Instructions for Completing the Study Plan Specialization: Spectroscopy and Imaging



	lan (AIMS) ectroscopy and Imaging	Technisch Universit Braunsch	ät		
lame:		Year of Enrollmen	ıt:	_	
Natricle Number:		Mentor:			
	Winter Semes	ster (1st Semester)	approx.	30 CP	
			CP		Advanced Ma
Foundations		Introduction to AIMS	5	×	Learning an
12. Semester	Compulsory	Mathematics for Engineers A	8	×	23. Seme
26 CP (total)		Programming in Python and Python Lab	8	×	15 CP (tot
		Biophysical Chemistry	8		
Specialization		Modern Optical Methods and Imaging	8		
Spectroscopy and		Solar and Chemical Energy Conversion*	8		
Imaging	Elective (16-20 CP)	Physical Biology of the Cell	10		Specializat
13. Semester		Chemometrics	5		Spectroscop
37 CP (total)		Theoretical Spectroscopy	8		Imagin
		Machine Learning in Computational Chemistry	8		13. Seme
		A) Sum of achieved CP for Specialization			37 CP (tot
Key Qualifications	Compulsory	Ethics and Epistemology	5	X	
13. Semester 12 CP (total)	Elective	Elective Modules	7		
		lectures: irregularly; practical course: every semester ster (2nd Semester)	approx.	30 CP	Key Qualifica 13. Seme 12 CP (tot
Foundations			CP		
12. Semester	Compulsory	Scientific Software Engineering – Lab	5	×	

	54	ester (2110 semester)	арріол	
Foundations			СР	_
12. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	×
Advanced Machine		Machine Learning for Data Science	5	
Learning and AI	Elective	Pattern Recognition	5	
23. Semester	Elective	Computer Lab Pattern Recognition	5	
15 CP (total)		Deep Learning Lab	5	
		Methods of Uncertainty Analysis and Quantification	5	
	Compulsory			
Specialization	Basic Module	Molecular Spectroscopy	5	X
Spectroscopy and	(5 CP)			
Imaging 13. Semester	Elective	Solar and Chemical Energy Conversion*	8	
37 CP (total)	(16-20 CP)	Sophisticated Imaging	10	
		B) Sum of achieved CP for Specialization	-	†
Key Qualifications				
13. Semester	Elective	Elective Modules	7	
12 CP (total)				

*Frequency of courses: lectures: irregularly; practical course: every semester

	Winter Sem	ester (3rd Semester)	approx.	30 CP
Advanced Machine			СР	
Learning and AI		Pattern Recognition		
23. Semester	Elective	(offered in German in winter semester)	5	
15 CP (total)		Computer Lab Pattern Recognition	5	
		Biophysical Chemistry	8	
Specialization Spectroscopy and Imaging 13. Semester 37 CP (total)		Modern Optical Methods and Imaging	8	
		Solar and Chemical Energy Conversion*	8	
	Elective	Physical Biology of the Cell	10	
	(16-20 CP)	Chemometrics	6	
		Theoretical Spectroscopy	8	
		Machine Learning in Computational Chemistry	8	
		C) Sum of achieved CP for Specialization		
	Compulsory	Research Lab	12-16	X
	(12-16 CP)	37 CP - (A + B + C) = CP Research Lab		
		_		
Key Qualifications	Compulsory	Ethics and Epistemology	5	×
13. Semester 12 CP (total)	Elective	Elective Modules	7	

*Frequency of courses: lectures: irregularly; practical course: every semester

Master's Thesis CP Master's Thesis 30		Summer Sem	nester (4th Semester)	approx. 3
30 CP 120 CP in total	Master's Thesis			СР
120 CP in total		Compulsory	Master's Thesis	30
	30 CP			
Date:Signature Student:	120 CP in total	٦		
Date:Signature Student:		_		

In the 1st and 3rd semester you can see the modules that are offered every winter semester Study Plan (AIMS) Specialization: Spectroscopy and Imaging Year of Enrollment Matricle Number: Mentor Winter Semester (3rd Semester Winter Semester (1st Semester) approx. 30 CP approx. 30 CP **Advanced Machine Foundations** Introduction to AIMS Learning and AI (offered in German in winter semester) 1.-2. Semester Mathematics for Engineers A 2.-3. Semester Computer Lab Pattern Recognition 26 CP (total) 15 CP (total) Programming in Python and Python Lab Modern Optical Methods and Imaging Biophysical Chemistry Solar and Chemical Energy Conversion* 8 Modern Optical Methods and Imaging Specialization 8 Physical Biology of the Cell Elective 10 Solar and Chemical Energy Conversion Specialization Spectroscopy and Chemometrics Spectroscopy and **Imaging** Elective (16-20 CP) Physical Biology of the Cell 10 Theoretical Spectroscopy 8 Imaging 1.-3. Semester Chemometrics Machine Learning in Computational Chemi 1.-3. Semester 37 CP (total) Theoretical Spectroscopy) Sum of achieved CP for Specialization 37 CP (total) Machine Learning in Computational Chemistry A) Sum of achieved CP for Specialization Compulsory 12-16 x (12-16 CP) 37 CP - (A + B + C) = CP Research Lab **Key Qualifications** Compulsory Ethics and Epistemology 1.-3. Semester Elective Modules **Key Qualifications** Compulsory 12 CP (total) thics and Epistemology 1.-3. Semester 12 CP (total) Frequency of courses: lectures: irregularly; practical course: every semester *Frequency of courses: lectures: irregularly; practical course: every semester Summer Semester (2nd Semester) approx. 30 CP Summer Semester (4th Semester) approx. 30 CP **Foundations** 1.-2. Semester Scientific Software Engineering – Lab 5 x Compulsory CP Master's Thesis 26 CP (total 4. Semester Compulsory Master's Thesis 30 x Advanced Machine Machine Learning for Data Science Pattern Recognition Learning and AI 120 CP in total 2.-3. Semester Computer Lab Pattern Recognition 15 CP (total) Deep Learning Lab Signature Student:_ Methods of Uncertainty Analysis and Quantification Signature Mentor:_ Basic Module Nolecular Spectroscopy Specialization Spectroscopy and (5 CP) Imaging 1.-3. Semester Solar and Chemical Energy Conversion* (16-20 CP) 37 CP (total) Sophisticated Imaging 10 3) Sum of achieved CP for Specialization For the master's degree, you need a total of

120 CP

In the 2nd semester you can see the modules that are offered every summer semester

> Elective Modules *Frequency of courses: lectures: irregularly; practical course: every semester

Elective

Key Qualifications 1.-3. Semester

12 CP (total)

Study Plan (AIMS)





Here you can see which area the modules belong to and how many CP must be earned in that area in total

Here you can see whether the modules are compulsory or elective.

Name:	Year of Enrollment:
Matricle Number:	Mentor:

	Winter Semes	ster (1st Semester)	approx.	30 (
			СР	
Foundations		Introduction to AIMS	5	X
12. Semester	Compulsory	Mathematics for Engineers A	8	^
26 CP (total)		Programming in Python and Python Lab	8)
		Biophysical Chemistry	8	
Specialization Spectroscopy and Imaging 13. Semester 37 CP (total)		Modern Optical Methods and Imaging	8	
		Solar and Chemical Energy Conversion*	8	\vdash
	Elective (16-20 CP)	Physical Biology of the Cell	10	Т
		Chemometrics	5	
		Theoretical Spectroscopy	8	
		Machine Learning in Computational Chemistry	8	
		A) Sum of achieved CP for Specialization		ϳ
Key Qualifications	Compulsory	5.1.	-	
13. Semester	, , , , ,	Ethics and Epistemology	5	
12 CP (total)	Elective	Elective Modules	7	

*	Summer Seme	ester (2nd Semester)	approx.	30
Foundations 12. Semester	Compulsory	cientific Software Engineering – Lab	CP 5	Ī
26 CP (total)		_		
Advanced Machine		Machine Learning for Data Science	5	Т
Learning and AI	Elective	attern Recognition	5	Т
23. Semester	Elective	omputer Lab Pattern Recognition	5	Γ
15 CP (total)		leep Learning Lab	5	Τ
		Methods of Uncertainty Analysis and Quantification	5	I
	Compulsory			_
Specialization	Basic Module	Molecular Spectroscopy	5	L
Spectroscopy and	(5 CP)	4		
Imaging 13. Semester	Elective	olar and Chemical Energy Conversion*	8	_
37 CP (total)	(16-20 CP)	ophisticated Imaging	10	t
) Sum of achieved CP for Specialization		t
Key Qualifications				_
13. Semester	Elective	lective Modules	7	L
12 CP (total)		y		

Winter Semester (3rd Semester)			approx. 30 CF		
Advanced Machine			CP 🥒		
riarancea macinic		Pattern Recognition			
Learning and AI 23. Semester	Elective	(offered in German in winter semester)	5		
15 CP (total)		Computer Lab Pattern Recognition	5		
		Biophysical Chemistry	8		
		Modern Optical Methods and Imaging	8		
		Solar and Chemical Energy Conversion*	8		
Specialization Spectroscopy and Imaging 13. Semester 37 CP (total)	Elective	Physical Biology of the Cell	10		
	(16-20 CP)	Chemometrics	6		
		Theoretical Spectroscopy	8		
		Machine Learning in Computational Chemistry	8		
		C) Sum of achieved CP for Specialization			
	Compulsory	Research Lab	12-16	x	
	(12-16 CP)	37 CP - (A + B + C) = CP Research Lab	12-10	^	
				•	
Key Qualifications	Compulsory	Ethics and Epistemology	5	x	
13. Semester		Elective Modules	7		
12 CP (total)	Elective				

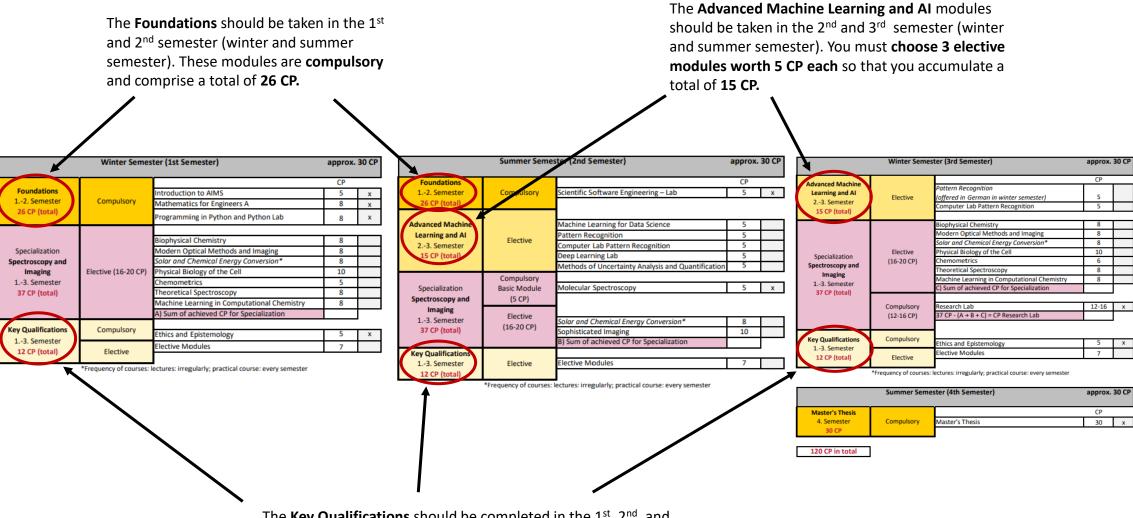
The ticked modules are compulsory; in the blank boxes, you should tick the modules you wish to select.

*Frequency of courses: lectures: irregularly; practical course: every semester

	Summer Semester (4th Semester)		approx. 30			
Master's Thesis			СР			
4. Semester	Compulsory	Master's Thesis	30	×		
30 CP						

120 CP in total

Date:_____Signature Student:______Signature Mentor:_____



The **Key Qualifications** should be completed in the 1st, 2nd, and 3rd semester and comprise a total of **12 CP**. It is advisable to complete the **compulsory Ethics and Epistemology** module (**5 CP**) in the 1st semester.

The remaining **7 CP** can be earned through **professionalization elective modules** (e.g., language courses).

Study Plan (AIMS)

Specialization: Spectroscopy and Imaging



Name:	Year of Enrollment:
Matricle Number:	Mentor:

	Winter Semes	ster (1st Semester)	approx.	30 CP
			СР	
Foundations		Introduction to AIMS	5	X
12. Semester	Compulsory	Mathematics for Engineers A	8	Х
26 CP (total)		Programming in Python and Python Lab	8	x
		Biophysical Chemistry	8	
Specialization Spectroscopy and		Modern Optical Methods and Imaging	8	
		Solar and Chemical Energy Conversion*	8	
Imaging	Elective (16-20 CP)	Physical Biology of the Cell	10	
13. Semester		Chemometrics	5	
37 CP (total)		Theoretical Spectroscopy	8	
		Machine Learning in Computational Chemistry	8	
		A) Sum of achieved CP for Specialization		
Key Qualifications	Compulsory	Estimated Februaries	1 5	
13. Semester	,,,,,	Ethics and Epistemology	5	Х
12 CP (total)	Elective	Elective Modules	7	

^{*}Frequency of courses: lectures: irregularly; practical course: every semester

	Summer Sem	ester (2nd Semester)	approx.	30 CP
Foundations			СР	
12. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	X
Advanced Machine		Machine Learning for Data Science	5	
Learning and AI	Elective	Pattern Recognition	5	
23. Semester	Elective	Computer Lab Pattern Recognition	5	
15 CP (total)		Deep Learning Lab	5	
		Mothode of Uncortainty Analysis and Quantification	5	
	Compulsory			
Specialization	Basic Module	Molecular Spectroscopy	5	Х
Spectroscopy and	(5 CP)			Г
Imaging 13. Semester	Elective	Solar and Chemical Energy Conversion*	8	_
37 CP (total)	(16-20 CP)	Sophisticated Imaging	10	-
or ar (total)		B) Sum of achieved CP for Specialization	10	
Key Qualifications		El-article Manufacture		_
13. Semester 12 CP (total)	Elective	Elective Modules	7	

^{*}Frequency of courses: lectures: irregularly; practical course: every semeste

	Winter Seme	ester (3rd Semester)	approx.	30 CP
Advanced Machine		Pattern Recognition	СР	
Learning and AI	Elective	(offered in German in winter semester)	5	
23. Semester	Elective	Computer Lab Pattern Recognition	5	
15 CP (total)		Biophysical Chemistry	8	
		Modern Optical Methods and Imaging	8	
	Elective (16-20 CP)		8	\vdash
		Solar and Chemical Energy Conversion*		-
Specialization		Physical Biology of the Cell	10	-
Spectroscopy and		Chemometrics	6	
Imaging		Theoretical Spectroscopy	8	
13. Semester		Machine Learning in Computational Chemistry	8	
37 CP (total)		C) Sum of achieved CP for Specialization		
	Compulsory	Research Lab	12-16	х
	(12-16 CP)	37 CP - (A + B + C) = CP Research Lab		
Key Qualifications	Compulsory	Ethics and Epistemology	5	Х
13. Semester 12 CP (total)	Elective	Elective Modules	7	

^{*}Frequency of courses: lectures: irregularly; practical course: every semester

Summer Semester (4th Semester)		approx. 30 CP		
Master's Thesis 4. Semester 30 CP	Compulsory	Master's Thesis	CP 30 x	
120 CP in total		_		

Signature Student:

Signature Mentor:

Specialization – 37 CP

In total, 37 CP must be earned in the specialization.

The modules can be completed in the 1st, 2nd, and 3rd semesters.

The specialization area consists of a Compulsory Basic Module, Elective Modules, and a Research Lab

Compulsory Basic Module - 5 CP

Elective Modules – 16 to 20 CP

You can choose from the remaining specialization elective modules so that you earn 16 to 20 CP.

Research Lab – 12 to 16 CP

The CP earned from the Basic Module and the Elective Modules are added together, in total 21 to 25 CP. The remaining CP to reach the 37 CP required for the specialization are then covered by the Research Lab. Therefore, depending on how many CP you still need, you will undertake a Research Lab worth 12 to 16 CP.

The **Research Lab** is a compulsory study research project including a report and presentation and participation in the seminar.

Study Plan (AIMS)

Specialization: Spectroscopy and Imaging



Name:	Year of Enrollment:
Matricle Number:	Mentor:

	Winter Semes	ster (1st Semester)	approx.	30 CP
			СР	
Foundations		Introduction to AIMS	5	X
12. Semester	Compulsory	Mathematics for Engineers A	8	X
26 CP (total)		Programming in Python and Python Lab	8	x
		Biophysical Chemistry	8	
Specialization Spectroscopy and Imaging	Elective (16-20 CP)	Modern Optical Methods and Imaging	8	
		Solar and Chemical Energy Conversion*	8	
		Physical Biology of the Cell	10	
13. Semester		Chemometrics	5	
37 CP (total)		Theoretical Spectroscopy	8	
		Machine Learning in Computational Chemistry	8	
		A) Sum of achieved CP for Specialization		
Key Qualifications	Compulsory			_
13. Semester	Compulsory	Ethics and Epistemology	5	X
	Elective	Elective Modules	7	
12 CP (total)	Elective			_

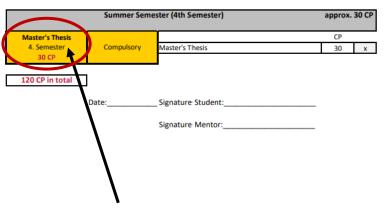
^{*}Frequency of courses: lectures: irregularly; practical course: every semester

Summer Semester (2nd Semester)			approx. 30 CP	
Foundations			CP	
12. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	X
Advanced Machine		Machine Learning for Data Science	5	
Learning and Al	er	Pattern Recognition	5	
23. Semester	Elective	Computer Lab Pattern Recognition	5	
15 CP (total)		Deep Learning Lab	5	
		Methods of Uncertainty Analysis and Quantification	5	
	Compulsory			
Specialization	Basic Module	Molecular Spectroscopy	5	X
Spectroscopy and	(5 CP)			
Imaging	Elective			
13. Semester	(16-20 CP)	Solar and Chemical Energy Conversion*	8	
37 CP (total)	(10-20 CF)	Sophisticated Imaging	10	
		B) Sum of achieved CP for Specialization		J
Key Qualifications				
13. Semester	Elective	Elective Modules	7	
12 CP (total)				

^{*}Frequency of courses: lectures: irregularly; practical course: every semester

	Winter Seme	ster (3rd Semester)	approx.	30 CP
Advanced Machine			CP	
Learning and Al		Pattern Recognition		
23. Semester	Elective	(offered in German in winter semester)	5	
15 CP (total)		Computer Lab Pattern Recognition	5	
		Biophysical Chemistry	8	
	Elective (16-20 CP)	Modern Optical Methods and Imaging	8	
		Solar and Chemical Energy Conversion*	8	
Consinlination		Physical Biology of the Cell	10	
Specialization Spectroscopy and		Chemometrics	6	
		Theoretical Spectroscopy	8	
Imaging 13. Semester		Machine Learning in Computational Chemistry	8	
37 CP (total)		C) Sum of achieved CP for Specialization		
	Compulsory	Research Lab	12-16	X
	(12-16 CP)	37 CP - (A + B + C) = CP Research Lab		
			·	
Key Qualifications	Compulsory	Ethics and Epistemology	5	Х
13. Semester 12 CP (total)	Elective	Elective Modules	7	
12 CP (total)	Elective			

*Frequency of courses: lectures: irregularly; practical course: every semester



Master's Thesis:

In the 4th semester, the master's thesis is completed (**30 CP**).

Once the study plan is completed, please have it signed by your mentor and submit it to the Examination Office.