Study and Examination Regulations for the Master's Program in Data Science 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 Xxx ##, 2018

§ 1 Applicability

(1) These regulations apply to the master's degree in Data Science 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.

(3) The master's program is suitable for part-time study. Part-time study requires advising from the relevant faculty so that an individualized plan of study can be created. Proof of this advising must be attached to an application for part-time study in accordance with Section 3 of the Regulations for Part-Time Studies at the University of Potsdam (Part-Time Regulations). The provisions of the Part-Time Regulations also apply.

§ 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 Master's Program

(1) The research-oriented master's program in Data Science builds upon the knowledge, skills, abilities, and methods acquired during the bachelor's degree program. The students will:

- Earn a qualification for scientific/scholarly work in Data Science and for development and leadership roles in a company.
- Develop in-depth knowledge and understanding of machine learning, statistics, data assimilation, scientific modeling, business analytics, software engineering, and information infrastructure. They will be able to define and interpret the particularities, limits, terminologies, and doctrines in the field of computational intelligence.
- Be able to use their knowledge and understanding to develop and pursue self-sufficient ideas for defining research questions or solving application-oriented problems. They will possess a broad, detailed, and critical understanding of

the state of the art in one or more specialized subfields.

- Be able to apply their knowledge and understanding, as well as their facility in solving problems, in new and unfamiliar situations that stand in a broader and multidisciplinary connection to the field of Data Science.
- Be able to integrate knowledge, to handle complexity, and to reach scientifically sound decisions even on the basis of incomplete or limited data while accounting for social, scientific, and ethical findings that arise from applying their knowledge and from their decisions. They will be able to acquire new knowledge and skills self-sufficiently and, largely self-directed, carry out research projects or application-oriented projects.
- Be able to convey their conclusions and the underlying information and reasoning clearly and unambiguously at the state of the art of research and applications to laypeople and members of the field; to discuss information, ideas, problems, and solutions at a scholarly level with laypeople and members of the field; and to take on extra responsibility within a team.

§ 4 Duration and Organization of Master's Studies

The consecutive, research-oriented master's program in Data Science is offered at the University of Potsdam as a single-discipline program with a standard period of study (full-time program) of four semesters and 120 credit points (CPs).

§ 5 Modules and Course of Study

(1) The master's program in Data Science is comprised of the following components:

Master's Degree		
Module Abbreviation	**Name of Module**	**CPs**
I Mandatory modules / Core modules (48 CPs)		
INF-DS-C1	Machine Learning	9
MAT-VMD837	Statistical Data Analysis	9
MAT-VMD838	Bayesian Inference and Data Assimilation	9
INF-DS-C2	Data Infrastructures and Software Engineering	6
INF-DS-C3	Data Science and Business Analytics	9
INF-DS-C4	Applied Data Science	6
II Elective Modules (*42 LP*)		

1. Research module (12 or 15 CPs)

The student must select either the module INF-DS-RMA or the module INF-DS-RMB.

INF-DSRMA	Research module A	12
INF-DSRMB	Research module B	15

2. Intermediate modules (27 or 30 CPs)

In addition to the research module, the student must select additional elective or advanced modules totaling 27 or 30 CPs. The following combinations are possible:

a) INF-DSRMA Research Module A and
- 5 modules of 6 CPs each, or
- 2 modules of 9 CPs each and 2 modules of 6 CPs each, or
- INF-DSAM11 and 3 modules of 6 CPs each, or
- INF-DSAM11 and 2 modules of 9 CPs each, or
or

b) INF-DSRMB Research Module B and
- 1 module of 9 CPs and 3 modules of 6 CPs each, or
- 3 modules of 9 CPs each, or
- INF-DSAM11, 1 module of 9 CPs, and 1 module of 6 CPs.

The student must select either the "A" or "B" version of a module, not both.

INF-DSAM1A	Advanced Machine Learning A	9
INF-DSAM1B	Advanced Machine Learning B	6
MAT-DSAM2A	Advanced Statistical Data Analysis A	9
MAT-DSAM2B	Advanced Statistical Data Analysis B	6
MAT-DSAM3A	Advanced Data Assimilations and Modeling A	9
MAT-DSAM3B	Advanced Data Assimilation and Modeling B	6
INF-DSAM4A	Advanced Infrastructures and Software Engineering A	6
INF-DSAM4B	Advanced Infrastructures and Software Engineering B	6
INF-DSAM5A	Advanced Business Analytics A	9
INF-DSAM5B	Advanced Business Analytics B	6
INF-DSAM6A	Advanced Applied Data Science A	9

INF-DSAM6B	Advanced Applied Data Science B	6
INF-DSAM7	Computer Engineering for Big Data	6
MAT-DSAM8A	Mathematical Foundations of Data Science A	9
MAT-DSAM8B	Mathematical Foundations of Data Science B	6
INF-DSAM9	Computational Foundations of Data Science	6
INF-DSAM10	Research Data Management, Law, and Ethics	6
INF-DSAM11	Applied Data Science Internship	12
BM3	Advanced Problem Solving Techniques	9
3. Bridge modules (6 or 12 CPs) In accordance with Section 3 of the Data Science Admission Regulations (ZulO), the Examining Board may require students upon admission to complete one (6 CPs) or two (2 x 6 CPs) of the FM2 and MAT-DSBM1 bridge modules marked with an asterisk ("*") instead of the 6 or 12 CP advanced modules if the content of said bridge modules was not included in the degree qualifying the student for this Master's program. Bridge modules may only be taken as part of the program when decided by the Examining Board upon admission. In the elective component, this reduces the scope of freely selectable modules by 6 or 12 CPs.		
* FM2	Foundations of Computer Science	6
*MAT-DSBM1	Foundations of Stochastics	6
Total CPs for bridge, mandatory, and elective modules to be completed		*90*
III. Final Thesis		*30*

(2) The language of instruction and examinations for the program is English. The modules are offered in English.

(3) The descriptions of the modules named in subsection 1 are given in the Module Catalog in Appendix 1 of these regulations.

(4) Sample courses of study for the master's program are provided in Appendix 2 of these regulations.

§ 6 Master's Thesis

(1) As soon as the student has completed at least 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.

§ 7 Passes

During the standard period of study, only one pass can be used in the Data Science master's program. Section 13 of BAMA-O also applies.

§ 8 Stay Abroad

We explicitly recommend that students complete a stay abroad during their studies. It is recommended to save this for the third or fourth semester.

§ 9 Application, Expiration, and Transitional Provisions

(1) These regulations go into effect on October 1, 2018.

(2) These regulations apply to all students who enroll in the master's program in Data Science at the University of Potsdam after these regulations go into effect.

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), apart from the modules INF-DSAM5A and INF-DSAM5B, which are governed by the statutes of the module catalog of the Faculty of Economics and Social Sciences as a supplement to the bachelor's and master's degree programs at the University of Potsdam (MK WiSo). Supplementary regulations and/or deviations from the MK MNF are indicated in the tables that follow.

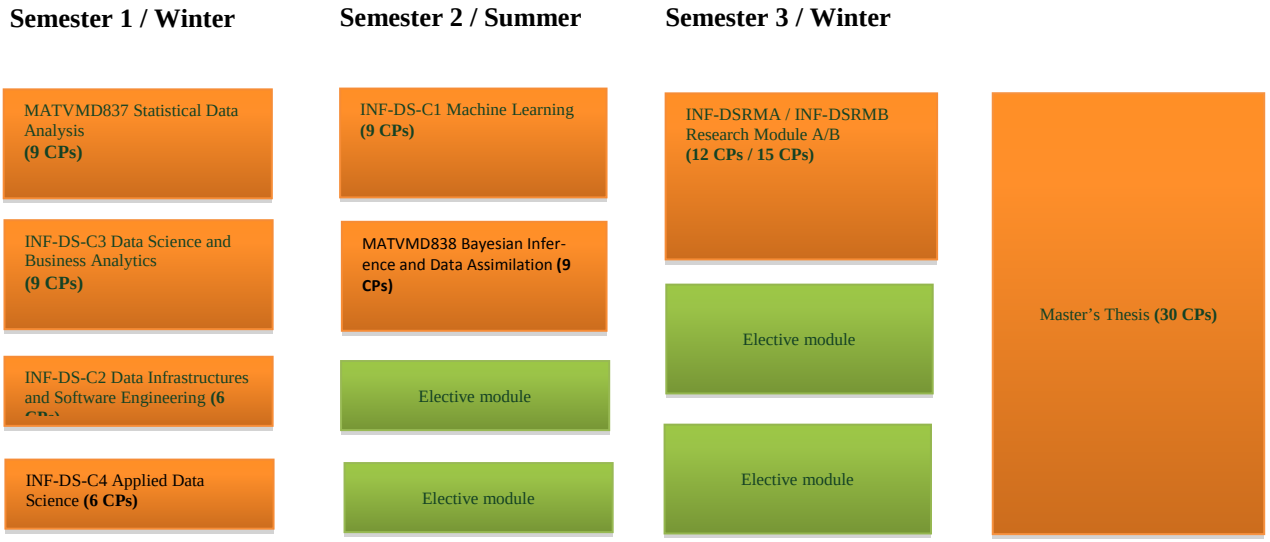
List of modules:

Module Number	Module Name	CPs	Mand./ Elec.	Prerequisites
MAT-DSBM1	Foundations of Stochastics	6	Mand.	if the Examining Board decides so under Section 5 subsection 1.
FM2	Foundations of Computer Science	6	Mand.	if the Examining Board decides so under Section 5 subsection 1.
INF-DS-C1	Machine Learning	9	Mand.	None
INF-DS-C2	Data Infrastructures and Software Engineering	6	Mand.	None
INF-DS-C3	Data Science and Business Analytics	9	Mand.	None
INF-DS-C4	Applied Data Science	6	Mand.	None
MATVMD837	Statistical Data Analysis	9	Mand.	None
MATVMD838	Bayesian Inference and Data Assimilation	9	Mand.	None
INF-DSRMA	Research Module A	12	Elec.	None
INF-DSRMB	Research Module B	15	Elec.	None
INF-DSAM1A	Advanced Machine Learning A	9	Elec.	Recommended: INF-DS-C1
INF-DSAM1B	Advanced Machine Learning B	6	Elec.	Recommended: INF-DS-C1
MAT-DSAM2A	Advanced Statistical Data Analysis A	9	Elec.	Recommended: MATVMD837
MAT-DSAM2B	Advanced Statistical Data Analysis B	6	Elec.	Recommended: MATVMD837
MAT-DSAM3A	Advanced Data Assimilation and Modeling A	9	Elec.	None
MAT-DSAM3B	Advanced Data Assimilation and Modeling B	6	Elec.	None
INF-DSAM4A	Advanced Infrastructures and Software Engineering A	6	Elec.	Recommended: INF-DS-C2
INF-DSAM4B	Advanced Infrastructures and Software Engineering B	6	Elec.	Recommended: INF-DS-C2
INF-DSAM5A	Advanced Business Analytics A	9	Elec.	Recommended: INF-DS-C3
INF-DSAM5B	Advanced Business Analytics B	6	Elec.	Recommended: INF-DS-C3
INF-DSAM6A	Advanced Applied Data Science A	9	Elec.	Recommended: INF-DS-C4
INF-DSAM6B	Advanced Applied Data Science B	6	Elec.	Recommended: INF-DS-C4
INF-DSAM7	Computer Engineering for Big Data	6	Elec.	None
MAT-DSAM8A	Mathematical Foundations of Data Science A	9	Elec.	None

MAT-DSAM8B	Mathematical Foundations of Data Science B	6	Elec.	None
INF-DSAM9	Computational Foundations of Data Science	6	Elec.	None
INF-DSAM10	Research Data Management, Law, and Ethics	6	Elec.	None
INF-DSAM11	Applied Data Science Internship	12	Elec.	None
BM3	Advanced Problem Solving Techniques	9	Elec.	None

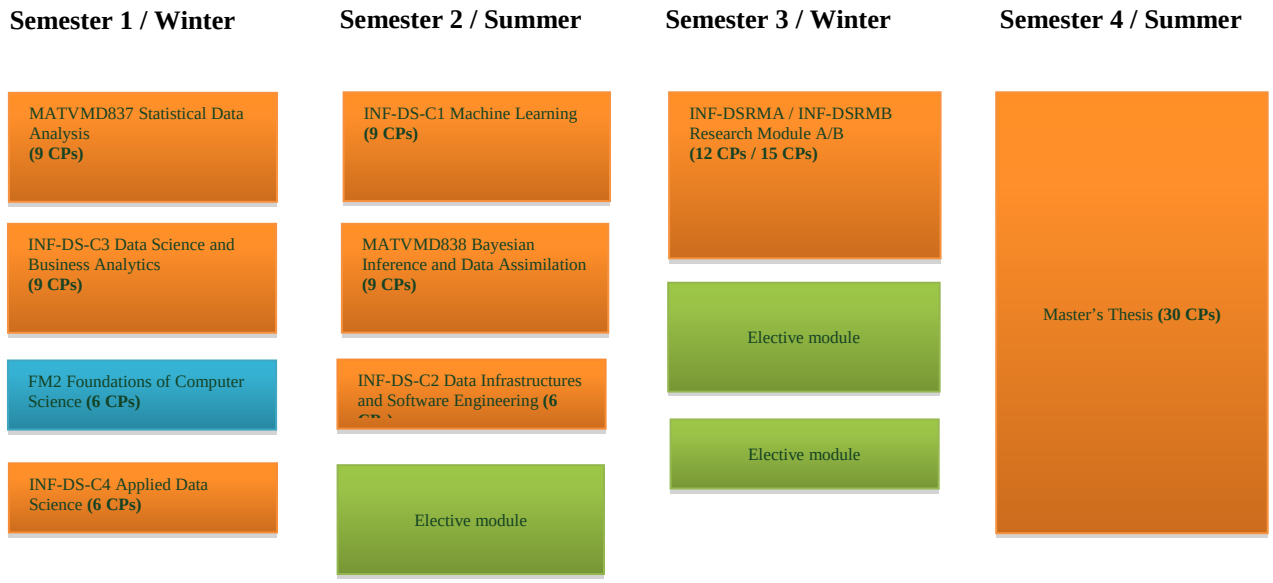
CP = Number of credit points; Mand. = Mandatory/core module; Elec. = Elective module

Appendix 2: Sample Course of Study



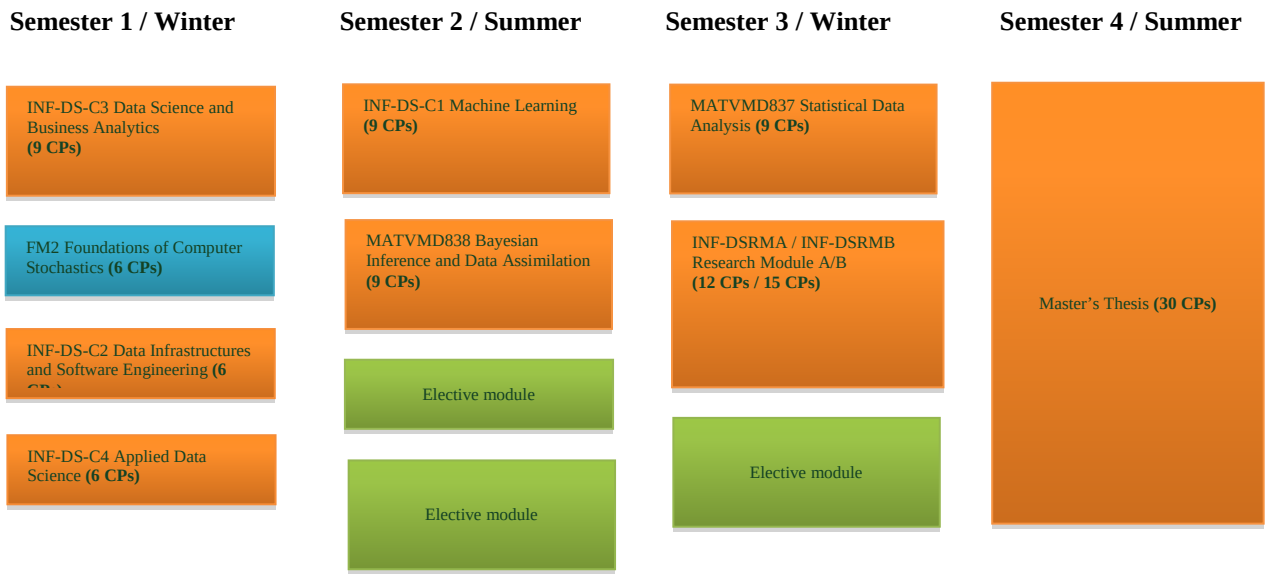
Orange = mandatory module, green = elective, blue = bridge module

Sample course of study without bridge modules (for example, a graduate of the bachelor's program in mathematics with a minor in computer science or a major in computer science with a minor in mathematics)



Orange = mandatory module, green = elective, blue = bridge module

Sample course of study for graduates of a mathematical or scientific bachelor's degree program



Orange = mandatory module, green = elective, blue = bridge module

Sample course of study for graduates of a bachelor's degree program in computer science