysis; Geometry	You have to choose at least 1 and at most 2 seminars. Topics can be chosen freely.
	II: Applied Mathematics	Topics are: Numerical Analysis / Scientific Computing; Optimization; Stochastics; Theoretical Computer Science	
	III: Minor Subject, German, ASQ	At least 12 CP are required for a minor subject and 3 CP for key qualifications. Students without sufficient German language skills can use all 21 CP for German language courses.	
	IV: Master thesis	You can register for your Master thesis after acquiring 75 CP.	