Study and Examination Regulations for the Master's Program in Bioinformatics at the University of Potsdam

Dated December 13, 2017

The Faculty Committee of the Faculty of Science at the University of Potsdam has approved on December 13, 2017 the following degree and examination regulations on the basis of Section 19 subsection 1 and Section 22 subsection 1–2 in combination with Section 72 subsection 2 no. 1 of the Brandenburg Higher Education Act (BbgHG) of April 28, 2014 (Law and Ordinance Gazette [GVBl.] I/14, [no. 18]), last amended by Section 2 of the Act of July 1, 2015 (Law and Ordinance Gazette [GVBl.] I/15 [no. 18]) in combination with the Ordinance on the Design of Examination Regulations to Guarantee the Equivalency of Studies, Examinations, and Degrees (University Examination Ordinance - HSPV) of March 4, 2015 (GVBl. II/15 [no. 12]), and with Section 21 subsection 2 no. 1 of the Basic Constitution of the University of Potsdam (GrundO) dated December 17, 2009 (Bulletin UP no. 4/2010 p. 60) in the Fourth Amended Version of the Basic Constitution of the University of Potsdam (GrundO) of November 15, 2017 (Bulletin UP no. 19/2017 p. 1039) and Section 1 subsection 2 of the new version of the General Regulations for Study and Examinations for Bachelor's and Master's Degrees at the University of Potsdam Not For Teachers In Training dated January 30, 2013 (BAMA-O) (Bulletin UP no. 3/2013, p. 35), last amended on February 24, 2016 (Bulletin UP 7/2016, p. 560):[1]

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[1] Approved by the President of the University of Potsdam on February 15, 2018

§ 1   Applicability

(1) These regulations apply to the Master's program in Bioinformatics at the University of Potsdam. These discipline-specific regulations supplement the new version of the General Regulations for Study and Examinations for Bachelor's and Master's Degrees (not for teachers in training) at the University of Potsdam (BAMA-O).

(2) In the event that these regulations contradict the BAMA-O, then the provisions in the BAMA-O supersede these regulations.

§2   Degree

The Faculty of Science at the University of Potsdam awards the degree of "Master of Science" (abbreviated as "MSc") to students who have completed the necessary credit points and graduation requirements.

§ 3   Objectives of Program

(1) The Bioinformatics Master's program builds upon the knowledge, skills, abilities, and methods acquired during the Bachelor's degree course.

(2) The Bioinformatics Master's program links together the degree programs in biosciences and computer science at the University of Potsdam. It is an interdisciplinary, research-oriented Master's program with practical applications. The overall goal of this degree program is to impart scientific findings about the workings of living cells and organisms, the interactions between organisms, and their interrelations with the non-living environment as well as to enable students to analyze such workings and interrelationships scientifically as central themes of systems biology.

(3) By strengthening students' theoretical and practical skills and knowledge, the Master's program in Bioinformatics aims to lay the foundation for self-sufficient interdisciplinary work in Bioinformatics and prepare students to carry out future activities and tasks in research departments of universities or extramural institutions, biotechnology companies, or biomedicine companies, or to incorporate them in teaching and education. The Master's program may flow directly into doctoral studies.

(4) The objective of the Master's program in Bioinformatics is to provide students with sound, application-oriented knowledge of Bioinformatics including its underlying biology and computer science, its contexts, and the tools for applying it. The focus is on a *systems biology* perspective, and in particular on incorporating molecular-biological

data and modeling complex biological systems. Additional focuses of the Bioinformatics Master's program include the uses of bioinformatics methods for breeding high-yield plants and for identifying the mechanisms of action of small molecules as well as their pharmacological uses. The students will be guided towards self-sufficient scientific work in these fields. This includes the acquisition of a scientific mindset and the ability to test hypotheses using appropriate empirical or theoretical methods.

(5) By assigning group projects and encouraging team work, the Master's program in Bioinformatics aims to prepare students for discussions within and across fields. The research projects within the Bioinformatics Master's program promote self-reliance in students' development of application- and research-oriented tasks. In addition, this also facilitates the students' acquisition of results-oriented presentation skills and the ability to contemplate potential implications for society.

§ 4 Duration and Organization of Program

The Master's program in Bioinformatics is offered at the University of Potsdam as a single-discipline program with a standard period of study (full-time program) of 4 semesters and 120 credit points (CPs).

§ 5 Modules and Course of Study

(1) The Master's program in Bioinformatics is comprised of the following components:

Master's Degree		
Module Abbreviation	**Name of Module**	**CPs**
I Bridge Modules (max. 12 Cps)		
Under Section 3 of the Bioinformatics admission regulations (ZulO), the Examining Board may require students to complete one or two bridge modules (totaling a maximum of 12 CPs) upon admission to the Master's program. In the elective component (III), this reduces the scope of freely selectable modules to 24 or 30 CPs.		
I.1 Modules for students with a BSc in a biological discipline		
BIO-MBIB01	Introduction to Databases and Practical Programming	6
BIO-MBIB03	Programming Expertise	6
I.2 Modules for students with a BSc in a computer science discipline		
BIO-B-	State of the Art in Biochemistry	6

KM1	and Molecular Biology	
BIO-MBIB04	Molecular, Structural, and Evolutionary Biology for Informaticians	6
II Mandatory modules (36 CPs)		
BIO-MBIP01	Algorithmic and Mathematical Bioinformatics	6
BIO-MBIP02	Statistical Bioinformatics	6
BIO-MBIP03	Bioinformatics of Biological Sequences (Evolutionary Genomics)	6
BIO-MBIP04	Analysis of Cellular Networks	6
MAT-MBIP05	Introduction to Theoretical Systems Biology	6
BIO-MBIP06	Constraint-Based Modeling of Cellular Networks	6
III Elective modules (36 CPs)		
A total of 6 elective modules worth 36 credit points must be successfully completed. If the student has been obliged to complete two bridge modules under no. I, the number of credit points to be completed is reduced to 24 or 30 CPs (4 or 5 modules) depending on the number of mandatory modules to be completed.		
BIO-MBIW01	Data Integration in Cellular Networks	6
BIO-MBIW02	Advanced Methods for Analysis of Biochemical Networks	6
BIO-MBIW03	Quantitative Genetics	6
BIO-MBIW04	Image Processing and Phenotyping in Bioinformatics	6
BIO-MBIW05	Structural Bioinformatics	6
BIO-MBIW06	Machine Learning in Bioinformatics	6
BIO-MBIW07	Integration of Cellular Layers and Systems	6
BIO-MBIW08	Practical Sequence Analysis	6
IV Project (18 CPs)		
BIO-MBIV01	Project Work	18
Total CPs for mandatory and elective modules to be completed		90
V Master's Thesis (30 CPs)		

(2) Further details of the module descriptions for the modules listed in subsection 1 are governed by Appendix 1 of these regulations.

(3) The language of instruction in the Bioinformatics Master's program is English. Exceptions are possible.

(4) A sample course of study for the Master's program is provided in Appendix 2 of these regulations.

§ 6 Master's Thesis

(1) As soon as the student has completed 75 percent of the total credit points to be earned in the degree program, excluding the credit points for the thesis (72 points), and has successfully completed the core/mandatory modules, he or she must immediately propose a topic for his/her Master's thesis.

(2) The Master's thesis, including the oral defense, is equivalent to 30 credit points.

(3) The Master's thesis is written in English; this is a departure from Section 30 subsection 12 of BAMA-O.

§ 7 Passes

In the Master's program in Bioinformatics, students have two passes (non-binding exams).

§ 8 Stay Abroad

The third or fourth semester is especially suitable for a stay abroad.

§ 9 Weighting of Modules for Grading Purposes

In a deviation from Section 31 subsection 1 sentence 1 of BAMA-O, the modules are weighted as follows in order to determine the overall grade for the Master's program:

Name of Module	Weight
Mandatory and elective modules (90 CPs)	66.6%
Master's thesis	33.3%
Total	**100%**

§ 10 Application, Expiration, and Transitional Provisions

(1) These regulations take effect on the day after their publication in the Official Public Notices of the University of Potsdam.

(2) These regulations apply to all students who enroll in the Master's program in Bioinformatics at the University of Potsdam after these regulations are published officially.

(3) The regulations for the Master's program in Bioinformatics at the University of Potsdam dated February 18, 2010 (Bulletin UP no. 15/10, p. 352) will elapse on October 1, 2022.

(4) Students who are still studying under the regulations for the Master's program in Bioinformatics at the University of Potsdam dated February 18, 2010 (Bulletin UP no. 15/10, p. 352) under section 3 when the new discipline-specific regulations go into effect can apply to transfer into the new regulations under subsection 1 within one year of the new discipline-specific regulations going into effect. Previously completed coursework is recognized in accordance with the provisions of Section 16 of BAMA-O. Once the transition period under subsection 3 has lapsed, students who are still studying under the prior regulations will be officially transferred to the new discipline-specific regulations under subsection 1.

Appendix 1: Module Catalog

The descriptions of the program's modules listed in Section 5 subsection 1 and the tables below are governed by the statutes of the module catalog of the Faculty of Science as a supplement to the Bachelor's and Master's programs at the University of Potsdam (MK MNF). Supplementary regulations and/or deviations from the MK MNF are indicated in the tables that follow.

List of Modules:

Module Number	Module Name	CPs	Mand./ Elec.	Prerequisites
BIO-MBIB01	Introduction to Databases and Practical Programming	6	Mand.	Proviso under Section 3 of the Bioinformatics Admission Regulations
BIO-MBIB03	Programming Expertise	6	Mand.	Proviso under Section 3 of the Bioinformatics Admission Regulations Recommended: BIO-MBIB01
BIO-B-KM1	State of the Art in Biochemistry and Molecular Biology	6	Mand.	Proviso under Section 3 of the Bioinformatics Admission Regulations
BIO-MBIB04	Molecular, Structural, and Evolutionary Biology for Informaticians	6	Mand.	Proviso under Section 3 of the Bioinformatics Admission Regulations
BIO-MBIP01	Algorithmic and Mathematical Bioinformatics	6	Mand.	None
BIO-MBIP02	Statistical Bioinformatics	6	Mand.	None
BIO-MBIP03	Bioinformatics of Biological Sequences (Evolutionary Genomics)	6	Mand.	None
BIO-MBIP04	Analysis of Cellular Networks	6	Mand.	Recommended: BIO-MBIB01, BIO-B-KM1
MAT-MBIP05	Introduction to Theoretical Systems Biology	6	Mand.	Recommended: BIO-MBIP01 or BIO-MBIP02
BIO-MBIP06	Constraint-Based Modeling of Cellular Networks	6	Mand.	None
BIO-MBIW01	Data Integration in Cellular Networks	6	Elec.	None
BIO-MBIW02	Advanced Methods for Analysis of Biochemical Networks	6	Elec.	None
BIO-MBIW03	Quantitative Genetics	6	Elec.	None
BIO-MBIW04	Image Processing and Phenotyping in Bioinformatics	6	Elec.	None
BIO-MBIW05	Structural Bioinformatics	6	Elec.	None
BIO-MBIW06	Machine Learning in Bioinformatics	6	Elec.	None
BIO-MBIW07	Integration of Cellular Layers and Systems	6	Elec.	None
BIO-MBIW08	Practical Sequence Analysis	6	Elec.	None
BIO-MBIV01	Project Work	18	Mand.	Recommended: Successful completion of the mandatory modules of the 1st and 2nd semesters

CP = Number of credit points; Mand. = Mandatory module; Elec. = Elective module

Appendix : Sample Course of Study

Course of Study for the Master's Program in Bioinformatics

FS 1 Winter Semester	**BIO-MBIB01** Introduction to Databases and Practical Programming *or* **BIO-B-KM1** State of the Art in Biochemistry and Molecular Biology *or* Elective modules 4 semester hours / 6 CPs	**BIO-MBIP01** Algorithmic and Mathematical Bioinformatics 4 semester hours / 6 CPs	**BIO-MBIP02** Statistical Bioinformatics 4 semester hours / 6 CPs	**BIO-MBIP03** Bioinformatics of Biological Sequences (Evolutionary Genomics) 4 semester hours / 6 CPs	**BIO-MBIP06** Constraint-Based Modeling of Cellular Networks 4 semester hours / 6 CPs
FS 2 Summer Semester	**BIO-MBIB03** Programming Expertise *or* **BIO-MBIB04** Molecular, Structural, and Evolutionary Biology for Informaticians *or* Elective Modules 4 semester hours / 6 CPs	**BIO-MBIP04** Analysis of Cellular Networks 4 semester hours / 6 CPs	**MAT-MBIP05** Introduction to Theoretical Systems Biology 4 semester hours / 6 CPs	Elective module 4 semester hours / 6 CPs	Elective module 4 semester hours / 6 CPs
FS 3 Winter Semester	**BIO-MBIV01** Project Work 12 semester hours / 18 CPs			Elective module 4 semester hours / 6 CPs	Elective module 4 semester hours / 6 CPs
FS 4 Summer Semester	Master's Thesis 30 CPs				

Bridge modules	Mandatory module	Elective module	Project	Master's thesis