# Instructions for Completing the Study Plan Specialization: Data-Driven Biology

# Study Plan (AIMS) Specialization: Data-Driven Biology



Name:	Year of Enrollment:
Matricle Number:	Mentor:

Winter Semester (1st Semester)		approx. 30 CP		
			СР	
Foundations	Committee of	Introduction to AIMS	5	x
12. Semester 26 CP (total)	Compulsory	Mathematics for Engineers A	8	x
26 CP (total)		Programming in Python and Python Lab	8	x
Specialization  Data-Driven Biology  13. Semester  37 CP (total)	Elective (10-15 CP)	Applied bioinformatics: biomarkers for diagnosis  A) Sum of achieved CP for Specialization	10	
Key Qualifications	Compulsory	Ethics and Epistemology	5	×
13. Semester 12 CP (total)	Elective	Elective Modules	7	

	Summer Semester (2nd Semester)			30 CP
Foundations			СР	
12. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	X
		Machine Learning for Data Science	5	
<b>Advanced Machine</b>		Pattern Recognition	5	
Learning and AI	Elective	Computer Lab Pattern Recognition	5	
23. Semester	Elective	Deep Learning Lab	5	
15 CP (total)		Methods of Uncertainty Analysis and Quantification	5	
Specialization	Compulsory Basic Module (10 CP)	Molecular Microbial Evolution and Diversity	10	X
Data-Driven Biology		Immunometabolism	10	
13. Semester		Network Biology	5	
37 CP (total)	Elective (10-15 CP)	Functional Genomics in Infection Biology	10	
		Microbial Proteomics	10	
		B) Sum of achieved CP for Specialization		
Key Qualifications				_
13. Semester	Elective	Elective Modules	7	
12 CP (total)		1		

Winter Semester (3rd Semester)			approx.	30 CP
Advanced Machine Learning and AI 23. Semester 15 CP (total)	Elective	Pattern Recognition (offered in German in winter semester) Computer Lab Pattern Recognition	CP 5 5	
Specialization  Data-Driven Biology	Elective (10-15 CP)	Applied bioinformatics: biomarkers for diagnosis C) Sum of achieved CP for Specialization	10	
13. Semester 37 CP (total)	Compulsory (12-17 CP)	Research Lab 37 CP - (A + B + C) = CP Research Lab	12-17	х
Key Qualifications	Compulsory	Ethics and Epistemology	5	X
13. Semester 12 CP (total)	Elective	Elective Modules	7	

		Summer Seme	ster (4th Semester)	approx.	30 CI
1	Master's Thesis			CP	
	4. Semester	Compulsory	Master's Thesis	30	X
ı	30 CP				
1	120 CP in total	1			
		1			
		Date:	Signature Student:		

Signature Mentor:\_\_\_\_\_

In the 1<sup>st</sup> and 3<sup>rd</sup> semester you can see the modules that are offered every winter semester Study Plan (AIMS) Specialization: Data-Driven Biology Name: Year of Enrollment: Matricle Number: Winter Semester (1st Semester) Winter Semester (3rd Semester approx. 30 CP approx. 30 CP CP **Advanced Machine Foundations** attern Recognition Introduction to AIMS 5 Learning and AI 1.-2. Semester Compulsory Elective offered in German in winter semester) 2.-3. Semester Mathematics for Engineers A 8 x omputer Lab Pattern Recognition 26 CP (total) 15 CP (total) Programming in Python and Python Lab 8 Specialization Applied bioinformatics: biomarkers for diagnosis 10 pplied bioinformatics: biomarkers for diagnosis 10 **Data-Driven Biology** Elective (10-15 CP) Elective (10-15 CP) A) Sum of achieved CP for Specialization Specialization 1.-3. Semester Data-Driven Biology 37 CP (total) 1.-3. Semester **Key Qualifications** Compulsory 37 CP (total) Compulsory 12-17 x Ethics and Epistemology 1.-3. Semester (12-17 CP) 7 CP - (A + B + C) = CP Research Lab lective Modules 12 CP (total) **Key Qualifications** Compulsory thics and Epistemology Summer Semester (2nd Semester) 1.-3. Semester approx. 30 CP ective Modules 12 CP (total) Foundations CP 5 x 1.-2. Semester Compulsory Scientific Software Engineering – Lab Summer Semester (4th Semester) approx. 30 CP 26 CP (total) Machine Learning for Data Science Master's Thesis attern Recognition Advanced Machine 4. Semester Compulsory Master's Thesis 30 omputer Lab Pattern Recognition Learning and AI 2.-3. Semester eep Learning Lab 15 CP (total) Methods of Uncertainty Analysis and Quantification 120 CP in total Compulsory Signature Student: Basic Module Molecular Microbial Evolution and Diversity 10 x Specialization (10 CP) Signature Mentor: **Data-Driven Biology** mmunometabolism 10 1.-3. Semester Network Biology 37 CP (total) Elective (10-15 CP) Functional Genomics in Infection Biology 10 Microbial Proteomics 10 3) 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 2<sup>nd</sup> semester you can see the modules that are offered every summer semester

12 CP (total)

## Study Plan (AIMS)

Matricle Number:



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.

pecialization: Data-Driven Biology		AUNICAS IN	Braunschweig
	Year of	Enrollment:	

Winter Semester (1st Semester)			approx.	30 CP
			CP	
Foundations 12. Semester	Commulance	Introduction to AIMS	5	х
26 CP (total)	Compulsory	Mathematics for Engineers A	8	x
20 CP (total)		Programming in Python and Python Lab	8	x
Specialization  Data-Driven Biology  13. Semester  37 CP (total)	Elective (10-15 CP)	Applied bioinformatics: biomarkers for diagnosis  A) Sum of achieved CP for Specialization	10	
Key Qualifications	Compulsory	Ethics and Epistemology	5	X
13. Semester 12 CP (total)	Elective	Elective Modules	7	

Summer Semester (2nd Semester) a		approx. 30 CP		
Foundations			CP	
12. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	X
		Machine Learning for Data Science	5	
Advanced Machine		Pattern Recognition	5	
Learning and AI	Flooting	Computer Lab Pattern Recognition	5	
23. Semester	Elective	Deep Learning Lab	5	
15 CP (total)		Methods of Uncertainty Analysis and Quantification	5	
Specialization	Compulsory Basic Module (10 CP)	Molecular Microbial Evolution and Diversity	10	X
Data-Driven Biology		mmunometabolism	10	
13. Semester		Network Biology	5	
37 CP (total)	Elective (10-15 CP)	Functional Genomics in Infection Biology	10	
	, , ,	Microbial Proteomics	10	
		B) Sum of achieved CP for Specialization		
Key Qualifications				•
13. Semester	Elective	Elective Modules	7	
12 CP (total)				

Winter Semester (3rd Semester)			approx.	30 CP
Advanced Machine Learning and Al 23. Semester 15 CP (total)	Elective	Pattern Recognition (offered in German in winter semester) Computer Lab Pattern Recognition	5 5	
Specialization  Data-Driven Biology	Elective (10-15 CP)	Applied bioinformatics: biomarkers for diagnosis C) Sum of achieved CP for Specialization	10	
13. Semester 37 CP (total)	Compulsory (12-17 CP)	Research Lab 37 CP - (A + B + C) = CP Research Lab	12-17	X
Key Qualifications	Compulsory	Ethics and Epistemology	5	х
12 CP (total)	Elective	Elective Modules	7	

30 x

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

120 CP in total			
	Date:	Signature Student:	
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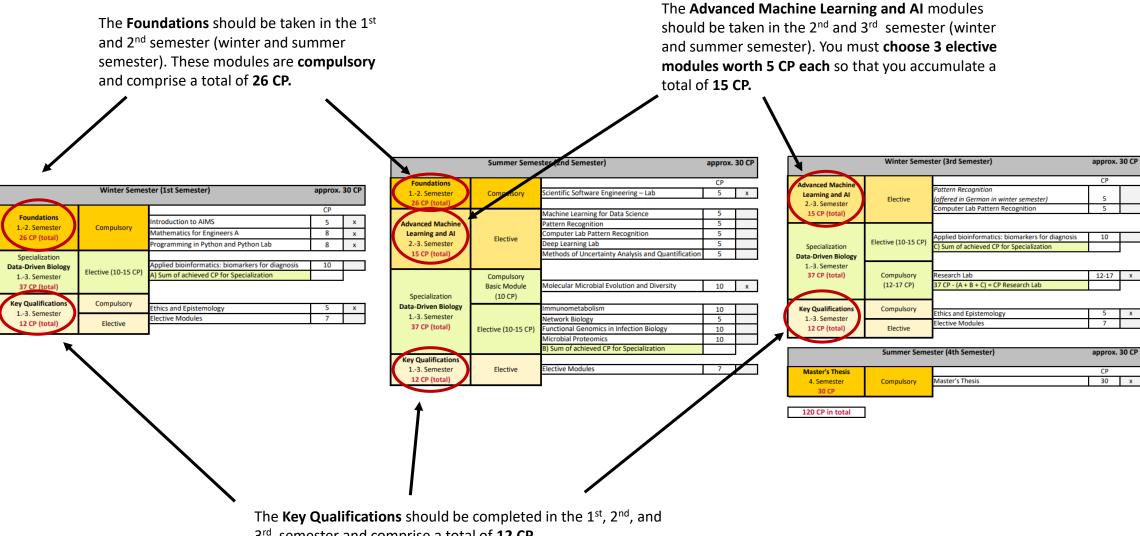
Signature Mentor:

Master's Thesis

Summer Semester (4th Semester)

Master's Thesis

4. Semester



The **Key Qualifications** should be completed in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> semester and comprise a total of **12 CP**.

It is advisable to complete the **compulsory Ethics and Epistemology** module (**5 CP**) in the 1<sup>st</sup> semester.

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

# Study Plan (AIMS) Specialization: Data-Driven Biology

	Technische Universität Braunschweig
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Name:	Year of Enrollment:
Matricle Number:	Mentor:

Winter Semester (1st Semester)			approx. 30 CP	
			СР	
Foundations	Constitution	Introduction to AIMS	5	х
12. Semester 26 CP (total)	Compulsory	Mathematics for Engineers A	8	х
26 CP (total)		Programming in Python and Python Lab	8	х
Specialization  Data-Driven Biology  13. Semester  37 CP (total)	Elective (10-15 CP)	Applied bioinformatics: biomarkers for diagnosis  A) Sum of achieved CP for Specialization	10	
Key Qualifications 13. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5	Х
	Elective	Elective Modules	7	

Summer Semester (2nd Semester)			approx. 30 CP	
Foundations			CP	
12. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	X
	Elective	Machine Learning for Data Science	5	
Advanced Machine		Pattern Recognition	5	
Learning and AI		Computer Lab Pattern Recognition	5	
23. Semester		Deep Learning Lab	5	
15 CP (total)		Methods of Uncertainty Analysis and Quantification	5	
Specialization  Data-Driven Biology  13. Semester  37 CP (total)	Compulsory Basic Module (10 CP)	Molecular Microbial Evolution and Diversity	10	х
	, , , ,	Immunometabolism	10	-
		Network Biology	5	
	Elective (10-15 CP)	Functional Genomics in Infection Biology	10	
		Microbial Proteomics	10	
		B) Sum of achieved CP for Specialization		
Key Qualifications				•
13. Semester	Elective	Elective Modules	7	
12 CP (total)				

	Winter Seme	ster (3rd Semester)	approx.	30 C
Advanced Machine			СР	
Learning and AI		Pattern Recognition	١.	
23. Semester	Elective	(offered in German in winter semester) Computer Lab Pattern Recognition	5	⊢
15 CP (total)		Computer Lab Pattern Recognition	- 3	
		Applied bioinformatics: biomarkers for diagnosis	10	$\vdash$
Specialization	Elective (10-15 CP)	C) Sum of achieved CP for Specialization		Г
Data-Driven Biology 13. Semester				
37 CP (total)	Compulsory	Research Lab	12-17	Х
	(12-17 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	_
	Summer Seme	ester (4th Semester)	approx.	30 C
Master's Thesis			СР	
4. Semester 30 CP	Compulsory	Master's Thesis	30	X
120 CP in total	]	_		
	Date:	_ Signature Student:		

## Specialization – 37 CP

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

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

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

Compulsory Basic Module - 10 CP

#### Flective Modules – 10 to 15 CP

You can choose from the remaining specialization elective modules so that you earn 10 to 15 CP.

### Research Lab - 12 to 17 CP

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

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

#### Study Plan (AIMS)



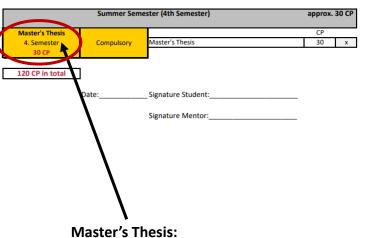
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Specialization:	Data-Driven	Biology

Name:	Year of Enrollment:
Matricle Number:	Mentor:

Winter Semester (1st Semester)		approx. 30 CP		
			СР	
Foundations	Committee	Introduction to AIMS	5	x
12. Semester 26 CP (total)		Mathematics for Engineers A	8	X
26 CP (total)		Programming in Python and Python Lab	8	x
Specialization  Data-Driven Biology  13. Semester  37 CP (total)	Elective (10-15 CP)	Applied bioinformatics: biomarkers for diagnosis  A) Sum of achieved CP for Specialization	10	
Key Qualifications 13. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5	X
	Elective	Elective Modules	7	

Summer Semester (2nd Semester)			approx.	approx. 30 CP	
Foundations			CP		
12. Semester 26 CP (total)	Compulsory	Scientific Software Engineering – Lab	5	Х	
		Machine Learning for Data Science	5		
Advanced Machine		Pattern Recognition	5		
Learning and AI	Elective	Computer Lab Pattern Recognition	5		
23. Semester	Elective	Deep Learning Lab	5		
15 CP (total)		Methods of Uncertainty Analysis and Quantification	5		
Specialization	Compulsory Basic Module (10 CP)	Molecular Microbial Evolution and Diversity	10	х	
Data-Driven Biology		Immunometabolism	10		
13. Semester 37 CP (total)		Network Biology	5		
	Elective (10-15 CP)	Functional Genomics in Infection Biology	10		
		Microbial Proteomics	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		
		B) Sum of achieved CP for Specialization			
Key Qualifications				_	
13. Semester 12 CP (total)	Elective	Elective Modules	7		

Winter Semester (3rd Semester)		approx. 30 CF		
Advanced Machine Learning and AI 23. Semester	Elective	Pattern Recognition (offered in German in winter semester) Computer Lab Pattern Recognition	CP 5	
Specialization Data-Driven Biology 13. Semester 37 CP (total)	Elective (10-15 CP)	Applied bioinformatics: biomarkers for diagnosis C) Sum of achieved CP for Specialization	10	
	Compulsory (12-17 CP)	Research Lab 37 CP - (A + B + C) = CP Research Lab	12-17	X
Key Qualifications 13. Semester 12 CP (total)	Compulsory	Ethics and Epistemology	5	X
	Elective	Elective Modules	7	



In the 4<sup>th</sup> 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.