Mathematics for Machine Learning

Prof. Ulrike von Luxburg, Winter Term 2024/25

General information

Lectures

Lectures start in the week of Oct. 14.

- Tuesday 8:15 - 10:00, lecture hall N04, Morgenstelle
- Thursday 8:15 - 10:00, lecture hall HS 23, Kupferbau

Tutorials

There are 4 tutorial groups each week.

- Group 1: Monday 12:00-14:00, seminar room S227, Hölderlinstraße 12
- Group 2: Monday 12:00-14:00, seminar room S229, Hölderlinstraße 12
- Group 3: Thursday 10:00-12:00, lecture hall 01, Neue Aula
- Group 4: Thursday 10:00-12:00, lecture hall A104, Sand 1

The tutorials and the assignments are organized by two PhD students:
Eric Günther (eric.guenther@uni-tuebingen.de)
Karolin Frohnapel (karolin.frohnapfel@uni-tuebingen.de)

The additional teaching assistants are:
Balázs Szabados (balazs.szabados@student.uni-tuebingen.de)
Devank Tyagi (devank.tyagi@student.uni-tuebingen.de)
Swagatam Haldar (swagatam.haldar@student.uni-tuebingen.de)

Tutorials take place every week and start on October 21 (Monday) and October 24 (Thursday). This is the place where we discuss the weekly assignments and where students can ask questions.

When entering the Ilias course, you will be asked to state your preferences regarding a tutorial. **The registration deadline for the course is October 15. Based on your preferences we will assign you to a tutorial by Friday, October 18.** The results of the assignment will be posted on the course web-page. You need to check this list to know which tutorial session you have to go to.

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, mulitvariate analysis, probability theory, statistics, optimization. Note that the course requires a solid basis in mathematics, similar to our Mathematics 1-3 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/2024_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 2023/24) 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 Friday. The first assignment will be published on October 18. Your solutions are due on Friday at 12:00 of the next week. Hence, the first assignment is due on October 25, 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 **one** pdf file per group (either prepared in latex or handwritten and scanned with high quality). The file name should include the exercise number and your last names (an example would be 'Ex01_Frohnapfel_Guenther.pdf'). Solutions will be handed in on the Ilias platform.

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 2023/24), you don't need to re-do the assignments to get admitted. If you got admitted before 2023/24, 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.