

# MADS-DL – Deep Learning

## Organization

Prof. Dr. Stephan Doerfel



**FACHHOCHSCHULE KIEL**  
University of Applied Sciences



Moodle (WiSe 24/25)

# Agenda

Me

Values, Conduct, Help

Values

Getting Help

Code of Conduct

The Module MADS-DL

# Outline

## Me

### Values, Conduct, Help

- Values

- Getting Help

- Code of Conduct

### The Module MADS-DL

# Hi, there!

Prof. Dr. Stephan Doerfel



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- ▶ Prof at FH Kiel :-)





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- ▶ larger consultations
  - ▶ Office C.12 - 1.31 or Zoom
  - ▶ no regular office hours
  - ▶ preferably, drop a mail first, including topics of discussion



# Outline

Me

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“For us, excellent teaching is  
**interdisciplinary**,  
application-oriented, based on  
research and science, and  
characterised by its  
**internationality** and the  
wide range of methods used.”

---

“Our University  
thrives on diversity.

It creates educational processes  
that are

gender-appropriate,  
intercultural, and  
non-discriminatory.”

# Defending our Democracy Together!

- ▶ *"We condemn in the strongest possible terms the inhuman plans for deportations of individual groups in our society that have come to light and we oppose them resolutely!"* – Björn Christensen (president of FH Kiel) in his mail to colleagues and students, Jan. 24, 2024 (translated from German)
- ▶ In January, a rally was organized in Kiel and called for by various local organizations incl. democratic parties, unions, public service organizations, universities incl. FH Kiel, and many others



# For Diversity



For Diversity - No space for discrimination!



# Agenda

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**Values, Conduct, Help**

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# Getting Help

Here are helpful institutions for support with issues of almost any kind (finance, psyche, family, health, legal, discrimination, sexual harassment, ...):

- ▶ FH Kiel:  [Study Guidance](#)
- ▶ FH Kiel (Diversity Representative):  [Counseling](#)
- ▶ Studentenwerk SH:  [Student Advice Center](#)
- ▶ Allgemeiner Studierendenausschuss der FH Kiel: (ASTA):  [Beratung](#)
- ▶  [Beschwerdestelle der FH Kiel](#)



Feel free to talk to me, colleagues, and fellow students!

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# Code of Conduct for our Sessions

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- ▶ Accept different opinions.

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- ▶ When speaking German, you can say Du to me.
- ▶ Let's agree on first name basis.



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Let's discuss time: session start/end/break!



# Students from other Study Programs

## Welcome!

- ▶ Students from other programs are welcome to the lecture!
- ▶ Please register with me, via email.
- ▶ It is YOUR responsibility to organize all official aspects – proper registration, credits, compatibility with you program, . . .
- ▶ Check with the examination office, organizers of your program of studies

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- ▶ no sample solutions!

---

“But one learns from books and  
reels only that certain things  
can be done.

Actual learning requires that  
you do those things.”

---

Prince Farad'n Corrino (in Frank Herbert's "Children of Dune")

# Active Participation



Active participation is the best way to prepare for becoming a data scientist in real life (and for the exam).

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Download notebooks before the lecture starts.  
Follow and comment them, while we discuss them.

# Effort and Time

Workload	By completing a module you get awarded with ECTS-credit points. Every ECTS credit point stands for 30 hours of work load.	
	<b>Credits</b> ⓘ	5,0 Credits
	<b>Contact hours</b> ⓘ	48 Hours
	<b>Self study</b> ⓘ	102 Hours

Source: Module Database

# Python



- ▶ We will use Python 3 for the practical parts of this course.
- ▶ Please make sure, your device is running python.
- ▶ Use a separate python environment for this lecture.
- ▶ Install latest packages, when needed.

# Learning Goals of MADS-DL

- ▶ understand and apply the fundamental idea of how artificial neural networks are built, learned, and evaluated for classification and prediction
- ▶ apply PyTorch to create predictors and classifiers using neural networks
- ▶ understand and apply neural convolutional layers
- ▶ understand and apply selected advanced notions in deep learning

# Attribution

Some parts of this lecture are based on scripts and notes of

Programmieren mit Neuronalen Netzen

Prof. Dr. Frank Puppe, Dr. Markus Krug, Amar Hekalo, M.Sc

Lecture at Würzburg University

# Roadmap

1. **Introduction:** Motivation, Roots, Perceptron
2. **Basics:** Tensors, PyTorch
3. **Neural Nets in PyTorch:** Multilayer Architecture, Classification, Regression
4. **A Multilayer Network for Regression:** Mathematical model, activation functions, dummification
5. **Training:** Network modes, automatic differentiation, learning hyperparameters, optimization/validation
6. **Computer Vision:** CNNs, image classification, explanations
7. **Forecasting Sequential Data:** Sequential data, recurrent architectures, full proof of concept experiment
8. **Further Notions:** Depending on time: further neural network constructs.



We'll spend a lot of time on basics and training!  
A deep understanding of the core elements is necessary  
to understand training results and process.

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# Examination

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Start looking for interesting datasets today!

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- ▶ Submission date in Moodle.
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 Do the work over the course of the next 14 weeks.  
Do NOT wait until the deadline!