Instructions for Completing the Study Plan Specialization: Chemical Synthesis and Drug Design

Study Plan (AIMS) Specialization: Chemical Synthesis and Drug Design



Name:	Year of Enrollment:
Matricle Number:	Mentor:

	Winter Semester (1st Semester)		approx. 30 C	
			CP	
Foundations	Compulsory	Introduction to AIMS	5	- 1
12. semester 26 CP (total)		Mathematics for Engineers A	8	
20 CF (total)		Programming in Python and Python Lab	8	
	Compulsory		_	_
	Basic Module	Organometallic Chemistry	4	Т
Constitution	choose 1 of 2			t
Specialization (4 0 Chemical Synthesis and Drug Design	(4 CP)	Advanced Inorganic Chemistry	8	۰
		Organic Synthesis Planning	4	╆
13. Semester		Enzyme Engineering	10	t
37 CP (total)	Elective	Fundamentals of Protein Structure Analysis	10	T
	(16-20 CP)	Advanced Theoretical Chemistry	8	Т
		Machine Learning in Computational Chemistry	8	т
	A) Sum of achieved CP for Specialization		┲	
Key Qualifications	Compulsory	Selvin and Enlateration		_
13. Semester		Ethics and Epistemology	5	-
12 CP (total)	Elective	Elective Modules	7	丄

	Summer Semester (2nd Semester) a			approx. 30 C	
Foundations			СР		
12. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	X	
Advanced Machine		Machine Learning for Data Science	5		
Learning and Al		Pattern Recognition	5		
23. Semester	Elective	Computer Lab Pattern Recognition	5		
15 CP (total)		Deep Learning Lab	5		
15 CF (total)		Methods of Uncertainty Analysis and Quantification	5		
Specialization Chemical Synthesis and Drug Design	Compulsory Basic Module choose 1 of 2 (4 CP)	Reaction Mechanisms	4		
13. semester 37 CP (total)	Elective	Catalysis	8		
S. C. (total)	(16-20 CP)	Biomolecular Modelling B) Sum of achieved CP for Specialization	8	F	
Key Qualifications		Elective Modules	,	_	
13. Semester 12 CP (total)	Elective	Elective Modules	7		

	Winter Sem	ester (3rd Semester)	approx.	30 CP
			СР	
Advanced Machine		Pattern Recognition		
Learning and AI 23. Semester	Elective	(offered in German in winter semester)	5	
15 CP (total)		Computer Lab Pattern Recognition	5	
		Advanced Inorganic Chemistry	8	
		Organic Synthesis Planning	4	
		Enzyme Engineering	10	
Specialization	Elective	Fundamentals of Protein Structure Analysis	10	
Chemical Synthesis	(16-20 CP)	Advanced Theoretical Chemistry	8	
and Drugs		Machine Learning in Computational Chemistry	8	
13. Semester		C) Sum of achieved CP for Specialization		
37 CP (total)	Compulsory	Research Lab	13-17	×
	(13-17 CP)	37 CP - (A + B + C) = CP Research Lab	13-17	
Key Qualifications	Compulsory	Ethics and Epistemology	5	X
13. Semester 12 CP (total)	Elective	Elective Modules	7	
	Summer Sen	nester (4th Semester)	approx.	30 CP
Master's Thesis			СР	
4. Semester 30 CP	Compulsory	Master's Thesis	30	X
30 Ci				
120 CP in total				
120 CP in total	Date:	Signature Student:		

In the 1st and 3rd semester you can see the modules that are offered every winter semester Study Plan (AIMS) Specialization: Chemical Synthesis and Drug D Matricle Number: approx. 30 CP Winter Semester (1st Semester) Winter Semester (3rd Semester) approx. 30 CP CP Advanced Machine Introduction to AIMS 5 X Learning and AI 1.-2. semester offered in German in winter semester) Mathematics for Engineers A 8 26 CP (total) 2.-3. Semester Computer Lab Pattern Recognition 5 Programming in Python and Python Lab 8 15 CP (total) Advanced Inorganic Chemistry Basic Module Organometallic Chemistry 4 Organic Synthesis Planning 4 choose 1 of 2 nzyme Engineering 10 Specialization (4 CP) Elective Specialization undamentals of Protein Structure Analysis **Chemical Synthesis** Advanced Inorganic Chemistry 8 (16-20 CP) **Chemical Synthesis** Organic Synthesis Planning and Drug Design 8 and Drugs Machine Learning in Computational Chemistry 1.-3. Semester) Sum of achieved CP for Specialization 1.-3. Semester 37 CP (total) Fundamentals of Protein Structure Analysis 37 CP (total) (16-20 CP) 8 Advanced Theoretical Chemistry esearch Lab 13-17 X Compulsory Machine Learning in Computational Chemistry (13-17 CP) 7 CP - (A + B + C) = CP Research Lab A) Sum of achieved CP for Specialization **Key Qualifications** Ethics and Epistemology **Key Qualifications** Compulsory 1.-3. Semester thics and Epistemology Elective Modules 1.-3. Semester lective Modules 12 CP (total) Elective Summer Semester (2nd Semester) approx. 30 CP Summer Semester (4th Semester) approx. 30 CP Foundations Master's Thesis Scientific Software Engineering – Lab Master's Thesis 30 x 4. Semester Compulsory Machine Learning for Data Science **Advanced Machine** Pattern Recognition Learning and AI Computer Lab Pattern Recognition 5 120 CP in total 2.-3. Semester Deep Learning Lab 15 CP (total) Methods of Uncertainty Analysis and Quantification Signature Student: Compulsory Basic Module Reaction Mechanisms Signature Mentor: 4 Specialization choose 1 of 2 hemical Synthesis an (4 CP) **Drug Design** 1.-3. semester Elective Catalysis 37 CP (total) (16-20 CP) Biomolecular Modelling B) Sum of achieved CP for Specialization For the master's degree, you need a total of **Key Qualifications** Elective Modules 1.-3. Semester Elective 120 CP

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

Study Plan (AIMS)



	Technische Universität Braunschweig
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Year of Enrollment:

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.

Matricle Number:		Mentor:			
	Winter Sem	ester (1st Semester)	approx.	30 CP	
			СР		
Foundations	Compulsory	Introduction to AIMS	5	х	
12. semester 26 CP (total)		Mathematics for Engineers A	8	х	
26 CP (total)		Programming in Python and Python Lab	8	х	
	Compulsory				
	Basic Module	Organometallic Chemistry	4		
Specialization	choose 1 of 2 (4 CP)				
Chemical Synthesis		Advanced Inorganic Chemistry	8		
and Drug Design		Organic Synthesis Planning	4		
13. Semester	Elective	Enzyme Engineering	10		
37 CP (total)	(16-20 CP)	Fundamentals of Protein Structure Analysis	10		
	(10-20 CP)	Advanced Theoretical Chemistry	8		
		Machine Learning in Computational Chemistry	0		

Key Qualifications

1.-3. Semester

Compulsory

A) Sum of achieved CP for Specialization

thics and Epistemology

Elective Modules

Summer Semester (2nd Semester)			approx. 30 CF	
Foundations 12. Semester 26 CP (total)	Compulsory	Sientific Software Engineering – Lab	CP 5	X
Advanced Machine Learning and Al 23. Semester 15 CP (total)	Elective	achine Learning for Data Science fattern Recognition Omputer Lab Pattern Recognition Leep Learning Lab Nethods of Uncertainty Analysis and Quantification	5 5 5 5	
Specialization Chemical Synthesis an I Drug Design	Compulsory Basic Module choose 1 of 2 (4 CP)	Faction Mechanisms	4	
13. semester 37 CP (total)	Elective (16-20 CP)	Citalysis Eomolecular Modelling E Sum of achieved CP for Specialization	8	
Key Qualifications 13. Semester 12 CP (total)	Elective	E ective Modules	7	

Winter Semester (3rd Semester)		approx. 30 CP	
		CP	
	Pattern Recognition		
Elective	(offered in German in winter semester)	5	
	Computer Lab Pattern Recognition	5	
	Advanced Inorganic Chemistry	8	
	Organic Synthesis Planning	4	
Floreton	Enzyme Engineering	10	
	Fundamentals of Protein Structure Analysis	10	
(16-20 CP)	Advanced Theoretical Chemistry	8	
	Machine Learning in Computational Chemistry	8	
	C) Sum of achieved CP for Specialization		
Compulsory	Research Lah	13-17	X
(13-17 CP)	37 CP - (A + B + C) = CP Research Lab	13-17	^
			•
Compulsory	Ethics and Epistemology	5	X
Elective	Elective Modules	7	
	Elective Elective (16-20 CP) Compulsory (13-17 CP) Compulsory	Elective Pattern Recognition (offered in German in winter semester)	Pattern Recognition CP

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

4. Semester 30 CP			
120 CP in total			

Master's Thesis

Date:	Signature Student:	
	Signature Mentor:	

Master's Thesis

approx. 30 CP

30 x

Summer Semester (4th Semester)

The Advanced Machine Learning and AI modules The **Foundations** should be taken in the 1st should be taken in the 2nd and 3rd semester (winter and 2nd semester (winter and summer and summer semester). You must choose 3 elective semester). These modules are compulsory modules worth 5 CP each so that you accumulate a and comprise a total of 26 CP. total of 15 CP. Winter Semester (1st Semester) approx. 30 CP Winter Semester (3rd Semester) approx. 30 CP approx. 30 CP **Foundations** cientific Software Engineering - Lab 5 x Pattern Recognition 1.-2. Semester ntroduction to AIMS Compulsory Learning and AI (offered in German in winter semester) 1.-2. semester Elective Mathematics for Engineers A 8 х 2.-3. Semester Computer Lab Pattern Recognition 26 CP (total) Machine Learning for Data Science 5 Advanced Machi rogramming in Python and Python Lab Pattern Recognition 5 Learning and AI Advanced Inorganic Chemistry Compulsory omputer Lab Pattern Recognition 5 Elective 2.-3. Semester Organic Synthesis Planning 4 Basic Module eep Learning Lab 5 rganometallic Chemistry 15 CP (total) choose 1 of 2 ethods of Uncertainty Analysis and Quantification Enzyme Engineering 10 Elective 10 Specialization (4 CP) Specialization undamentals of Protein Structure Analysis Compulsory (16-20 CP) Advanced Theoretical Chemistry **Chemical Synthesis** 8 Chemical Synthesis Advanced Inorganic Chemistry **Basic Module** eaction Mechanisms 4 Specialization and Drugs Machine Learning in Computational Chemistry 8 and Drug Design Organic Synthesis Planning choose 1 of 2 emical Synthesis an C) Sum of achieved CP for Specialization 1.-3. Semester 1.-3. Semester nzyme Engineering 10 Elective **Drug Design** 37 CP (total) 37 CP (total) undamentals of Protein Structure Analysis 10 (16-20 CP) 1.-3. semester Compulsory 13-17 X Elective Catalysis dvanced Theoretical Chemistry 8 37 CP (total) (13-17 CP) 37 CP - (A + B + C) = CP Research Lab Machine Learning in Computational Chemistry (16-20 CP) molecular Modelling 8 Sum of achieved CP for Specialization) Sum of achieved CP for Specialization **Key Qualification Key Qualification** Compulsory **Key Qualification** Compulsory Ethics and Epistemology ective Modules 7 thics and Epistemology 1.-3. Semester Elective 1.-3. Semester Elective Modules 1.-3. Semester 12 CP (total) ective Modules Elective 12 CP (total) Elective Summer Semester (4th Semester) approx. 30 CF Master's Thesis Master's Thesis 30 x Semester Compulsory 30 CP 120 CP in total The **Key Qualifications** should be completed in the 1st, 2nd, and

3rd semester and comprise a total of **12 CP**.

elective modules (e.g., language courses).

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**

Study Plan (AIMS)





Name:	Year of Enrollment:
Matricle Number:	Mentor:

Winter Semester (1st Semester)			approx. 30 C	
			СР	
Foundations	Compulsory	Introduction to AIMS	5	X
12. semester 26 CP (total)		Mathematics for Engineers A	8	X
20 CF (total)		Programming in Python and Python Lah	8	х
	Compulsory			$\overline{}$
Specialization Chemical Synthesis and Drug Design 13. Semester 37 CP (total)	Basic Module choose 1 of 2 (4 CP)	Organometallic Chemistry	4	\blacksquare
		Advanced Inorganic Chemistry	8	\top
		Organic Synthesis Planning	4	
	Flective	Enzyme Engineering	10	
	Licetive	Fundamentals of Protein Structure Analysis	10	
	(16-20 CP)	Advanced Theoretical Chemistry	8	П
		Machine Learning in Computational Chemistry	8	T
		A) Sum of achieved CP for Specialization		丆
Key Qualifications	Compulsory	Ethics and Epistemology	5	X
13. Semester 12 CP (total)	Elective	Elective Modules	7	

Summer Semester (2nd Semester)		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 Al		Pattern Recognition	5	
23. Semester	Elective	Computer Lab Pattern Recognition	5	
23. Semester 15 CP (total)		Deep Learning Lab	5	
		Methods of Uncertainty Analysis and Quantification	5	
	Compulsory			$\overline{}$
Specialization Chemical Synthesis and Drug Design 13. semester	Basic Module choose 1 of 2 (4 CP)	Reaction Mechanisms	4	1
	Elective	Catalysis	8	-
37 CP (total)	(16-20 CP)	Biomolecular Modelling	8	1
		B) Sum of achieved CP for Specialization		y
key Qualifications				
13. Semester	Elective	Elective Modules	7	
12 CP (total)				

Winter Semester (3rd Semester)			approx. 30 (
Advanced Machine			СР	
Learning and Al 23. Semester 15 CP (total)	Elective	Pattern Recognition		
		(offered in German in winter semester)	5	
		Computer Lab Pattern Recognition	5	
	Elective (16-20 CP)	Advanced Inorganic Chemistry	8	
		Organic Synthesis Planning	4	
		Enzyme Engineering	10	
Specialization		Fundamentals of Protein Structure Analysis	10	
Chemical Synthesis and Drugs 13. Semester 37 CP (total)		Advanced Theoretical Chemistry	8	
		Machine Learning in Computational Chemistry	8	
		C) Sum of achieved CP for Specialization		Г
	Compulsory	Research Lab	13-17	х
	(13-17 CP)	37 CP - (A + B + C) = CP Research Lab		Г
Variable and the second	0			
Key Qualifications 13. Semester	Compulsory	Ethics and Epistemology	5	X
13. Semester 12 CP (total)	Elective	Elective Modules	7	
and the feetall	Licetive			

mpulsory	Master's Thesis	CP 30	x
			_
		Signature Student:	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 - 4 CP

Note: in the Chemical Synthesis and Drug Design specialization, you can choose between two basic modules; you must complete one of them.

Elective Modules – 16 to 20 CP

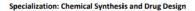
You can choose from the remaining specialization elective modules so that you earn 16 to 20 CP.

Research Lab – 13 to 17 CP

The CP earned from the Basic Module and the Elective Modules are added together, in total 20 to 24 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 13 to 17 CP.

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

Study Plan (AIMS)



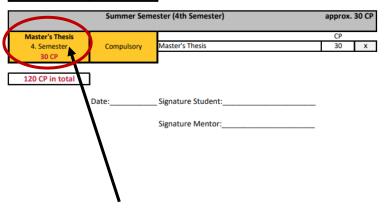


Name:	Year of Enrollment:
Matricle Number:	Mentor:

Winter Semester (1st Semester)			approx. 30	
			СР	
Foundations	Compulsory	Introduction to AIMS	5	x
12. semester 26 CP (total)		Mathematics for Engineers A	8	х
20 CF (total)		Programming in Python and Python Lab	8	х
	Compulsory			
	Basic Module	Organometallic Chemistry	4	
Specialization Chemical Synthesis and Drug Design 13. Semester 37 CP (total)	choose 1 of 2 (4 CP)	,		Г
	(1.20)	Advanced Inorganic Chemistry	8	
		Organic Synthesis Planning	4	
	Elective	Enzyme Engineering	10	
	(16-20 CP)	Fundamentals of Protein Structure Analysis	10	
		Advanced Theoretical Chemistry	8	
		Machine Learning in Computational Chemistry	8	
		A) Sum of achieved CP for Specialization		
Key Qualifications	Compulsory	Ethics and Epistemology	5	х
13. Semester		Elective Modules	7	_
12 CP (total)	Elective			

Summer Semester (2nd Semester)		approx.	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	
		Pattern Recognition	5	
Learning and AI 23. Semester 15 CP (total)	Elective	Computer Lab Pattern Recognition	5	
		Deep Learning Lab	5	
		Methods of Uncertainty Analysis and Quantification	5	
	Compulsory			
Specialization Chemical Synthesis and Drug Design 13. semester	Basic Module choose 1 of 2	Reaction Mechanisms	4	
	(4 CP)			
	Flective	Catalysis	8	
37 CP (total)	2.000.70	Biomolecular Modelling	8	\vdash
	(16-20 CP)	B) Sum of achieved CP for Specialization	0	
Key Qualifications				•
13. Semester	Elective	Elective Modules	7	
12 CP (total)				

Winter Semester (3rd Semester)			approx. 30 CP	
Advanced Machine	1		СР	
	Elective	Pattern Recognition		
Learning and Al 23. Semester		(offered in German in winter semester)	5	
15 CP (total)		Computer Lab Pattern Recognition	5	
	Elective (16-20 CP)	Advanced Inorganic Chemistry	8	
		Organic Synthesis Planning	4	
		Enzyme Engineering	10	
Specialization Chemical Synthesis and Drugs 13. Semester 37 CP (total)		Fundamentals of Protein Structure Analysis	10	
		Advanced Theoretical Chemistry	8	
		Machine Learning in Computational Chemistry	8	
		C) Sum of achieved CP for Specialization		\Box
	Compulsory	Research Lab	13-17	х
	(13-17 CP)	37 CP - (A + B + C) = CP Research Lab		一
		_		
Key Qualifications	Compulsory	Ethics and Epistemology	5	X
13. Semester 12 CP (total)	Elective	Elective Modules	7	
12 CP (total)	2.30070			



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.