# Matthias Carl Laupichler ML Foundations in Python (09/24) () Erfasste Fragebögen = 11



	Auswertungsteil der gesch	ossenen Fragen		
Legende Fragetext	Relative Häufigkeiten der Antworten StdAbw. M Linker Pol	Mittelwert Median % 50% 0% 25% 2 3 4 5 Histogramm	Rechter Pol	n=Anzahl mw=Mittelwert md=Median s=StdAbw. E.=Enthaltung
1. Questions about the	e course (1)			
<sup>1.1)</sup> The difficulty of the le	ecture part of the course (i.e., theoretical input by	instructors) is		
	Far too low		9.1%	n=11
	A little too low		9,1%	
	Just right		54,5%	5
	A little too high		27,3%	)
	Far too high		0%	
<sup>2)</sup> The difficulty of the ex	xercise part of the course (e.g. programming exe	ercises in python) is		
	Far too low		0%	n=11
	A little too low		0%	
	Just right		63,6%	
	A little too high		36,4%	)
	Far too high		0%	
<sup>.3)</sup> The pace of the cours	se is			
	Far too slow		0%	n=11
	A little too slow		9,1%	
	Just right		72,7%	5
	A little too fast		18,2%	)
	Way too fast		0%	
<sup>.4)</sup> Overall, I give the cou	urse the following school grade:			
-	"Ungenügend" / Unsatisfactory (6)		0%	n=11
	"Mangelhaft" / Deficient (5)		0%	
	"Ausreichend" / Sufficient (4)		0%	
	"Befriedigend" / Satisfactory (3)		0%	
	"Gut" / Good (2)		9,1%	
	"Sehr gut" / Very good (1)		90,9%	)

1.5)	Overall, I give the lecture part of the course (i.e., theore	etical input by ins	structors	) the fo	ollowir	ng sch	ool grade	e:	
	"Ungenügend" / I	Unsatisfactory (6)						0%	n=11
	"Mangelh	aft" / Deficient (5)						0%	
	"Ausreicher	nd" / Sufficient (4)						0%	
	"Befriedigend"	' / Satisfactory (3)						0%	
		"Gut" / Good (2)						36,4%	
	"Sehr gu	ut" / Very good (1)						63,6%	
1.6)	Overall, I give the exercise part of the course (e.g., prog	gramming exerc	ises in p	ython)	the fo	ollowin	g school	grade:	
	"Ungenügend" / I	Unsatisfactory (6)						0%	n=11
	"Mangelh	aft" / Deficient (5)						0%	
	"Ausreicher	nd" / Sufficient (4)						0%	
	"Befriedigend"	' / Satisfactory (3)						0%	
		"Gut" / Good (2)		)				27,3%	
	"Sehr gu	ut" / Very good (1)						72,7%	
1.7)	The course is useful for conducting my research projects.	Do not agree at all	0%	0%	0%	60%	40%	Fully agree	n=10 mw=4,4 md=4 s=0,5 E.=1
 1.8)	I can use what I have learned independently in my research projects.	Do not agree at all	0%	2	11,1%	33,3%	55,6%	Fully agree	n=9 mw=4,4 md=5 s=0,7 E.=2
— — 1.9)	The amount of examples in the course was appropriate.	Do not agree at all	0%	0%	0%	9,1%	90,9%	Fully agree	n=11 mw=4,9 md=5 s=0,3
2.	Evaluation of Learning Objectives								
	5		19.00/	19.20/	26.49/	19.20/	0.1%		
2.1)	<b>Python programming (in general):</b> My skills in this area <i>before</i> starting the course were	Very low	10,2%	2	30,4%	4	5	Very high	n=11 mw=2,8 md=3 s=1,3
2.2)	<b>Python programming (in general):</b> My skills in this area are <i>now</i>	Very low	0%	9,1%	18,2%	54,5%	18,2% H 5	Very high	n=11 mw=3,8 md=4 s=0,9
2.3)	I can use the Linux terminal/console. My skills in this area <i>before</i> starting the course were	Very low	27,3%	9,1%	27,3%	9,1%	27,3% 1 5	Very high	n=11 mw=3 md=3 s=1,6
2.4)	I can use the Linux terminal/console. My skills in this area are <i>now</i> .	Very low	0%	2	27,3%	36,4%	36,4%	Very high	n=11 mw=4,1 md=4 s=0,8
2.5)	I can explain gradient descent techniques. My skills in this area <i>before</i> starting the course were	Very low	27,3%	36,4%	9,1%	9,1%	18,2%	Very high	n=11 mw=2,5 md=2 s=1,5

2.6)	I can explain gradient descent techniques. My skills in this area are <i>now</i>	Very low	0% 0% 9,1% 63,6% 27,3%	Very high	n=11 mw=4,2 md=4 s=0,6
2.7)	I can calculate descriptive statistics like mean, variance, and distribution in Python. My skills in this area <i>before</i> starting the course were	Very low	9,1% 9,1% 18,2% 27,3% 36,4%	Very high	n=11 mw=3,7 md=4 s=1,3
2.8)	I can calculate descriptive statistics like mean, variance, and distribution in Python. My skills in this area are <i>now</i>	Very low	0% 0% 9,1% 18,2% 72,7%	Very high	n=11 mw=4,6 md=5 s=0,7
2.9)	I can explain the concept of Eigenvalues and their importance for PCA. My skills in this area <i>before</i> starting the course were	Very low	20% 40% 30% 0% 10% 1 2 3 4 5	Very high	n=10 mw=2,4 md=2 s=1,2 E.=1
2.10)	I can explain the concept of Eigenvalues and their importance for PCA. My skills in this area are <i>now</i>	Very low		Very high	n=10 mw=4,3 md=4 s=0,5 E.=1
2.11)	I can demonstrate how k-nearest neighbors algorithms work in Python. My skills in this area <i>before</i> starting the course were	Very low	90,9% 9,1% 0% 0% 0% 1 2 3 4 5	Very high	n=11 mw=1,1 md=1 s=0,3
2.12)	I can demonstrate how k-nearest neighbors algorithms work in Python. My skills in this area are <i>now</i>	Very low	0% 0% 18,2% 54,5% 27,3%	Very high	n=11 mw=4,1 md=4 s=0,7
2.13)	I can demonstrate how support vector machine algorithms work in Python. My skills in this area <i>before</i> starting the course were	Very low	90,9% 9,1% 0% 0% 0% 1 2 3 4 5	Very high	n=11 mw=1,1 md=1 s=0,3
2.14)	I can demonstrate how support vector machine algorithms work in Python. My skills in this area are <i>now</i>	Very low	0% 9,1% 9,1% 63,6% 18,2%	Very high	n=11 mw=3,9 md=4 s=0,8
2.15)	I can demonstrate how decision tree and random forest algorithms work in Python. My skills in this area <i>before</i> starting the course were	Very low	90,9% 9,1% 0% 0% 0% 1 2 3 4 5	Very high	n=11 mw=1,1 md=1 s=0,3
2.16)	I can demonstrate how decision tree and random forest algorithms work in Python. My skills in this area are <i>now</i>	Very low	0% 0% 18,2% 54,5% 27,3%	Very high	n=11 mw=4,1 md=4 s=0,7
2.17)	I can demonstrate how k-means algorithms work in Python. My skills in this area <i>before</i> starting the course were	Very low	90,9% 9,1% 0% 0% 0% 1 2 3 4 5	Very high	n=11 mw=1,1 md=1 s=0,3
2.18)	I can demonstrate how k-means algorithms work in Python. My skills in this area are <i>now</i>	Very low	0% 0% 18,2% 45,5% 36,4%	Very high	n=11 mw=4,2 md=4 s=0,8



3.3)	Did you find the use of PyTorch for deep learning useful?	Not useful at all	0%	0%	0%	9,1%	90,9%	Very useful	n=11 mw=4.9 md=5 s=0,3
3.4)	How helpful was the topic <b>"Brain Decoding"</b> in teaching relevant machine learning skills? (on day 12)	Not helpful at all	0%	0%	0%	36,4%	63,6%	Very helpful	n=11 mw=4,6 md=5 s=0,5
3.5)	How helpful was the topic <b>"Medical Image</b> <b>Segmentation</b> " in teaching relevant machine learning skills? (on day 13)	Not helpful at all	0%	0%	0%	60%	40%	Very helpful	n=10 mw=4,4 md=4 s=0,5 E.=1
3.6)	How helpful was the topic " <b>Implementing multi- head attention for language modelling</b> " in teaching relevant machine learning skills? (on day15)	Not helpful at all	0%	0%	20%	30%	50% 1 5	Very helpful	n=10 mw=4,3 md=4,5 s=0,8 E.=1
4.	Questions about the course (3)								
4.1)	The course follows a clear structure.	Do not agree at all	0%	0%	0%	18,2%	81,8% 5	Fully agree	n=11 mw=4,8 md=5 s=0,4
4.2)	The way the course is designed adds to the understanding of the material.	Do not agree at all	0%	0%	9,1%	18,2%	72,7% 5	Fully agree	n=11 mw=4,6 md=5 s=0,7
4.3)	The course has a good mix of knowledge transfer, interactive elements and discussion.	Do not agree at all	0%	0%	9,1%	27,3%	63,6%	Fully agree	n=11 mw=4,5 md=5 s=0,7
4.4)	The instructors are responsive to students' questions and suggestions.	Do not agree at all	0%	2	0%	0%	100%	Fully agree	n=11 mw=5 md=5 s=0
4.5)	The instructors clarify the usability and usefulness of the course content.	Do not agree at all	0%	0%	0%	27,3%	72,7%	Fully agree	n=11 mw=4,7 md=5 s=0,5
4.6)	The instructors use good teaching materials (e.g., slides, presentations, bibliography, script) to support the learning process.	Do not agree at all	0%	0%	9,1%	9,1%	81,8% 5	Fully agree	n=11 mw=4,7 md=5 s=0,6
4.7)	The instructors have good time management skills.	Do not agree at all	0%	0%	9,1%	9,1%	81,8% 5	Fully agree	n=11 mw=4,7 md=5 s=0,6
4.8)	The instructors express themselves clearly and comprehensively.	Do not agree at all	0%	0%	9,1%	9,1%	81,8% <b>8</b> 1,8% <b>5</b>	Fully agree	n=11 mw=4,7 md=5 s=0,6

4.9)	The instructors encourage active student participation in the course.	Do not agree at all	0%	10%	<u>0%</u> 3	10%	80% 5	Fully agree	n=10 mw=4,6 md=5 s=1 E.=1
5	Questions about the course (4)								
5.1)	How much did you learn in this course?	Very little	0%	0%	0%	9,1%	90,9%	Very much	n=11 mw=4,9 md=5 s=0,3
5.2)	How interested were you in the topic <i>before</i> the course began?	Very little	0%	0%	27,3%	36,4%	36,4%	Very much	n=11 mw=4,1 md=4 s=0,8
6	Participant statistics								
6.1)	Did you attend the Python preparation course offer	red by Jan Steiner?							
	No becaus	Yes						9,1% 18.2%	n=11
	No, because I al	ready had Python skills						63,6%	
		No, for another reason						9,1%	
6.2)	What is your highest educational qualification?								n=11
	High school alpioma / i	achelor (or comparable)						18.2%	
		Master (or comparable)		-	-	-		81,8%	
		PhD / "Doctorate"						0%	
	Hat	ilitation / Professorship						0%	
		None of the above						0%	
6.4)	How did you find time to take part in this course?								
	Took personal vaca	tion time / time off work						18,2%	n=11
	My employer/supervisor let me take the course d	uring my working hours						54,5%	
	Took educational le	eave ("Bildungsurlaub")						0%	
	Took the course in addition to my usual workload (e.g., working i	n the morning/evening)						18,2%	
	Other / a co	ombination of the above						9,1%	
6.5)	To which gender identity do you most identify?								
		Female						18,2%	n=11
		Male						72,7%	
		Other / Diverse	_					0%	
		Prefer not to answer						9,1%	

# Profillinie

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Institut für Medizindidaktik

Name der/des Lehrenden:

Matthias Carl Laupichler Titel der Lehrveranstaltung: ML Foundations in Python (09/24) (Name der Umfrage)

Verwendete Werte in der Profillinie: Mittelwert

#### 1. Questions about the course (1)

1.7)	The course is useful for conducting my research projects.	Do not agree at all			Fully agree	n=10	mw=4,4	md=4	s=0,5
1.8)	I can use what I have learned independently in my research projects.	Do not agree at all		-i	Fully agree	n=9	mw=4,4	md=5	s=0,7
1.9)	The amount of examples in the course was appropriate.	Do not agree at all		<b>`</b>	Fully agree	n=11	mw=4,9	md=5	s=0,3

### 2. Evaluation of Learning Objectives

- **Python programming (in general):** My skills in this area *before* starting the course 2.1) wére...
- **Python programming (in general):** My skills in this area are *now*... 2.2)
- 2.3) I can use the Linux terminal/console. My skills in this area *before* starting the course were...
- 2.4) I can use the Linux terminal/console. My skills in this area are *now*...
- 2.5) I can explain gradient descent techniques. My skills in this area before starting the course wére...
- 2.6) I can explain gradient descent techniques. My skills in this area are *now*...
- I can calculate descriptive statistics like mean, variance, and distribution in Python. My skills in this area *before* starting the course 2.7)
- I can calculate descriptive statistics like mean, variance, and distribution in Python. 2.8) My skills in this area are now.
- I can explain the concept of Eigenvalues and their importance for PCA. My skills in this area *before* starting the course 2.9)
- 2.10) I can explain the concept of Eigenvalues and their importance for PCA. My skills in this area are *now...*
- I can demonstrate how k-nearest neighbors algorithms work in Python. My skills in this area *before* starting the course
- 2.12) I can demonstrate how k-nearest neighbors algorithms work in Python. My skills in this area are *now*...
- 2.13) I can demonstrate how support vector machine algorithms work in Python. My skills in this area *before* starting the course
- 2.14) I can demonstrate how support vector machine algorithms work in Python. My skills in this area are *now*...
- <sup>2.15)</sup> I can demonstrate how decision tree and random forest algorithms work in Python. My skills in this area before starting the course
- 2.16) I can demonstrate how decision tree and random forest algorithms work in Python. My skills in this area are *now*...
- 2.17) I can demonstrate how k-means algorithms work in Python. My skills in this area *before* starting the course
- I can demonstrate how k-means algorithms 2.18) work in Python. My skills in this area are *now*.
- <sup>2.19)</sup> I can explain the concept of Gaussian mixture models.

My skills in this area before starting the course

Very low		Very high	n=11	mw=2,8	md=3	s=1,3
Very low		Very high	n=11	mw=3,8	md=4	s=0,9
Very low	$ - +\langle$	Very high	n=11	mw=3	md=3	s=1,6
Very low		Very high	n=11	mw=4,1	md=4	s=0,8
Very low		Very high	n=11	mw=2,5	md=2	s=1,5
Very low		Very high	n=11	mw=4,2	md=4	s=0,6
Very low		Very high	n=11	mw=3,7	md=4	s=1,3
Very low		Very high	n=11	mw=4,6	md=5	s=0,7
Very low		Very high	n=10	mw=2,4	md=2	s=1,2
Very low		Very high	n=10	mw=4,3	md=4	s=0,5
Very low		Very high	n=11	mw=1,1	md=1	s=0,3
Very low		Very high	n=11	mw=4,1	md=4	s=0,7
Very low		Very high	n=11	mw=1,1	md=1	s=0,3
Very low		Very high	n=11	mw=3,9	md=4	s=0,8
Very low		Very high	n=11	mw=1,1	md=1	s=0,3
Very low		Very high	n=11	mw=4,1	md=4	s=0,7
Very low		Very high	n=11	mw=1,1	md=1	s=0,3
Very low		Very high	n=11	mw=4,2	md=4	s=0,8
Very low		Very high	n=11	mw=1,2	md=1	s=0,4

- <sup>2.20)</sup> I can explain the concept of Gaussian mixture models.
- My skills in this area are *now*... <sup>2.21)</sup> I can use PCA for dimensionality reduction in Python. My skills in this area *before* starting the course

My skills in this area *before* starting the course <sup>2.22)</sup> I can use PCA for dimensionality reduction in Puthon

- Python. My skills in this area are *now*... <sup>2.23)</sup> I can explain the concepts of feedforward neural networks and convolutional neural
- networks. 2.24) I can explain the concept of feedforward neural networks and convolutional neural
- networks.
   <sup>2.25)</sup> I can demonstrate the training process of simple neural networks in Python. My skills in this area *before* starting the course
- <sup>2.26)</sup> I can demonstrate the training process of simple neural networks in Python. My skills in this area are now...
- 2.27) I can explain the link between convolutional neural networks and cross correlation. My skills in this area *before* starting the course
- <sup>2.28)</sup> I can explain the link between convolutional neural networks and cross correlation. My skills in this area are *now*...
- 3. Questions about the course (2)
- <sup>3.1)</sup> Was GitHub a helpful tool for conducting the course?
- 3.2) Was the introduction to the HPC-Cluster helpful?
- <sup>3.3)</sup> Did you find the use of PyTorch for deep learning useful?
- 3.4) How helpful was the topic "Brain Decoding" in teaching relevant machine learning skills? (on day 12)
- 3.5) How helpful was the topic "Medical Image Segmentation" in teaching relevant machine learning skills? (on day 13)
- 3.6) How helpful was the topic "Implementing multi-head attention for language modelling" in teaching relevant machine learning skills?
- 4. Questions about the course (3)

Very low Very high n=11 mw=3,8 s=1,1 md=4 Very high Very low n=11 s=0,3 mw=1,1 md=1 Very low Very high n=11 mw=3.9 md=4 s=0.9 Very high Very low n=11 mw=1,3 md=1 s=0,6 Very low Very high n=11 mw=4.3 md=4 s=0.8 Very low Very high n=11 mw=1,3 md=1 s=0,6 Very low Very high n=11 mw=4 md=4 s=0,9 Very low Very high n=11 mw=1.1 s=0.3 md=1 Very low Very high n=11 mw=3,5 md=4 s=1,4

Not helpful at all			Very helpful	n=11	mw=4,7	md=5	s=0,5
Not helpful at all		$\left  \left< - \right  \right>$	Very helpful	n=9	mw=4,2	md=5	s=1
Not useful at all		$\rightarrow$	Very useful	n=11	mw=4,9	md=5	s=0,3
Not helpful at all			Very helpful	n=11	mw=4,6	md=5	s=0,5
Not helpful at all			Very helpful	n=10	mw=4,4	md=4	s=0,5
Not helpful at all			Very helpful	n=10	mw=4,3	md=4,5	s=0,8

4.1)	The course follows a clear structure.	Do not agree at all		<b>_</b>	Fully agree	n=11	mw=4,8	md=5	s=0,4
4.2)	The way the course is designed adds to the understanding of the material.	Do not agree at all		 -+	Fully agree	n=11	mw=4,6	md=5	s=0,7
4.3)	The course has a good mix of knowledge transfer, interactive elements and discussion.	Do not agree at all		4	Fully agree	n=11	mw=4,5	md=5	s=0,7
4.4)	The instructors are responsive to students' questions and suggestions.	Do not agree at all		$\rightarrow$	Fully agree	n=11	mw=5	md=5	s=0
4.5)	The instructors clarify the usability and usefulness of the course content.	Do not agree at all		<b>í</b>	Fully agree	n=11	mw=4,7	md=5	s=0,5
4.6)	The instructors use good teaching materials (e. g., slides, presentations, bibliography, script) to support the learning process	Do not agree at all			Fully agree	n=11	mw=4,7	md=5	s=0,6
4.7)	The instructors have good time management skills.	Do not agree at all		 	Fully agree	n=11	mw=4,7	md=5	s=0,6
4.8)	The instructors express themselves clearly and comprehensively.	Do not agree at all			Fully agree	n=11	mw=4,7	md=5	s=0,6
4.9)	The instructors encourage active student participation in the course.	Do not agree at all		 _ <b>i</b> _	Fully agree	n=10	mw=4,6	md=5	s=1

# 5. Questions about the course (4) 5.1) How much did you learn in this course? 5.2) How interested were you in the topic *before* the course began? Very little Very much Number of the course began?

# Auswertungsteil der offenen Fragen

### 5. Questions about the course (4)

- <sup>5.3)</sup> What did you like most about the course?
- I appreciated that students from every field were welcomed in the course, even when not coming from a strong mathematical / coding background. The lecturers and tutors were really friendly, non-judgemental and patient. The exercises used fun application examples. I think the course covers a lot of aspects in a relatively fast pace, which provides a great overview, but requires revisiting the topics later on to fully grasp them. Overall I learned a lot, had a lot of fun and got motivated to further explore the topics. One of the best courses I ever took, I would recommend to everyone interested in the topic!
- I liked it very much how Elena and Moritz presented and explained the topics. It was very clear and their explanations were very helpful. They were very patient and helpful with the programming tasks, I wasn't afraid to ask questions.
- I literally started out as a noob in ML and DL and was bit nervous when people around me used to speak in CNN language; and now I have the tools and knowledge to understand and train my own Neural Networks and implement Transformers. That speaks for itself.

The mix of lectures and exercises were amazing! I got lot of time to solve exercises and ask questions.

- Instructors and tutors were very helpful. The lectures and exercises were interesting. The course was intense but very good for learning the stuff in a short period of time.
- The exercises, especially the difficulty of the exercises. Most of them were hard enough that they took a lot of time and effort but not so hard that they were impossible to do. I was forced to develop my python skills in order to be able to solve the exercises and could always use the new skills in the following days.
- The exercises were really cool, especially the optional tasks.
- The machine Learning algorithms.
- The supervised coding sessions were very helpful. This way, it was avoided that participants get stuck on minor problems that could be clarified easily and could focus on the broader learnings from the course.
- <sup>5.4)</sup> What could be improved about this course?
- A bit more emphasis and explaination regarding the basics of the neural network training (for me it went too fast to complex stuff). Additional information about hyperparameter tuning for neural nets (since for all methods prior to NNs this was a very interesting subject that seems to be important for real life applications)
- A bit more explanations for the todos of the exercises in the first three days and the last one would be helpful.
- Maybe there could be something like a hint structure implemented for the exercises to help beginners especially. Sometimes the understanding of what needs to be done / what is the desired output is hard to visualise in the exercises. As well as which functions are even available/possible

for example:

Exercise 1 - Hint 1: (explaining the main steps): in the init we want to add all the nn elements that we want to call in the forward path. then we call them in the forward path and update the initial input by feeding it to the next function. Exercise 1 - Hint 2: in the forward pass, the input needs to be reshaped in the correct form first Exercise 1 - Hint 3: for reshaping consider using th.permute()

This could be an addition to the help of the tutors.

- More about generative NNs. Offer the Advanced ML course directly "im Anschluss" so that all our obtained knowledge is still "frisch" from the current course.
- More optional tasks to dive into the topics more deeply.
- Most of the course is perfect, I would say. Exercises and Readme are well done. If anything, I would like to have some more details in the slides and make them more verbose. This would allow one to return to them in a year if needed and read them as notes. I also would not mind having bit longer lectures covering the theory in greater slightly greater detail before jumping into exercises.
- On the one hand, I liked the clear separation between theory and practice. On the other hand, I would have liked some more explanations about the programming tasks.
- There was a step change in difficulty in the exercise at the start of the neural networks exercises. More structure could have been provided for the first network exercise, and then gradually reduce the pre-given structure over the course of the next exercises. At the beginning of the exercises, some time could be devoted to clarify key components used in the exercises (e.g. explain what dataloaders are and how they can be used prior to the first exercise where they are used).

## 6. Participant statistics

- <sup>6.3)</sup> What is your main field of research?
- Astronomy
- chemistry
- Economics
- Humanities
- Mathematics
- medicine
- Neurobiology
- Neuroscience
- Physics (2 Nennungen)
- Theoretical chemistry
- <sup>6.6)</sup> What is your age (in years)?
- 23
- 24
- 25
- **2**7
- 29 (3 Nennungen)
- **3**1
- **3**5