

# The Elements of Machine Learning



19 October 2022



UNIVERSITÄT  
DES  
SAARLANDES



**CISPA**  
HELMHOLTZ CENTER FOR  
INFORMATION SECURITY

# Your Responsible Adults



Prof. Dr. Jilles Vreeken  
lecturer



Dr. Aleksandar Bojchevski  
lecturer

# Your Daily Caretakers



Advait  
Gadhikar  
TA



David  
Kaltenpoth  
TA



Janis  
Kalofolias  
TA



Sarah  
Mameche  
TA

# Tentative Schedule

Oct	27	Bias & Variance
Nov	3	Linear Regression I
	10	Linear Regression II
	17	Classification I
	24	Classification I
Dec	1	Generalization
	8	Model Selection
	15	Moving Beyond Linear
Jan	5	Dimensionality Reduction
	12	Clustering
	19	Trees and Forests
	26	Support Vector Machines
Feb	2	Neural Networks
	9	ML and the Real World



# When

## Lectures

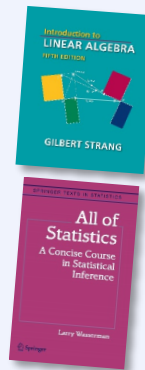
- Thu 16:15-17:45 in GHH E2.2, on Zoom, and on YouTube
- last lecture: **Feb 9, 2023**

## Exams

- written (English)
- main exam on **February 23, 2023**
- re-exam on **March 23, 2023**

# Prerequisites

- Basic programming skills
  - we'll be using Python
- Basic mathematics
  - 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



# Assignment Zero

**Assignment Zero** is already available online

- ungraded self-assessment
- still time left to prepare

You are **strongly** recommended to take it

# Tutorial Zero

**Tutorial Zero** is already available online

- short introduction to Python and Jupyter notebooks

You are **strongly** recommended to check it out

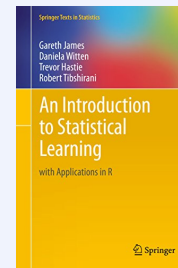


# Course Material

## *An Introduction to Statistical Learning*

Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani

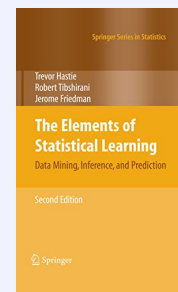
(second edition, 2021, [PDF](#))



## *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

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 based on

- passing 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
- every *three* bonus points improve a *passing grade* by 1/3<sup>rd</sup>
  - six bonus points possible, maximum improvement 2/3<sup>rd</sup>

# Assignments

Every sheet contains

- multiple theory questions
- multiple practical questions
- one bonus question

One sheet every two weeks

- deadline 14:00
- may do individually or in teams of two
- solutions to non-bonus questions posted after the deadline

First sheet handed out on November 3rd

- deadline **November 17<sup>th</sup> 2022**

# Plagiarism

We do not condone plagiarism

- we want you to solve the assignments
- **plagiarism** from other sources or teams **is not tolerated**

We carefully consider every assignment sheet

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

Last year, we officially warned 48 students

- ten were caught twice and expelled from the course

# Tutorials

## Tutorials

- two timeslots: Mon 12-14 (HS 0.01) and Tue 12-14 (HS 0.02)
- hybrid via Zoom, **no recordings**
- **register by Friday, October 28<sup>th</sup> via** <https://cms.cispa.saarland/eml22/>

## Week $n$

- assignment deadline, solutions to non-bonus questions posted

## Week $n + 1$

- recap of previous lecture, discussion of **basic** questions, questions from students

## Week $n + 2$

- recap of previous lecture, discussion of **bonus** question, questions from students

# Communication

I have a question!

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

Private Issues

- email to [eml-tas@cispa.de](mailto:eml-tas@cispa.de)

**Be Nice, Always**

- we are here to help, not to serve – will not answer to rudeness
- use the template “Dear X, ... , Best regards, <You>”