Applied Computational Life Sciences

Examples of typical Study Plans

1. Students with Life Science Background, Fulltime Studies *Case 1*

	Specialisation Modules			Cluster Modules	Core Competences	Total ECTS
First Semester (Autumn)	Mathematical Modelling (5ECTS)	Programming, Data Structures and Algorithms (5ECTS)	Specialisation Track Module 1 (5 ECTS)	CO1 Modelling of Complex Systems (3 ECTS)	D1 Handling and Visualising Data (3 ECTS)	30
				CO2 Machine Learning (3 ECTS)	D2 (Design and Analysis of Experiments (3 ECTS)	
					D3 Modelling and Exploration of Multivariate Data (3 ECTS)	
Second Semester (Spring)	Relational Databases (2 ECTS)	Introduction to Neural Networks (2 ECTS)	Specialisation Track Module 2 (5 ECTS)	CO3 Optimisation and Bio-Inspried Algorithms (3 ECTS)	B3 Innovation and Project Management (3 ECTS)	30
	Advanced Data Architectures (3 ECTS)	Deep Learning (3 ECTS)	Software Engineering and Design Patterns (3ECTS)			
			Computational Life Science Seminar (3 ECTS)	CO4 Imaging for the Life Sciences (3 ECTS)		
Third Semester (Autumn)	Master's Thesis (30 ECTS)					30

Mandatory Modules	Elective Modules

Note: The elective modules presented here is one possible choice. You may choose other elective modules. The modules Relational Databases, Introduction to Neural Networks and D1 Handling and Visualising Data are required by following mandatory modules are thus marked as mandatory in this table. However, they become elective for students with a computational background if they have already fulfilled the requirements in previous studies.

2. Students with Life Science Background, Fulltime Studies *Case 2*

	Specialisation Modules			Cluster Modules	Core Competences	Total ECTS
First Semester (Autumn)	Mathematical Modelling (5ECTS)	Programming, Data Structures and Algorithms (5ECTS)	Specialisation Track Module 1 (5 ECTS)	CO1 Modelling of Complex Systems (3 ECTS)	D1 Handling and Visualising Data (3 ECTS)	30
				CO2 Machine Learning (3 ECTS)	D2 (Design and Analysis of Experiments (3 ECTS)	
					D3 Modelling and Exploration of Multivariate Data (3 ECTS)	
Second Semester (Spring)	Relational Databases (2 ECTS)	Introduction to Neural Networks (2 ECTS)	Specialisation Track Module 2 (5 ECTS)	CO3 Optimisation and Bio-Inspried Algorithms (3 ECTS)	B4 Politics and Scocienty (3 ECTS)	27
	Advanced Data Architectures (3 ECTS)	Deep Learning (3 ECTS)	Developing Software as a Product (3ECTS)			
			Elective Life Science Modules (3 ECTS)			
Third Semester (Autumn)	Advanced Deep Learning (3 ECTS)	Master's Thesis (30 ECTS)				33

Mandatory Modules	Elective Modules

Note: The elective modules presented here is one possible choice. You may choose other elective modules. The modules Relational Databases, Introduction to Neural Networks and D1 Handling and Visualising Data are required by following mandatory modules are thus marked as mandatory in this table. However, they become elective for students with a computational background if they have already fulfilled the requirements in previous studies.

3. Students with Computational Background, Fulltime Studies
Case 1

	Specialisation Modules			Cluster Modules	Core Competences	Total ECTS
First Semester (Autumn)	Mathematical Modelling (5ECTS)	Specialisation Track Module 1 (5 ECTS)	Elective Life Science Modules (3 ECTS)	CO1 Modelling of Complex Systems (3 ECTS)	D2 (Design and Analysis of Experiments (3 ECTS)	28
			Elective Life Science Modules (3 ECTS)		D3 Modelling and Exploration of Multivariate Data (3 ECTS)	
					D4 Data and Ethics (3 ECTS)	
Second Semester (Spring)	Advanced Data Architectures (3 ECTS)	Specialisation Track Module 2 (5 ECTS)	Software Engineering and Design Patterns (3ECTS)	CO3 Optimisation and Bio-Inspried Algorithms (3 ECTS)	B2 Management and Leadership for the Life Sciences (3 ECTS)	29
	Deep Learning (3 ECTS)		Developing Software as a Produc (3 ECTS)	CO4 Imaging for the Life Sciences (3 ECTS)	B3 Innovation and Project Management (3 ECTS)	
Third Semester (Autumn)	Advanced Deep Learning (3 ECTS)	Master's Thesis (30 ECTS)				33

4. Students with Computational Background, Fulltime Studies
Case 2

	Specialisation Modules			Cluster Modules	Core Comptetences	Total ECTS
First Semester (Autumn)	Mathematical Modelling (5ECTS)	Specialisation Track Module 1 (5 ECTS)	Elective Life Science Modules (3 ECTS)	CO1 Modelling of Complex Systems (3 ECTS)	D2 (Design and Analysis of Experiments (3 ECTS)	30
		Specialisation Track Module 2 (5 ECTS)			D3 Modelling and Exploration of Multivariate Data (3 ECTS)	
					D4 Data and Ethics (3 ECTS)	
Second Semester (Spring)	Advanced Data Architectures (3 ECTS)	Software Engineering and Design Patterns (3ECTS)	Elective Life Science Modules (3 ECTS)	CO3 Optimisation and Bio-Inspried Algorithms (3 ECTS)	B2 Management and Leadership for the Life Sciences (3 ECTS)	30
	Deep Learning (3 ECTS)	Developing Software as a Produc (3 ECTS)	Computational Life Science Seminar (3 ECTS)	CO4 Imaging for the Life Sciences (3 ECTS)	B3 Innovation and Project Management (3 ECTS)	
Third Semester (Autumn)	Master's Thesis (30 ECTS)					30

5. Students with Computational Background, Fulltime Studies
Case 4

	Specialisation Modules			Cluster Modules	Core Comptences	Total ECTS
First Semester (Autumn)	Mathematical Modelling (5ECTS)	Specialisation Track Module 1 (5 ECTS)	Elective Life Science Modules (3 ECTS)	CO1 Modelling of Complex Systems (3 ECTS)	D2 (Design and Analysis of Experiments (3 ECTS)	30
		Specialisation Track Module 2 (5 ECTS)			D3 Modelling and Exploration of Multivariate Data (3 ECTS)	
Second Semester (Spring)	Advanced Data Architectures (3 ECTS)	Software Engineering and Design Patterns (3ECTS)	Master's Thesis Milestone 1 (10 ECTS)	CO3 Optimisation and Bio-Inspried Algorithms (3 ECTS)	B2 Management and Leadership for the Life Sciences (3 ECTS)	31
	Deep Learning (3 ECTS)	Developing Software as a Produc (3 ECTS)			B3 Innovation and Project Management (3 ECTS)	
Third Semester (Autumn)	Advanced Deep Learning (3 ECTS)		Elective Life Science Modules (3 ECTS)		D4 Data and Ethics (3 ECTS)	29
	Master's Thesis Milestone 2 and 3 (20 ECTS)					

6. Parttime Studies

The studies can be planned over 4 to 7 semesters. Discuss your plans with the thesis supervisor and the study coordinator to make sure you have an optimal study plan.

Boundary Conditions:

- Core Competences you take at least 12 ECTS (i.e. 4 modules) *Core Competences*, of which are mandatory
    - o D1 *Handling and Visualising Data*
    - o D2 *Design and Analysis of Experiments* – D1 *Handling and Visualising Data is required* (if you have covered D1 *Handling and Visualising Data* in previous studies you may skip it)
    - o D3 *Modelling and Exploration of Multivariate Data* – D1 *Handling and Visualising Data is required* (if you have covered D1 *Handling and Visualising Data* in previous studies you may skip it)
- you take at least 9 ECTS (i.e. 3 modules) from Cluster Modules, of which are mandatory
    - o CO1 *Modelling of Complex Systems*
    - o CO2 *Machine Learning and Pattern Recognition*
    - o CO3 *Optimisation and Bio-Inspired Algorithms*
- you take at least 5 ECTS from
    - o *Programming, Algorithms and Data Structures* (5 ECTS) (if you have covered *Programming, Algorithms and Data Structures* in previous studies you may skip it)
    - o Software Development and Design Patterns (3 ECTS) – *Programming, Algorithms and Data Structures* or equivalent is a requirement
    - o *Developing Software as a Product* (3 ECTS) – *Programming, Algorithms and Data Structures* or equivalent is a requirement
- *Deep Learning* is mandatory and *Introduction to Neural Networks* and *Machine Learning and Pattern Recognition* or equivalent is a requirement (if you have covered *Introduction to Neural Networks* in previous studies you may skip it)
- *Advanced Data Architectures* is mandatory and *Relational Databases* or equivalent is a requirement (if you have covered *Relational Databases* in previous studies you may skip it)