

# MATHEMATICS FOR MACHINE LEARNING

PROF. ULRIKE VON LUXBURG, WINTER TERM 2026/27

## General information (as of 14. September 2026)

### Lectures

Lectures start in the week of Oct. 12.

- Tuesday 10:15 - 11:45, lecture hall A2, Maria-von-Linden-Str. 1
- Thursday 10:15 - 11:45, lecture hall A2, Maria-von-Linden-Str. 1

### Tutorials

There are 3 tutorial groups each week.

- Group 1: Tuesday 8:00-10:00, lecture hall A2, ground floor, Maria-von-Linden-Str. 1
- Group 2: Wednesday 10:00 - 12:00, lecture hall, ground floor, Maria-von-Linden-Str. 6
- Group 3: Thursday 8:00 - 10:00, lecture hall A2, ground floor, Maria-von-Linden-Str. 1

The tutorials and the assignments are organized by two PhD students:

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The teaching assistants are:

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Tutorials take place every week and start in the week of October 19. This is the place where we discuss the weekly assignments and where students can ask questions. In the Ilias course you can find subgroups for the tutorials. The registration for the tutorial groups starts on October 13th at 6pm. The groups will be filled via first-come-first-serve until full. In case you want to change your group later, you need to find another student with whom you can switch groups. Then contact one of the teaching assistants.

## Contents and required skills

**This course is intended for the students of the master program in machine learning.** Depending on your background, (some of) the material might be a recap — or not. Contents of the course are linear algebra, multivariate analysis, optimization, probability theory, statistics. Note that the course requires a solid basis in mathematics, similar to the Mathematics 1 - Mathematics 3 lectures that Tübingen-based students would have attended in our Bachelor program in computer science (which was a pre-requisite to get accepted in our Master ML program). The course is not recommended for students without this background.

## Course material

All material related to the course can be found on the following webpage. This includes general information, videos, slides, assignments, literature etc.

[http://www.tml.cs.uni-tuebingen.de/teaching/2026\\_maths\\_for\\_ml/index.php](http://www.tml.cs.uni-tuebingen.de/teaching/2026_maths_for_ml/index.php)

Some material is password protected, we are going to send you the password by email (after you have registered). Please do not distribute the password-protected material.

# Requirements

To pass the whole course, there are two requirements:

- To be admitted to the final exam, you have to achieve at least 50 % of the points in the weekly assignments, on average over the whole semester.
- You have to pass the final exam (see below).

The final grade is going to be the one of the final exam.

Participants of previous years: if you have participated in the Mathematics for Machine Learning lecture last year (winter term 2025/26) and have passed the criteria for being admitted to the exam, then you will be re-admitted to the exam without re-taking the assignments. If this applies to you, please send us an email that contains your name, study degree, matriculation number before you register for our exam.

# Assignments

For every week there will be an assignment (Übungsblatt) published on Monday. The first assignment will be published on October 19. Your solutions are due on Monday at 12:00 of the next week. Hence, the first assignment is due on October 26, 12:00.

We encourage you to work in groups to solve the exercises. To hand in the exercises, please form groups of two students (that is, two students jointly hand in solutions). Note that both students need to be familiar with all the solutions their group submits, so they can present them in the tutorial sessions. You can use the forum in Ilias to find a partner.

The solution that you hand in should be **a single, hand-written** pdf file per group. The file name should include the exercise number and your last names (an example would be 'Ex01\_Frohnafel\_Guenther.pdf'). Solutions will be handed in on the Ilias platform.

# Using generative AI

The exercises are meant to help you understand the lecture contents and to prepare you for the exam. So please try to solve them yourself, rather than delegating to generative AI. **It is super-important that YOU work on the solutions yourself, to experience to fail through some approaches and succeed by others. YOU need to learn how to distinguish approaches that work and don't work and develop strategies for solving problems. Verifying and understanding LLM-created solutions is not the same as deriving your own solutions.**

If you want scientific evidence, here is a recent study about the fact that watching somebody explain is not the same as working on the problem yourself:

<https://tinyurl.com/pnde9fzm> (Louis Deslauriers, Logan S. McCarty, Kelly Miller, and Greg Kestin: Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom)

As minimal standard, we expect that you have hand-written the submitted solutions yourselves and that you have understood everything that you submit. Solutions that are obviously generated by AI are banned and result in losing the exam admission.

# Exams

To be admitted to the exam, you need to achieve at least 50 % of the points in the weekly assignments, on average over the whole semester. If you got admitted to the exam last year (WS 2025/26), you don't need to re-do the assignments to get admitted. If you got admitted before 2025/26, you need to do the assignments again to get admitted.

There is going to be one exam at the beginning of the semester break and one at the end of the semester break (dates are not fixed yet because they are organized through a centralized process). You can choose yourself which of the two exams you would like to take. But note that there won't be a third exam: if you skip the first

exam and fail the second one, you would need to wait a year to take the exam again.

The general mode for exams is: You are not allowed to bring any material (books, slides, etc) except for what we call the controlled cheat sheet: one side (A4, one side only) of handwritten (!) notes, made by yourself. This cheat sheet needs to be handed in with the exam, but will not be graded.

## Questions and answers

If you have a question, please try not to fire off emails to us right away. Please check our course website that we will regularly update with the newest information, ask your fellow students, or post your question in the Ilias Forum. You can also always approach us after the lecture or during the tutorials.

## Suggestions, feedback, ...

If you have suggestions how to improve the lecture or tutorials, please do talk to us, for example in the Questions and Answer sessions. In case you want to give anonymous feedback, you can use an anonymous online form, the link is on the course webpage.