Elements of Machine Learning

17th October 2024

Introduction and Organization

SIC Saarland Informatics Campus

Lecturers

Prof. Dr. Isabel Valera
Lecturer

Dr. Kavya Gupta
Lecturer

The slides are adapted from the previous iteration of EML given by Prof. Dr. Jilles Vreeken and Dr. Krikamol Muandet

Teaching Assistants

Deborah D. Kanubala

TA

Batuhan Koyuncu

TA

Nektarios Kalampalikis

TA

Tutors

- Matthew Chu
- Aiman Abdulaziz Mohammed Al-Azazi
- Camilo Martínez
- Marina Shustova
- Nischal Maharjan
- Sina Mavali
- Alakshendra Jyotsnaditya Ramkrishna Singh
- Sai Suresh Macharla Vasu
- Soham Roy

Tentative Schedule (check CMS for updates)

Lecture Date	Number	Topic
oct 17, 2024	1	Introduction
oct 24, 2024	2	Regression
oct 31, 2024	3	
nov 07, 2024	4	Classification
nov 14, 2024	5	
nov 21, 2024	6	Generalization & Model Selection
nov 28, 2024	7	
Dec 05, 2024	8	Beyond Linearity
Dec 12, 2024	9	Unsupervised I: (Dimensionality Reduction)
Dec 19, 2024	10	Unsupervised II: (Clustering)
		Christmas break
Jan 09, 2025	11	Tree-based Models
Jan 16, 2025	12	SVMs
Jan 23, 2025	13	NNs
Jan 30, 2025	14	ML & Real World
feb 06, 2025	15	Q&A lecture for exam preparation

When

Registration:

- In CMS by November 10th 2024, via https://cms.sic.saarland/eml24/
- In LSF up to one week before the exam.

Lectures:

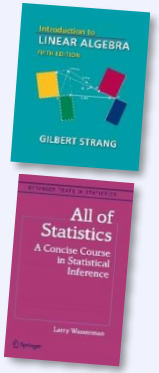
- Every Thursday 16:00 – 18:00 in E.2.2 Lecture Hall 0.01 (Günter Hotz Hörsaal)
- Last lecture: February 6th , 2025

Exams:

- written (English)
- main exam: 14-17h on February 19th , 2025
- re-exam : : 14-17h on March 20th , 2025

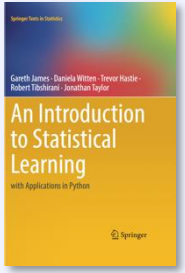
Prerequisites

- Basic programming skills
  - we'll be using Python
- Basic mathematics and proof techniques
  - at least at Bachelor level (CompSci, BioInf, or equivalent)
- Linear algebra
  - if not, read *Introduction to Linear Algebra* by Strang
- Basic knowledge in statistics
  - if not, read *All of Statistics* by Wasserman

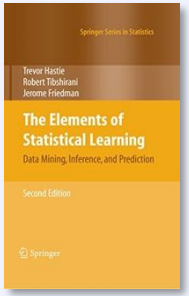


Course Material

An Introduction to Statistical Learning *with Applications in Python*
Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, and Jonathan Taylor
(first edition, 2023, PDF)



The Elements of Statistical Learning
Trevor Hastie, Robert Tibshirani and Jerome Friedman
(second edition, 2009, PDF)



Basic and Advanced

EML is special

- **Basic Lecture** in all updated BSc CS programs
- **Advanced Lecture** for all students in other programs (but MSc Cybersecurity)

You can **only once** receive credits for EML

- either as a Basic Lecture **or** as an Advanced Lecture
- and, only if you did not complete an equivalent course (e.g. ESL)

Credits and Grade

6 ECTS if you

- pass the exam

To qualify for the exam, you need to score

- a cumulative 50% of points over the theory assignments
- a cumulative 50% of points over the practical assignments

Final grade

- best grade out of main or re-exam

Exercise Sheets – Self Assessment

Exercise sheet zero is already available online

- Ungraded
- still time left to prepare

There will be **four ungraded exercise sheets**, that will be released as the course progresses.

- Solutions published the week after the sheet is released
- You are strongly encouraged to **solve them on your own first**
- You can ask us questions during tutorials

Assignments

Five assignments in total

- One assignment approximately every two weeks
- Can be submitted in groups of 2 or individually, register your teams on CMS
- Check CMS for deadline of each assignment

Every assignment contains (total of 50 points)

- Multiple theory questions (40 points)
- One practical question (10 points)

First assignment will be handed out on October 24th , 2024

- Deadline November 13th, 2024

Plagiarism

We do not condone plagiarism

- we want you to solve the assignments
- plagiarism from other sources or teams is not tolerated
- you may of course *consult* other sources, but not simply *copy* solutions
- you need to add a reference to any external source used

We will carefully check for plagiarism in every assignment

- we warn once, second time you're out and reported to exam office

Tutorials

- Four timeslots:

  Monday: 10-12 h
  Monday: 14-16 h
  Thursday: 14-16 h
  Friday: 12-14 h

- Only in-person in HS003 in E1.3
- Select your tutorial preferences by (tomorrow) Friday 18th at 12pm.

In Tutorials

- exercise sheet discussion, questions from students

Communication

I have a question!

1. check the EML CMS, lecture material, and recommended reading first
2. check if your question is not already asked/answered on the Forum
3. if not, post your question in the EML Discourse Forum on CMS

Private Issues

- email to Dr Gupta

Be Nice, Always


Enjoy the ride!