

Instructions for Completing the Study Plan

Specialization: Spectroscopy and Imaging

Study Plan (AIMS)

Specialization: Spectroscopy and Imaging



Name: _____ Year of Enrollment: _____
Matricule Number: _____ Mentor: _____

Winter Semester (1st Semester)		approx. 30 CP	
Foundations 1.-2. Semester 26 CP (total)	Compulsory	CP	
		Introduction to AIMS	5 x
		Mathematics for Engineers A	8 x
		Programming in Python and Python Lab	8 x
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8
		Modern Optical Methods and Imaging	8
		Solar and Chemical Energy Conversion*	8
		Physical Biology of the Cell	10
		Chemometrics	5
		Theoretical Spectroscopy	8
		Machine Learning in Computational Chemistry	8
		A) Sum of achieved CP for Specialization	
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5 x
	Elective	Elective Modules	7

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

Summer Semester (2nd Semester)		approx. 30 CP	
Foundations 1.-2. Semester 26 CP (total)	Compulsory	CP	
		Scientific Software Engineering – Lab	5 x
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Machine Learning for Data Science	5
		Pattern Recognition	5
		Computer Lab Pattern Recognition	5
		Deep Learning Lab	5
		Methods of Uncertainty Analysis and Quantification	5
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Compulsory Basic Module (5 CP)	Molecular Spectroscopy	5 x
	Elective (16-20 CP)	Solar and Chemical Energy Conversion*	8
		Sophisticated Imaging	10
		B) Sum of achieved CP for Specialization	
Key Qualifications 1.-3. Semester 12 CP (total)	Elective	Elective Modules	7

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

Winter Semester (3rd Semester)		approx. 30 CP	
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	CP	
		Pattern Recognition (offered in German in winter semester)	5
		Computer Lab Pattern Recognition	5
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8
		Modern Optical Methods and Imaging	8
		Solar and Chemical Energy Conversion*	8
		Physical Biology of the Cell	10
		Chemometrics	6
		Theoretical Spectroscopy	8
		Machine Learning in Computational Chemistry	8
		C) Sum of achieved CP for Specialization	
	Compulsory (12-16 CP)	Research Lab	12-16 x
		37 CP = (A + B + C) = CP Research Lab	
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5 x
	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			CP	
		Master's Thesis		30	x
120 CP in total					

Date: _____ Signature Student: _____

Signature Mentor: _____

In the 1st and 3rd semester you can see the modules that are offered every winter semester

Study Plan (AIMS)
Specialization: Spectroscopy and Imaging

Name: _____ Year of Enrollment: _____
Matricule Number: _____ Mentor: _____



Winter Semester (1st Semester)		approx. 30 CP	
Foundations 1.-2. Semester 26 CP (total)	Compulsory	Introduction to AIMS	5 x
		Mathematics for Engineers A	8 x
		Programming in Python and Python Lab	8 x
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8
		Modern Optical Methods and Imaging	8
		Solar and Chemical Energy Conversion*	8
		Physical Biology of the Cell	10
		Chemometrics	5
		Theoretical Spectroscopy	8
		Machine Learning in Computational Chemistry	8
		A) Sum of achieved CP for Specialization	
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5 x
	Elective	Elective Modules	7

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

Summer Semester (2nd Semester)		approx. 30 CP	
Foundations 1.-2. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5 x
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Machine Learning for Data Science	5
		Pattern Recognition	5
		Computer Lab Pattern Recognition	5
		Deep Learning Lab	5
		Methods of Uncertainty Analysis and Quantification	5
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Compulsory Basic Module (5 CP)	Molecular Spectroscopy	5 x
	Elective (16-20 CP)	Solar and Chemical Energy Conversion*	8
		Sophisticated Imaging	10
		B) Sum of achieved CP for Specialization	
	Elective	Elective Modules	7

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

Winter Semester (3rd Semester)		approx. 30 CP	
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Pattern Recognition (offered in German in winter semester)	5
		Computer Lab Pattern Recognition	5
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8
		Modern Optical Methods and Imaging	8
		Solar and Chemical Energy Conversion*	8
		Physical Biology of the Cell	10
		Chemometrics	6
		Theoretical Spectroscopy	8
		Machine Learning in Computational Chemistry	8
		C) Sum of achieved CP for Specialization	
	Compulsory (12-16 CP)	Research Lab	12-16 x
		37 CP - (A + B + C) = CP Research Lab	
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5 x
	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	30 x

120 CP in total

Date: _____ Signature Student: _____

Signature Mentor: _____

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

Study Plan (AIMS) Specialization: Spectroscopy and Imaging



Name: _____ Year of Enrollment: _____
Matricule Number: _____ Mentor: _____

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.

Winter Semester (1st Semester) approx. 30 CP			
Foundations 1.-2. Semester 26 CP (total)	Compulsory	Introduction to AIMS	5 x
		Mathematics for Engineers A	8 x
		Programming in Python and Python Lab	8 x
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8
		Modern Optical Methods and Imaging	8
		Solar and Chemical Energy Conversion*	8
		Physical Biology of the Cell	10
		Chemometrics	5
		Theoretical Spectroscopy	8
		Machine Learning in Computational Chemistry	8
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	A) Sum of achieved CP for Specialization	
	Compulsory	Ethics and Epistemology	5 x
	Elective	Elective Modules	7

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

Summer Semester (2nd Semester) approx. 30 CP			
Foundations 1.-2. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5 x
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Machine Learning for Data Science	5
		Pattern Recognition	5
		Computer Lab Pattern Recognition	5
		Deep Learning Lab	5
		Methods of Uncertainty Analysis and Quantification	5
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Compulsory Basic Module (5 CP)	Molecular Spectroscopy	5 x
	Elective (16-20 CP)	Solar and Chemical Energy Conversion*	8
		Sophisticated Imaging	10
		B) Sum of achieved CP for Specialization	
Key Qualifications 1.-3. Semester 12 CP (total)	Elective	C) Sum of achieved CP for Specialization	
	Elective	Elective Modules	7

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

Winter Semester (3rd Semester) approx. 30 CP			
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Pattern Recognition <i>(offered in German in winter semester)</i>	5
		Computer Lab Pattern Recognition	5
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8
		Modern Optical Methods and Imaging	8
		Solar and Chemical Energy Conversion*	8
		Physical Biology of the Cell	10
		Chemometrics	6
		Theoretical Spectroscopy	8
	Compulsory (12-16 CP)	Machine Learning in Computational Chemistry	8
		C) Sum of achieved CP for Specialization	
		Research Lab	12-16 x
		37 CP - (A + B + C) = CP Research Lab	
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5 x
	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		CP	
		Master's Thesis	30	x
120 CP in total				

Date: _____ Signature Student: _____

Signature Mentor: _____

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

The **Foundations** should be taken in the 1st and 2nd semester (winter and summer semester). These modules are **compulsory** and comprise a total of **26 CP**.

The **Advanced Machine Learning and AI** modules should be taken in the 2nd and 3rd semester (winter and summer semester). You must **choose 3 elective modules worth 5 CP each** so that you accumulate a total of **15 CP**.

Winter Semester (1st Semester)			approx. 30 CP	
Foundations 1.-2. Semester 26 CP (total)	Compulsory	CP		
		Introduction to AIMS	5	x
		Mathematics for Engineers A	8	x
		Programming in Python and Python Lab	8	x
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8	
		Modern Optical Methods and Imaging	8	
		Solar and Chemical Energy Conversion*	8	
		Physical Biology of the Cell	10	
		Chemometrics	5	
		Theoretical Spectroscopy	8	
		Machine Learning in Computational Chemistry	8	
		A) Sum of achieved CP for Specialization		
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5	x
	Elective	Elective Modules	7	

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

Summer Semester (2nd Semester)			approx. 30 CP		
Foundations 1.-2. Semester 26 CP (total)	Compulsory	CP			
		Scientific Software Engineering – Lab	5	x	
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Machine Learning for Data Science	5		
		Pattern Recognition	5		
		Computer Lab Pattern Recognition	5		
		Deep Learning Lab	5		
		Methods of Uncertainty Analysis and Quantification	5		
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Compulsory Basic Module (5 CP)	Molecular Spectroscopy	5	x	
	Elective (16-20 CP)	Solar and Chemical Energy Conversion*	8		
		Sophisticated Imaging	10		
Key Qualifications 1.-3. Semester 12 CP (total)	Elective	B) Sum of achieved CP for Specialization			
		Elective Modules	7		

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

Winter Semester (3rd Semester)			approx. 30 CP		
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	CP			
		Pattern Recognition <i>(offered in German in winter semester)</i>	5		
		Computer Lab Pattern Recognition	5		
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8		
		Modern Optical Methods and Imaging	8		
		Solar and Chemical Energy Conversion*	8		
		Physical Biology of the Cell	10		
		Chemometrics	6		
		Theoretical Spectroscopy	8		
		Machine Learning in Computational Chemistry	8		
	Compulsory (12-16 CP)	C) Sum of achieved CP for Specialization			
		Research Lab	12-16		x
		37 CP - (A + B + C) = CP Research Lab			
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5		x
	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	CP			
		Master's Thesis	30	x	
120 CP in total					

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: _____

Matriculation Number: _____ Mentor: _____

Winter Semester (1st Semester)			approx. 30 CP		
Foundations 1.-2. Semester 26 CP (total)	Compulsory		CP		
		Introduction to AIMS	5	x	
		Mathematics for Engineers A	8	x	
		Programming in Python and Python Lab	8	x	
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8		
		Modern Optical Methods and Imaging	8		
		Solar and Chemical Energy Conversion*	8		
		Physical Biology of the Cell	10		
		Chemometrics	5		
		Theoretical Spectroscopy	8		
		Machine Learning in Computational Chemistry	8		
		A) Sum of achieved CP for Specialization			
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5	x	
	Elective	Elective Modules	7		

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

Summer Semester (2nd Semester)			approx. 30 CP		
Foundations 1.-2. Semester 26 CP (total)	Compulsory		CP		
		Scientific Software Engineering – Lab	5	x	
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Machine Learning for Data Science	5		
		Pattern Recognition	5		
		Computer Lab Pattern Recognition	5		
		Deep Learning Lab	5		
		Methods of Uncertainty Analysis and Quantification	5		
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Compulsory Basic Module (5 CP)	Molecular Spectroscopy	5	x	
	Elective (16-20 CP)	Solar and Chemical Energy Conversion*	8		
		Sophisticated Imaging	10		
		B) Sum of achieved CP for Specialization			
	Elective	Elective Modules	7		

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

Winter Semester (3rd Semester)			approx. 30 CP		
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective		CP		
		Pattern Recognition (offered in German in winter semester)	5		
		Computer Lab Pattern Recognition	5		
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8		
		Modern Optical Methods and Imaging	8		
		Solar and Chemical Energy Conversion*	8		
		Physical Biology of the Cell	10		
		Chemometrics	6		
		Theoretical Spectroscopy	8		
		Machine Learning in Computational Chemistry	8		
		C) Sum of achieved CP for Specialization			
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory (12-16 CP)	Research Lab	12-16	x	
		37 CP - (A + B + C) = CP Research Lab			
	Compulsory	Ethics and Epistemology	5	x	
	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		CP		
		Master's Thesis	30	x	
120 CP in total					

Date: _____ 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: _____

Matriculation Number: _____

Mentor: _____

Winter Semester (1st Semester)				approx. 30 CP
Foundations 1.-2. Semester 26 CP (total)	Compulsory		CP	
		Introduction to AIMS	5	x
		Mathematics for Engineers A	8	x
		Programming in Python and Python Lab	8	x
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8	
		Modern Optical Methods and Imaging	8	
		Solar and Chemical Energy Conversion*	8	
		Physical Biology of the Cell	10	
		Chemometrics	5	
		Theoretical Spectroscopy	8	
		Machine Learning in Computational Chemistry	8	
		A) Sum of achieved CP for Specialization		
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5	x
	Elective	Elective Modules	7	

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

Summer Semester (2nd Semester)				approx. 30 CP
Foundations 1.-2. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	x
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Machine Learning for Data Science	5	
		Pattern Recognition	5	
		Computer Lab Pattern Recognition	5	
		Deep Learning Lab	5	
		Methods of Uncertainty Analysis and Quantification	5	
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Compulsory Basic Module (5 CP)	Molecular Spectroscopy	5	x
	Elective (16-20 CP)	Solar and Chemical Energy Conversion*	8	
		Sophisticated Imaging	10	
		B) Sum of achieved CP for Specialization		
	Elective	Elective Modules	7	

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

Winter Semester (3rd Semester)				approx. 30 CP
Advanced Machine Learning and AI 2.-3. Semester 15 CP (total)	Elective	Pattern Recognition (offered in German in winter semester)	5	
		Computer Lab Pattern Recognition	5	
Specialization Spectroscopy and Imaging 1.-3. Semester 37 CP (total)	Elective (16-20 CP)	Biophysical Chemistry	8	
		Modern Optical Methods and Imaging	8	
		Solar and Chemical Energy Conversion*	8	
		Physical Biology of the Cell	10	
		Chemometrics	6	
		Theoretical Spectroscopy	8	
		Machine Learning in Computational Chemistry	8	
		C) Sum of achieved CP for Specialization		
	Compulsory (12-16 CP)	Research Lab	12-16	x
		37 CP - (A + B + C) = CP Research Lab		
Key Qualifications 1.-3. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5	x
	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 120 CP in total	Compulsory		CP	
		Master's Thesis	30	x

Date: _____ Signature Student: _____

Signature Mentor: _____

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.