

# Study Programmes

## Master of Science Mathematics



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April 15th, 2025



# What to Expect in the Next Hour

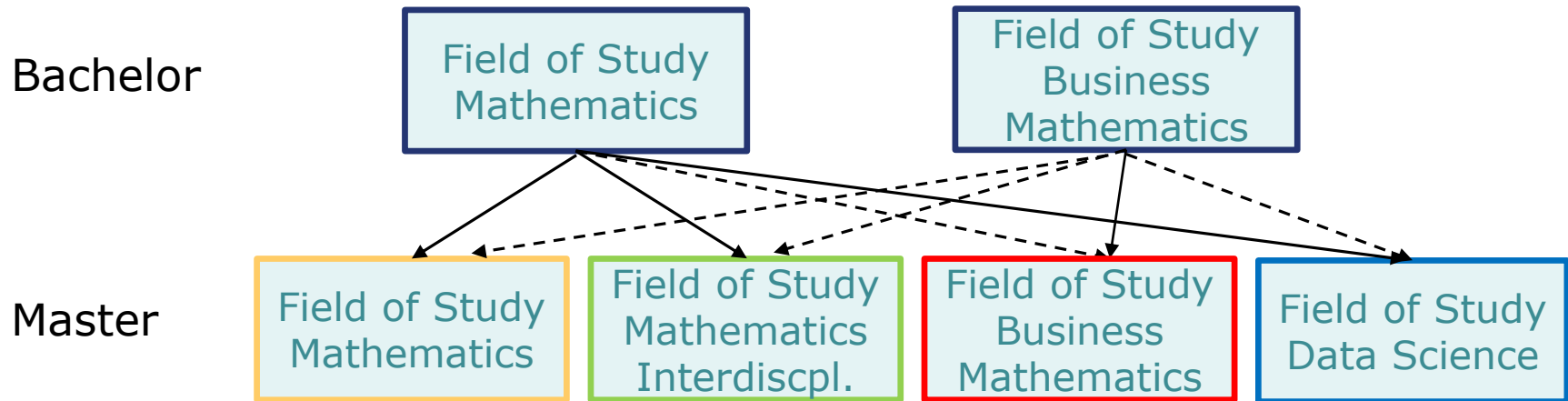


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- STUDY PROGRAMME AND FIELD OF STUDY
- MODULES IN THE MASTER'S PROGRAMME
- MODULES, REGISTRATION & EXAMS
- EXAMINATION PLAN
- SUPPORT

# STUDY PROGRAMME AND FIELD OF STUDY

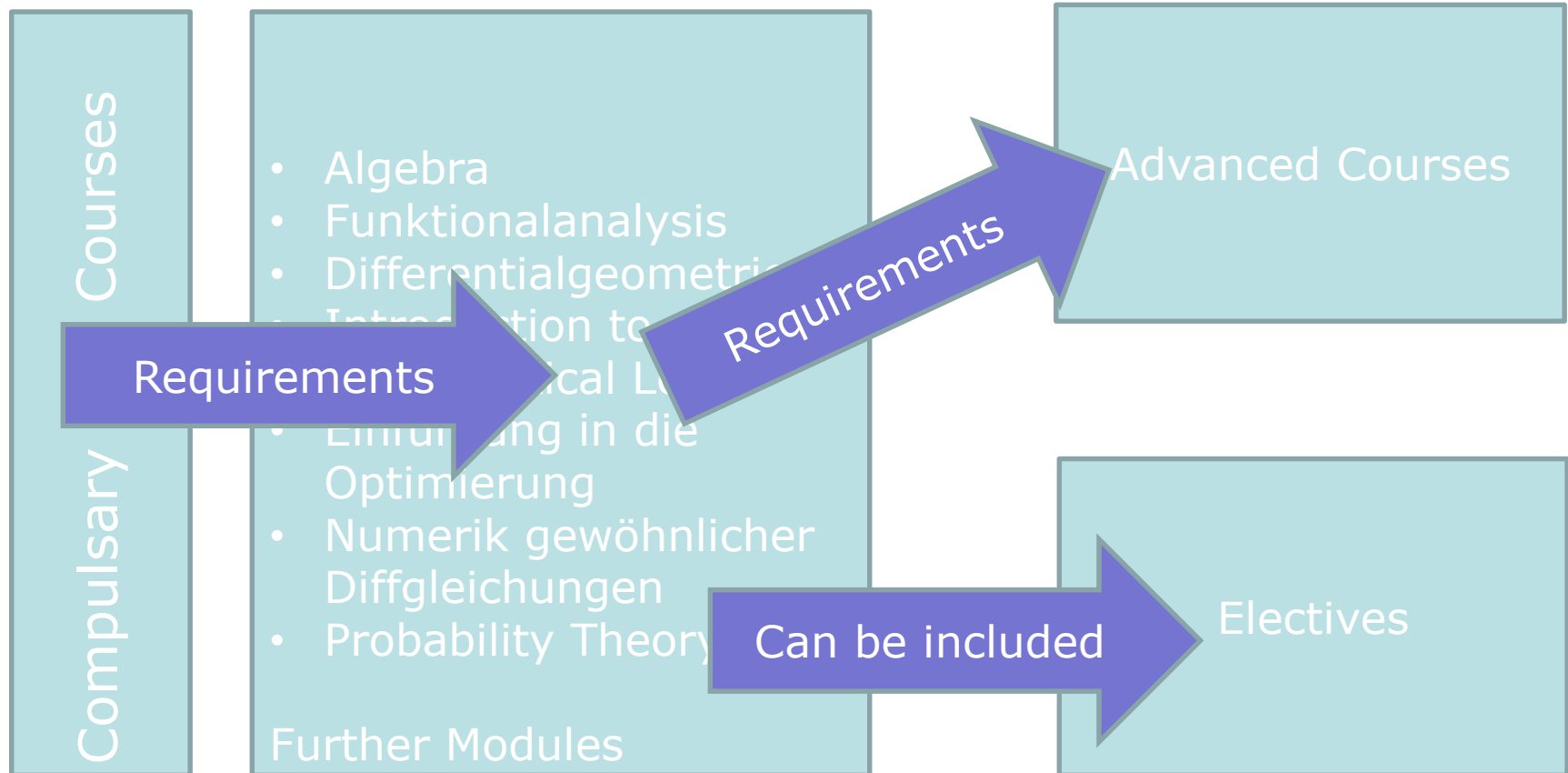
# Overview Bachelor/Master of Science Study Programmes



# Structure Bachelor-Master

## Bachelor

## Master



# Master PO 2024: Study Programme/Field of Study



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## Mathematics Mathematics

- 2 Advanced Courses in Mathematics

## Mathematics Business Mathematics

- 1 Advanced Course in Mathematics, 1 Advanced Course in Economics

## Mathematics interdisciplinary

- 1 Advanced Course in Mathematics, 1 non mathematical Advanced Course

## Mathematics Data Science

- 2 Advanced Courses (Data Science) in Mathematics

# Advanced Courses

## Research Areas in Maths



- Algebra (alg)
- Analysis (ana) and Analysis (Data Science)
- Geometry and Approximation (geo)
- Logic (log)
- Numerical Analysis (num) and Numerical Analysis (Data Science)
- Optimization (opt) and Optimization (Data Science)
- Probability and Statistics (sto) and Stochastics (Data Science)





# Study plan Mathematics



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2 Advanced courses	36 CP
2 Seminars/Projects	10 CP
Electives	39 CP
Programme related courses	31 – 34 CP
Additional courses in Mathematics	14 – 25 CP
Minor	9 – 20 CP
Interdisciplinary Courses	5 – 8 CP
Interdisciplinary Electives	0 – 3 CP
Studium Generale	5 – 8 CP
Master's Thesis	<u>35 CP</u>
	120 CP

# Study plan Mathematics



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1. Sem	2. Sem	3. Sem	4. Sem
2 Advanced Course Mathematics, each 18 CP			Master's Thesis, 30 + 5 CP
Electives (Maths), 14-25 CP			
Minor, 9-20 CP		2 Seminars each 5 CP	
Interdisciplinary Courses, 5-8 CP			

# Study plan Mathematics: Minor



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## Three options:

- **Minor Intermediate:** Minor at Master's level; sufficient selection in English e.g. in Economics, Computer Science, Physics
- **Minor Basic:** Minor at Bachelor's level; usually taught in German
- **Additional Courses in Mathematics** on Master's level (not 3rd year Bachelor's courses!)

# Study plan Business Mathematics



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1 Advanced course opt/sto	18 CP
1 Seminar/Project opt/sto	5 CP
Electives	62 CP
Programme related courses	54 – 57 CP
Additional courses in Mathematics	18 – 28 CP
Advanced course in Economics	22 – 32 CP
Minor (Business Admin+Econ)	7 – 17 CP
Interdisciplinary Courses	5 – 8 CP
Interdisciplinary Electives	0 – 3 CP
Studium Generale	5 – 8 CP
Master's Thesis	35 CP
	<hr/>
	120 CP

# Study plan Business Mathematics



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1. Sem	2. Sem	3. Sem	4. Sem
Advanced Course Mathematics, 18 CP (Optimization or Stochastics)			Master's Thesis, 30 + 5 CP
Electives (Maths), 18-28 CP			
Minor, 7 - 17 CP (Business Admin+Econ)		Seminar, 5 CP	
Non-mathematical Advanced Course, 22-32 CP (Economics) incl. Seminar			
Interdisciplinary Courses, 5-8 CP			

# Study plan Business Mathematics: Minor



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## Minor intermediate in Business and Computer Science:

- Modules from the [Business Information Systems](#) study programme
- Modules from the [Bachelor Computer Science](#) study programme
- Modules from the [Master Computer Science](#) study programme

# Study plan Mathematics Interdisciplinary



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1 Advanced course	18 CP
Seminar/Project	5 CP
Electives	62 CP
Programme related courses	54 – 57 CP
Additional courses in Mathematics	18 – 28 CP
Advanced non-mathematical course	22 – 32 CP
Minor	7 – 17 CP
Interdisciplinary Courses	5 – 8 CP
Interdisciplinary Electives	0 – 3 CP
Studium Generale	5 – 8 CP
Master's Thesis	35 CP
	<hr/>
	120 CP

# Study plan Mathematics Interdisciplinary



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1. Sem	2. Sem	3. Sem	4. Sem
Advanced Course Mathematics, 18 CP			Master's Thesis, 30 + 5 CP
Electives (Maths), 18-28 CP			
Minor, 7 - 17 CP		Seminar, 5 CP	
Non-mathematical Advanced Course, incl. Seminar 22-32 CP			
Interdisciplinary Courses, 5-8 CP			



# Study plan Mathematics Interdisciplinary: Minor



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- **Minor Intermediate:** Minor at Master's level; sufficient selection in English eg. in Economics, Computer Science, Physics
- *Can but does not have to* be from the same discipline as the non-mathematical Advanced Course

# Study plan Mathematics in Data Science



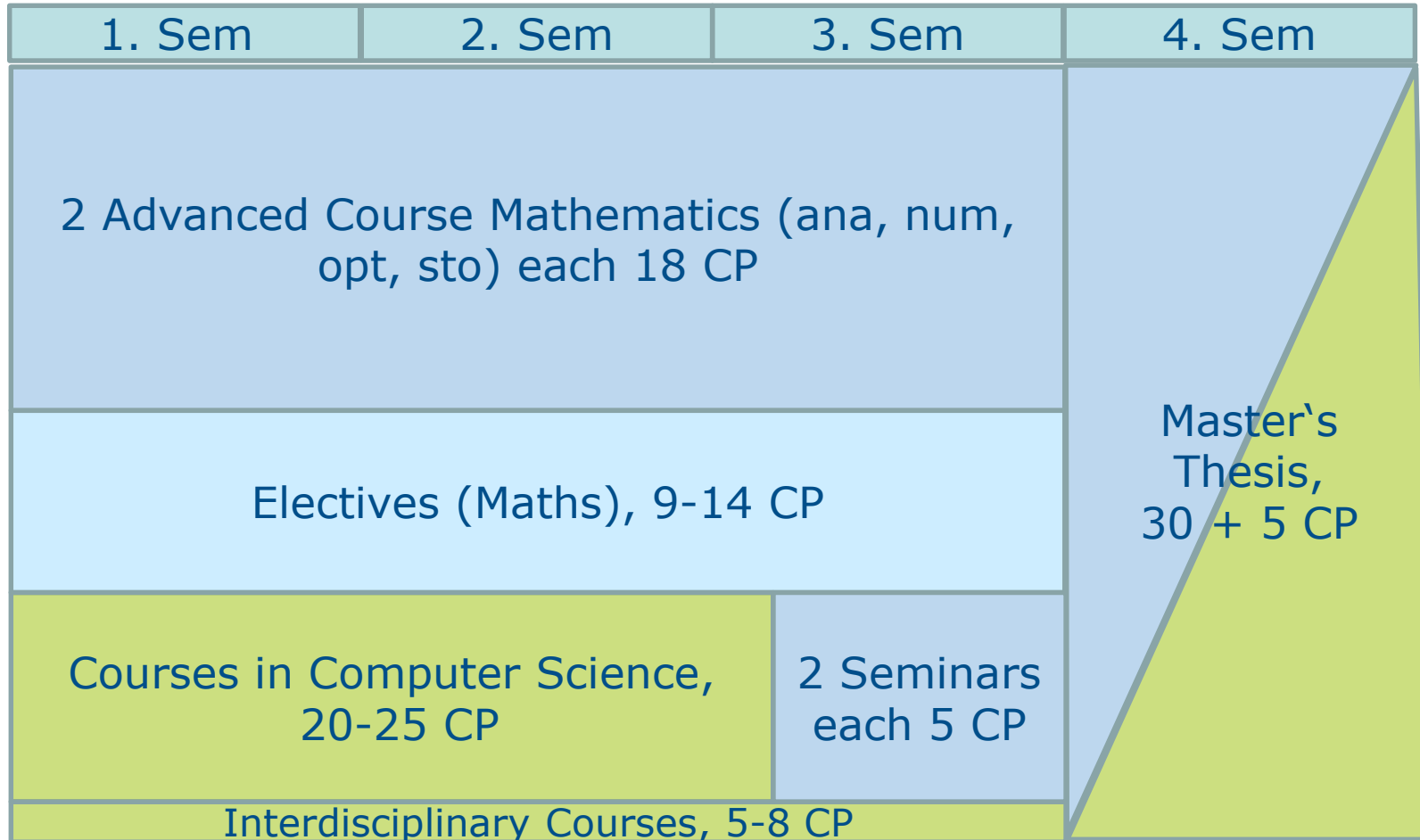
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2 Advanced courses	36 CP
2 Seminars/Projects	10 CP
Electives	39 CP
Programme related courses	31 – 34 CP
Additional courses in Mathematics	9 – 14 CP
Courses in Computer Science	20 – 25 CP
Interdisciplinary Courses	5 – 8 CP
Interdisciplinary Electives	0 – 3 CP
Studium Generale	5 – 8 CP
Master's Thesis	35 CP
	120 CP

# Study plan Mathematics in Data Science



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# Study plan Mathematics in Data Science: Advanced Courses



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	SoSe 25	WiSe 25/26	SoSe 26	WiSe 26/27
<b>Analysis</b>	PDE II/2 Data Assimilation for Fluid Dynamics Machine Learning for Fluid Dynamics	Partial Differential Equations 1		Partial Differential Equations 1
<b>Num Analysis</b>		Numerics for PDEs with Uncertain Data	Efficient Methods for Data Assimilation Scalable Linear Solvers for Data Science	
<b>Optimization</b>	Discrete Optimization	Optimization in Machine Learning Non linear Optimization	Discrete Optimization First-order methods for optimization in data analytics	Optimization Methods in Data Science Non linear Optimization
<b>Stochastics</b>	Mathematical Statistics	Statistical Theory of Deep Learning		Mathematical Statistics

# Study plan Mathematics in Data Science: Minor



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Minor intermediate Computer Science: From a catalogue of selected courses regarding Data Science



# Minor

The four fields of study differ in terms of the **minor**:

- There are three options in **Mathematics**:
  - Minor at Bachelor's level (usually only possible in German)
  - Minor at Master's level
  - Additional Mathematics Master's modules

You must commit to one of the three options. You can apply to change once.

- In **Mathematics Interdisciplinary**, a minor at Master's level must be chosen
- In **Business Mathematics**, business modules at Master's level or computer science modules must be selected.
- In **Data Science**, Master's modules from Computer Science must be selected

# Minor

[My TUCaN](#) | [Course Catalogue](#) | [Schedule](#) | [Courses](#) | [Examinations](#) | [Service](#) | [App](#)



[My Modules](#)

[My Courses](#)

[My Elective Subjects](#)



[My Modules](#)

[My Courses](#)

[My Elective Subjects](#)

[Registration](#)

[My Current Registrations](#)

## Electives

### Studies M.Sc. Mathematics Field of Study Mathematics (2024) for

[Select studies and semester](#)

[My TUCaN](#) | [Course Catalogue](#) | [Schedule](#) | [Courses](#) | [Examinations](#) | [Service](#) | [Application](#) | [Help](#) |

## Electives

### Studies B.Sc. Mathematik / Mathematik (2018) for

[Select studies and semester](#)

Studium:

[Select minors and specializations](#)

#### Programme-related Courses ( 2)

Compulsory Elective Mathematics Courses

[Minor basic](#)

#### Minor basic ( 1)

[Minor basic in Economics \(2020\)](#)

# MODULES IN THE MASTER'S PROGRAMME



# Advanced Courses in Mathematics

- Core of the Master's programme
- Enables the preparation of the Master's thesis
- The Advanced Course is a container module with 18 CP: combination of 2 - 4 Master's lectures, each with either 5 or 9 CP
- There are no exams for individual lectures; combined oral exam for all 2-4 lectures, possibly with several examiners
- Prerequisites and recommendations on the website
- For non-mathematical Advanced Courses (Maths interdisciplinary or Business Maths), the rules on the website apply



# Seminars

- Seminars are Study Examinations that are not graded
- In the Field of Study Mathematics and Data Science, two seminars from different research areas must be taken. These do not necessarily have to be the same as the Advanced Courses.
- In the Field of Study Data Science they must be from ana, num, opt or sto.
- In the Field of Study Business Mathematics, one seminar from opt or sto must be completed
- In the Field of Study Mathematics interdisciplinary, one seminar from any research area must be taken

# Electives in Mathematics

- Lectures either from the **Bachelor's elective area** (if not yet taken) or from the **Master's lectures** that were not taken for the Advanced Course(s)
- Examinations, oral or written, for the individual lectures
- For the Field of Study *Business Mathematics*: at least 9 CP must be taken from Optimization if the Advanced Course is in Stochastics, or vice versa
- For the Field of Study *Mathematics Interdisciplinary*: at least 9 CP must come from an area other than the Advanced Course

# Interdisciplinary Courses

- **Interdisciplinary Electives:**
  - Non-Academic Internship (a professor must confirm that the internship was sufficiently mathematical)
  - Holding Exercise Classes
- **Studium Generale:**  
All modules that are not mathematics or minor subjects, and language courses at the Language Centre

The grades of the interdisciplinary area are not included in the overall grade calculation, the CPs are included in the 120 CP.

# Master's Thesis

- Should (but does not have to) come from one of the Advanced Courses
- In *Data Science* it must be *Data Science* related
- In *Business Maths* it must come from either *sto* or *opt*
- It is also possible to write the Master's thesis in the non-mathematical Advanced Course. Please clarify this in advance, both with the other department and in mathematics!
- You do not have to register on Tucan or take an exam for the Research Project Preparation module. It is automatically booked when you register for the Master's thesis

In transition from the German to the English Master:

- All advanced courses are also offered in English
- If the module is described as "German, English if required", the course will be held in English as soon as a student requests it in English

## Read the Regulations!

in particular due to content-related constraints in elective areas, e.g. the requirements for the CPs for each category

If in doubt, do not hesitate to ask!

# MODULES, REGISTRATION & EXAMS



# Registration for Modules

Required registrations:

1. For the module
2. For the course
3. For the Technical Exam and/or Study Exam

Then you can:

- Choose an Exercise Class
- Get access to the moodle course ←
- Check the results of the exams

For questions regarding  
moodle please turn to  
your lecturer!

Registration for modules and exams via [TUCaN](#)



[Access to the registration](#): in September (winter semester) or March (summer semester)

- **Study Examinations** (“Studienleistung”):  
Can be repeated as often as necessary, must "only" be passed  
Examples: Seminars, in some (Bachelor's) lectures completion of exercises as a prerequisite for subject examination
- **Technical Examination** (“Prüfungsleistung”):  
limited repetition, graded, grades determine the final grade with few exceptions  
Examples: written exams, oral exams for the Advanced Courses, Master's thesis

# Registration for Exams

- If a lecture module includes **Study Exams** (Bachelor's Electives), you must register for the Study Exam of the module in question in addition to the Technical Exam
- When registering in TUCaN, you can see which modules also include Study Exams in addition to the Technical Exam
- Please note that it is also necessary to register for the Study Exam if the lecturer does not check the Study Exam (usually x per cent of the homework) separately
- Important: In contrast to the registration for a Technical Exam, registration for a Study Exam is only possible in the semester in which the course takes place



# Registration and Deregistration for Exams



- Planned [registration period](#):

Winter semester: mid-November - mid-December

Summer semester: June

Dates can be viewed on the website!



- Registration via Tucan

# Appointments for Oral Exams

There are a number of oral examinations in the Master's programme:

- in the **Advanced Modules** area: all examinations are oral

	Vc	Fa	St	Pr	Nc	Dä	Gr	Gr	Se	...
<b>1. Advanced Courses in Mathematics</b> (Type § 30(5) limited to a single justifiable change) One specialisation module each from two different fields of research must be chosen (18 CP each). The contents of the respective specialisation module are agreed between students and examiners individually. In general, the contents of the respective area of specialisation consists of the module contents with the total of 12 contact hours per week which are distributed as follows: (2x(4+2) or 1x(4+2)+2x(2+1) or 4x(2+1))										
04-13-0103/en	Advanced Course in Algebra									
	Refer for instance to course catalogue: Catalogue M.Sc. Mathematics: Algebra									
04-13-0111/en	Advanced Course in Analysis									
	Refer for instance to course catalogue: Catalogue M.Sc. Mathematics Analysis									
04-13-0105/en	Advanced Course in Geometry and Approximation									
	Refer for instance to course catalogue: Catalogue M.Sc. Mathematics: Geometry and Approximation									
04-13-0107/en	Advanced Course in Mathematical Logic									
	Refer for instance to course catalogue: Catalogue M.Sc. Mathematics: Mathematical Logic									
<b>3.1.1 Additional Courses in Mathematics</b> (Type § 30(6) with unrestricted module change) Before first registering for a module from this area, an attentive Study and Examination Plan must be presented to the Examination Board. Modules with recommendation "Mathematics: Master" according to the Modules Handbook: Refer to catalogue listed under M.Sc. Mathematics Modules from the Compulsory Elective area Mathematics of the B.Sc. Mathematics (field of study Mathematics) with recommendation "Mathematics: Bachelor academic year 3" according to the Modules Handbook: Refer to catalogue listed under B.Sc. Mathematics: Academic year 3 Additional modules subject to approval by Departmental Council (Fachbereichsrat)										
<b>3.1.2 Courses in a Minor or Additional Courses in Mathematics</b> (Type § 30(4) limited to a single justifiable change of minor) Exactly one of the three following options can be chosen (9-20 CP each): - a minor intermediate (only if required prior knowledge can be demonstrated) - a minor basic - additional mathematics modules at Master's level (at least 9 CP from research areas distinct from the two selected Advanced Courses)										

# Appointments for Masters' Modules



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- Please **check with the examiners** by the end of the lecture period: **How and when** the examination dates are set
- **Register in Tucan** for the exam
- Please **contact the examiner** directly for an appointment

# Appointments for Advanced Courses

An Advanced Course in the Master's programme covers several lectures.

For this reason, no examinations need to be registered for and/or taken for the individual lectures.

You register for the Advances Course and the examination (18CP) if you

- ...have agreed on the examination content with the examiner

- ...have proved to the examiner that these contents are different from courses that you would otherwise take in the Master's programme or have previously taken in the Bachelor's programme

- ...have attended the relevant courses

# Appointments for Advanced Courses

An additional **confirmation of registration** must be requested via the contact form in the Office for Student Affairs .

Please use this form to contact your examiner to **arrange an appointment for the exam**. The completed and signed appointment form must be submitted to the Office for Student Affairs no later than one week before the examination date.



# Confirmation of Registration for an Oral Module Examination



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Office for Student Affairs  
Department of Mathematics



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Herewith, we confirm that Mr/Ms/Mx

\_\_\_\_\_  
Name, first name, student registration number of examinee

has properly registered for the oral examination of the module  
*04-13-0103/en Advanced Course in Algebra*

\_\_\_\_\_  
Module title

(18 CP)

within the degree programme  
*M.Sc. Mathematics (2018)*

\_\_\_\_\_  
Degree programme/field of study, version of examination regulations (PO)

(as stated below).

This is the 2<sup>nd</sup> retake examination and must be held by 2 examiners.

Office for Student Affairs of Mathematics,  
represented by

3.07.2024 G. Bartsch

\_\_\_\_\_  
Date (dd/mm/yyyy), signature, stamp



## Fixing date and time for an oral module examination

Herewith, I confirm that I have fixed the following date and time with the above-mentioned examinee for the above-mentioned oral examination:

01/10/2024, 11:00 - 12:00, S2|15-413

Date (dd/mm/yyyy), time (from - to) and examination room

Tick (check) only, if examination date is NOT during the lecture-free period:

- Examination is scheduled for immediately after the registration phase (*possible reason: subsequent stay abroad*)
- Examination is scheduled for 1<sup>st</sup> week of lectures (*possible reason: Examiner is not available towards the end of the lecture-free period*)
- Examination is scheduled for 2<sup>nd</sup> week of lectures (*please state reason*):

Reason for scheduling examination for 2<sup>nd</sup> week of lectures

**Examinations scheduled for 3<sup>rd</sup> week of lecture and later must be approved separately as a separately scheduled examination date!**

Signed by examiner:

\_\_\_\_\_   
 Date (dd/mm/yyyy), name and signature of examiner

Please hand in fully completed and signed form at least one week before the scheduled examination (by 30 September (summer semester) / 31 March (winter semester) at the latest) at the Office for Student Affairs of Mathematics.

If a registered examination is not scheduled in due time using this form, you will be deregistered automatically (ex officio) at the end of the semester (30 September / 31 March).

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**Only for specialisation examinations in the M.Sc. study programmes**

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The registered and scheduled examination as stated overleaf is a specialisation examination in the field of

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Algebra | <input type="checkbox"/> Numerical Analysis |
| <input type="checkbox"/> Analysis           | <input type="checkbox"/> Optimisation       |
| <input type="checkbox"/> Geometry           | <input type="checkbox"/> Stochastics        |
| <input type="checkbox"/> Mathematical Logic | (18 CPs)                                    |

The examination includes the contents of the courses stated below as per modules handbook

04-10-0222 Algebraic Geometry

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04-10-0589 Algebraic Geometry II

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and, in addition, the contents listed below:

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I affirm that the contents mentioned above have not been included elsewhere in my final Bachelor's qualifications or will not be included in my final Master's qualifications. Any possible overlap, as listed below, I have presented to the examiner:

# Special Examination Date


Under certain conditions, a [special examination date](#) can be requested, in some cases outside the examination periods:

- stay abroad/internship
- prolonged illness
- last examination before graduation
- module is offered for the last time

First clarify with your [examiner](#) whether he/she is willing to offer you a separate examination date. Then request the application form at the Office for Student Affairs . After you have filled it out completely and the examiner has signed it, send the form back to the Office for Student Affairs . The application will be submitted to the [examination board for approval](#).

If you are unsure whether your special examination application has a chance of success, you can contact the Coordinator of Student Affairs

# And Deregistration for Exams

- **Deregistration** from an exam is permitted **up to 8 days** before the exam without providing a reason
- Usually via TUCaN: <https://www.tucan.tu-darmstadt.de> 
- During the week before the exams: In case of **illness**:  
Deregistration only with a medical certificate, to be submitted within three calendar days of the examination date - always to the Maths Office for Student Affairs (*Studienbüro*)
- **Oral Examinations**: *must* be deregistered via the Office for Student Affairs  
Make sure to inform your examiner!



# Retaking an Exam (APB Sections 30 - 32)

„It is only possible to re-take an exam that you have passed in very few cases.“

→ In most cases: No improvement of grades!

„The **second retake** examination of a written technical examination can take place orally if the examiners and candidate agree to this arrangement.“

„ If requested, an **oral supplementary examination** can be taken in an examination failed in the second retake; this is possible only once per degree programme.“

→ „mEP“, only the grades 4.0 or 5,0 are possible



# Module Change

## Areas with unrestricted module change options

### (§ 30, 6 APB)

- It is possible to change as long as the module are not definitively failed
- It may lead to a prolonged time of study

- > Electives Mathematics
- > Interdisciplinary Courses
- > Studium Generale



# Module Change

## Areas with restricted module change options

### (§ 30,4 APB)

- Change is possible once with a good reason, approval of examination board is required
- It may lead to a prolonged time of study

- > Advanced Courses
- > Minor

# EXAMINATION PLAN

# Examination Plan (-> Downloads)



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## Examination Quest / Request for certificate



### Master of Science Mathematics PO 2024 – As of September 2024

Voluntary plan       Minor plan       Request for certificate

Name, first name

Student ID number

Field of study:  Mathematics       Business Mathematics       Mathematics Interdisciplinary  
 Mathematics in Data Science

	Module Nr.	Titel	Area	CI
M.Sc. Thesis + Introd. Scientific Work		<i>Fill in area only</i>		35
Advanced Course 1		<i>Fill in area only</i>		18
Seminar 1		<i>Fill in area only</i>		5
Advanced Course 2		<i>Fill in area and credit points only</i>		
Seminar 2		<i>Fill in area and credit points only</i>		



# Examination Plan

- If you completed your **Maths Bachelor's degree at the TU**, you have already submitted the examination plan with your certificate application.
- If you completed your **Bachelor's degree at another university** or in **another subject**, you must submit a complete first examination plan together with a transcript of records for your Bachelor's degree at the start of your Master's programme.
- For the **non-mathematical specialization** in Mathematics interdisciplinary (except computer science, physics, economics), the department offering the minor subject must confirm the choice of modules
- Any different choices in the area of minor or non-mathematical specialisation require the approval of a new minor study plan.

# SUPPORT

# Tips and Advice

- Attend all the lectures and regularly
- Do the exercise sheets
- Look for study groups
- Connect with your fellow students
- Find the right amount of CPs for you
- Read your emails, the information in Moodle and on the web pages
- Register for the exams in time
- Seek contact with the professors
- Have a life outside of your academic studies

If in doubt ask for help

# Office for Student Affairs etc.

## Office for Student Affairs:

- Mrs Bartsch 06151 16 21442
- Contact Form: [https://www.mathematik.tu-darmstadt.de/studium/studienbuero\\_und\\_studienberatung/studienbuero\\_studienberatung.en.jsp](https://www.mathematik.tu-darmstadt.de/studium/studienbuero_und_studienberatung/studienbuero_studienberatung.en.jsp)
- Office Hour:
  - In person: wednesdays, 10 – 12 am, room S2 15/243
  - Online office hour via Zoom (meeting-ID: 878 8431 6072, code: 099818) tuesdays, 10 – 11 am



# Office for Student Affairs etc.

## Foreign Exchange Coordinator:

- Tara Rensch-Hewitt 06151-16 21441
- Email: [rensch-hewitt@mathematik.tu-darmstadt.de](mailto:rensch-hewitt@mathematik.tu-darmstadt.de)
- Office Hours:
  - In person: tuesdays, 9.30 - 11 am, room S2 15/233
  - Zoom: Wednesdays, 10 – 11 am

## Coordinator of Student Affairs:

- Cornelia Seeberg 06151-16 21441
- Email: [seeberg@mathematik.tu-darmstadt.de](mailto:seeberg@mathematik.tu-darmstadt.de)
- Office Hours:
  - In person: thursdays, 2-4 pm, room S2 15/241
  - Zoom: mondays, 2–4 pm



# Office for Student Affairs etc.



**Dean of Studies:** Professor Martin Otto  
otto@mathematik.tu-darmstadt.de

**Chairman of the examination board:** Professor Ulrich Reif  
reif@mathematik.tu-darmstadt.de

**Fachschaft** (departmental student body):  
fachschaft@mathematik.tu-darmstadt.de