

Please note that only the German version of these regulations is legally binding. The English translation is provided for informational purposes only!

## Examination Regulations for the Bachelor's degree program in Data Science as a full-time program at the Catholic University of Eichstätt-Ingolstadt

Dated MM-DD-YYYY

On the basis of Article 5 (3)(1) of the Concordat between the Holy See and the Free State of Bavaria and dated March 29, 1924 (BayRS 2220-1-WFK), the Catholic University of Eichstätt-Ingolstadt issues the following examination regulations:

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## **Section 1**

### **Scope of application**

<sup>1</sup>These Examination Regulations govern the examination requirements for the Bachelor's degree program in Data Science as a full-time program. <sup>2</sup>The respectively current version of the General Examination Regulations (APO) of the Catholic University of Eichstätt-Ingolstadt dated November 26, 2014, also applies.

## **Section 2**

### **Types of examination**

- (1) <sup>1</sup>Insofar as a module provides for the possibility of completing voluntary in-semester exercises, the lecturer may, at the beginning of the course, determine that passing the in-semester exercises will improve the module grade by one (0.3 or 0.4) or two grade levels (0.6 or 0.7). <sup>2</sup>The in-semester exercises are handed out by the lecturer at regular intervals as part of the course and can be completed and handed in by the students independently; they do not comprise more than two thirds of the independent study time of the course and are graded by the lecturer with credits. <sup>3</sup>The in-semester exercises are passed if at least 50% of the total number of credits that can be achieved in the in-semester exercises have been achieved. <sup>4</sup>The same shall apply if one or more voluntary in-semester written examinations are offered as part of the on-campus courses instead of in-semester exercises.
- (2) <sup>1</sup>A portfolio examination consists of the submission and grading of a portfolio at the end of the semester. <sup>2</sup>It contains a compilation of the exercises or programming tasks completed by the student with solutions prepared by the student. <sup>3</sup>The student shall attach a declaration confirming that the portfolio is the student's own work. <sup>4</sup>The portfolio typically comprises six to twelve individual submissions, usually two to four printed pages in length. <sup>5</sup>The specific form of submission will be determined by the lecturer at the beginning of the course.
- (3) <sup>1</sup>The type of examination 'Case Studies' is a collection of coordinated work on a specified topic. <sup>2</sup>It comprises a written elaboration (report, management summary, project documentation, written elaboration of the project idea, etc.) and may also include a presentation (e.g. group presentation, paper and/or video). <sup>3</sup>In the case of individual projects, the length of the written elaboration is generally ten to 20 pages; in the case of team projects with presentation, the length of the written part is generally five to ten pages per team member; the duration of the presentation is generally ten to 20 minutes.
- (4) <sup>1</sup>The type of examination 'seminar paper/written assignment with presentation (*Referat/Präsentation*)' includes a presentation (*Referat/Präsentation*) that is closely related to the topic of the seminar paper/written assignment. <sup>2</sup>Both the presentation (*Referat/Präsentation*) and the seminar paper/written assignment are included in the module grade, with the written work contributing at least 50% to the module grade. <sup>3</sup>The exact weighting is specified in the respective module description. <sup>4</sup>The scope of the seminar paper/written assignment is usually ten to 20 pages; the time for working on it is usually 15 weeks. <sup>5</sup>The duration of the presentation (*Referat/Präsentation*) is usually ten to 20 minutes.

## **Section 3**

### **Qualification requirements**

- (1) <sup>1</sup>The following qualifications are required for this Bachelor's degree program:
  1. General university entrance qualification or equivalent admission qualification,

2. A2 German language proficiency (European Framework of Reference).

<sup>2</sup>Persons who are not EU citizens or who have acquired their higher education entrance qualification outside the European Union must also have successfully completed an aptitude test procedure in accordance with Annex 3 in order to be admitted to the degree program.

- (2) <sup>1</sup>The required qualifications in accordance with para. 1 no. 2 are proven by the school-leaving certificate, a Goethe certificate for level A2 or other qualifying proof. <sup>2</sup>Knowledge and skills according to para. 1 no. 2 must be demonstrated after one academic year at the latest; until then, enrollment is subject to reservation.

#### **Section 4 Degree**

Upon successful completion of the program, graduates are awarded the degree Bachelor of Science (abbreviated: BSc).

#### **Section 5 Standard length of program, start of studies and program structure**

- (1) The standard length of the Bachelor's degree program is six semesters.
- (2) Students can start the program in the winter semester.
- (3) In this degree program, students must choose a specialization. Possible specializations are
1. Applied Mathematics and Scientific Computing
  2. Business Analytics
  3. Digital Transformation of Society
  4. Environmental Sciences
  5. Finance and Economics
  6. Machine Learning and Statistics

#### **Section 6 Passing the Bachelor's examination**

The Bachelor's examination has been passed when

1. all modules up to the end of the eighth semester have been awarded the grade 'sufficient' (4.0) or better or have been assessed as 'passed' and
2. the student has acquired a total of 180 ECTS credits.

#### **Section 7 Required area, required elective area, orientation, elective area**

- (1) The 180 ECTS credits to be acquired are divided into the following areas:

1. Required area (110 ECTS credits),
2. Specialization (25 ECTS credits),
3. General required elective area (15 ECTS credits),
4. Internship (10 ECTS credits),
5. Bachelor's seminar (5 ECTS credits) and Bachelor's thesis (10 ECTS credits),
6. Studium Pro (5 ECTS credits).

(2) <sup>1</sup>In the required area, the modules listed in Annex 1 worth a total of 110 ECTS credits must be successfully completed.

<sup>2</sup>In accordance with Annex 1, the module 'Analysis 1 for Data Science' can be replaced by the following modules from the Bachelor's degree program or the teaching degree program in Mathematics:

- Analysis I: 10 ECTS credits; module examination: Written or oral examination; voluntary in-semester exercises possible
- Analysis I (GS/MS/RS): 5 ECTS credits; module examination: Written or oral examination, voluntary in-semester exercises possible

<sup>3</sup>In accordance with Annex 1, the module 'Analysis 2 for Data Science' can be replaced by the following modules from the Bachelor's degree program or the teaching degree program in Mathematics:

- Analysis II: 10 ECTS credits; module examination: Written or oral examination; voluntary in-semester exercises possible
- Analysis and Linear Algebra II (GS/MS/RS): 10 ECTS credits; module examination: Written or oral examination, voluntary in-semester exercises possible

(3) <sup>1</sup>In the specialization, students must acquire 25 ECTS credits from the module catalog of the selected specialization. <sup>2</sup>Students are not legally entitled to have all specializations offered to them to a sufficient extent. <sup>3</sup>In addition to the module catalog of the specializations, comparable modules that have been successfully completed at German or foreign universities may also be admitted for the specialization. <sup>4</sup>The degree program manager shall decide on the admission of modules.

(4) In the general required elective area, students acquire 15 ECTS credits in modules not yet completed from one of the module catalogs of one of the permissible specializations or from the module catalog of the Data Science program.

(5) Further 10 ECTS credits must be completed in practical training in the industry or in a research group at a higher education institution lasting at least eight weeks. Students write an internship report of 5-10 pages about this training.

(6) All students must acquire 5 ECTS credits in a seminar module listed in Annex 2 (required attendance) on a topic that is related to the Bachelor's thesis.

## **Section 8**

### **Minimum ECTS score requirement (*Grundlagen- und Orientierungsprüfung*)**

(1) The minimum ECTS score requirement enables students to check early in their studies whether they will likely be able to fulfill the requirements of this Bachelor's degree program.

(2) <sup>1</sup>The minimum ECTS score requirement is passed if the student has completed two of the following required modules by the end of the second semester of the program at the latest:

1. Linear Algebra 1

2. Linear Algebra 2 and Analytical Geometry
3. Analysis 1 for Data Science, alternatively Analysis I or Analysis I (GS/MS/RS)
4. Analysis 2 for Data Science, alternatively Analysis II or Analysis and Linear Algebra II (GS/MS/RS)

and, including these modules, has successfully completed required modules worth a total of 35 ECTS credits. <sup>2</sup>An examination that, for organizational reasons, is only offered at the beginning of the lecture period of the next semester shall count as part of the preceding semester.

(3) The minimum ECTS score requirement is deemed as

1. taken and not passed if the student exceeds the deadline in para. 2 for reasons for which he or she is responsible, and
2. failed at the final attempt if the student, for reasons for which he or she is responsible, fails to successfully complete two of the following modules by the end of the third semester at the latest:
  - a. Linear Algebra 1
  - b. Linear Algebra 2 and Analytical Geometry
  - c. Analysis 1 for Data Science, alternatively Analysis I or Analysis I (GS/MS/RS)
  - d. Analysis 2 for Data Science, alternatively Analysis II or Analysis and Linear Algebra II (GS/MS/RS)

or, if the student has not successfully acquired a total of 50 ECTS credits of required modules, including the modules mentioned above; para. 2 sentence 2 shall apply accordingly.

### **Section 9 Bachelor's thesis**

- (1) <sup>1</sup>The topic of the Bachelor's thesis can be chosen from the field of Data Science as well as from a subject of a specialization, insofar as it is of substantial relevance to the field of Data Science. <sup>2</sup>The topic must be submitted to the chairperson of the board of examiners for approval.
- (2) <sup>1</sup> The period allocated for working on the Bachelor's thesis is two months. <sup>2</sup>Students are awarded 10 ECTS credits for the Bachelor's thesis.

### **Section 10 Final academic record**

The final academic record will indicate the chosen specialization.

### **Section 11 Entry into force**

The Examination Regulations enter into force with effect from October 1, 2022.

Annex 1: Required modules

<b>Module title in English</b>	<b>Official module title</b>	<b>Type of examination</b>	<b>Number of ECTS credits</b>	<b>Admission requirements</b>
Introduction to Statistics	Einführung in das statistische Arbeiten	Written examination (60-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	5	None
Introduction to Programming	Einführung in die Programmiertechnik	Portfolio examination	5	None
Basics of Information Systems	Grundlagen von Informationssystemen	Written examination (60-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	5	None
Linear Algebra 1	Lineare Algebra I	Written examination (60-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	10	None
Analysis 1 for Data Science	Analysis 1 for Data Science	Written examination (90-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	5	None
Hands-on Machine Learning and Data Science	Hands-on Machine Learning and Data Science	Written examination (60-90 minutes) or oral examination (20-30 minutes) or	10	Introduction to Programming Technology

		portfolio examination		
Algorithms and Data Structures	Algorithmen und Datenstrukturen	Written examination (60-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	5	None
Linear Algebra 2 and Analytic Geometry	Lineare Algebra II und analytische Geometrie	Written examination (60-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	10	None
Analysis 2 for Data Science	Analysis 2 for Data Science	Written examination (90-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	5	None
Foundations of Data Science	Foundations of Data Science	Written examination (60-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible; alternatively: portfolio examination	10	None
Advanced Programming	Advanced Programming	Portfolio examination	5	Introduction to Programming Technology
Introduction to Stochastics	Einführung in die Stochastik	Written examination (90-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	5	None

Optimization in Data Science	Optimization in Data Science	Written examination (90-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible	5	None
Foundations of Machine Learning	Foundations of Machine Learning	Written examination (60-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible; alternatively: portfolio examination	10	Introduction to Programming Technology, Hands-on Machine Learning and Data Science, Introduction to Stochastics
Data Lab	Data Lab	Case Studies	5	None
Statistical Learning	Statistisches Lernen	Written examination (60-120 minutes) or oral examination (20-30 minutes), voluntary in-semester exercises possible; alternatively: portfolio examination	5	None
Ethics of Algorithms and Data	Ethics of Algorithms and Data	Case Studies	5	None

## Annex 2 Seminar modules

<b>Module title in English</b>	<b>Module title in German</b>	<b>Type of examination</b>	<b>Number of ECTS credits</b>	<b>Required attendance</b>
Algebraic and Geometric Seminar for BSc	Bachelorseminar zu Algebra und Geometrie	Written assignment with presentation	5	Required attendance
Analytical Seminar for BSc	Bachelorseminar zur Analysis	Written assignment with presentation	5	Required attendance
Applied Mathematical Seminar for BSc	Bachelorseminar zur Angewandten Mathematik	Written assignment with presentation	5	Required attendance
Seminar in Computational Mathematics for BSc	Seminar in Computational Mathematics for BSc	Written assignment with presentation	5	Required attendance
Seminar in Data Assimilation for BSc	Seminar in Data Assimilation for BSc	Written assignment with presentation	5	Required attendance
Seminar in Machine Learning and Related Topics for BSc	Bachelorseminar zu maschinellem Lernen und verwandten Themen	Written assignment with presentation	5	Required attendance
Seminar in Probability and Statistics for BSc	Bachelorseminar zur Statistik und Stochastik	Written assignment with presentation	5	Required attendance

Seminar in Signal and Data Processing for BSc	Bachelorseminar zur Signal- und Datenverarbeitung	Written assignment with presentation	5	Required attendance
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### Annex 3:

Aptitude Test for applicants who are not EU citizens or who have acquired their higher education entrance qualification outside the European Union

#### 1 Purpose of the Aptitude Test

The purpose of this Aptitude Test is to determine whether the applicant is suitably prepared for the content and methodological requirements of the Bachelor's degree program.

#### 2 Admission requirements

2.1 <sup>1</sup>The application must be submitted via 'uni-assist'. <sup>2</sup>The following documents must be attached to the application form:

1. Proof of higher education entrance qualification, if not in German, with German or English translation;
2. Résumé;
3. If applicable, individual proof of the grade achieved in mathematics as indicated on the university entrance qualification;
4. If applicable, proof of SAT Math score;
5. If applicable, proof of TestAS result;
6. If applicable, proof of participation in recognized national or international mathematics or computer science competitions;
7. If applicable, proof of extracurricular activities in the field of data science.

2.2 <sup>1</sup>The application for admission to the aptitude test procedure must be submitted to the KU in due form, together with all documents that need to be attached, by a deadline set by the board of examiners for the Bachelor's degree program in Data Science (cut-off deadline). <sup>3</sup>In deviation from the provisions of the German Civil Code (*Bürgerliches Gesetzbuch*, BGB), the deadline for submitting applications shall not extend to the next working day (Article 31 (3) sentence 2 BayVwVfG).

#### 3 Process to determine aptitude for the degree program

3.1 The aptitude test is carried out by a committee appointed by the board of examiners for the Bachelor's degree program in Data Science. The relevant provisions for the board of examiners shall apply accordingly to the business of the committee.

3.2. The work in accordance with 2.1 sentence 2 nos. 3 to 7 is graded as follows on the basis of an evaluation sheet issued by the committee for the Aptitude Test:

Grade 1.0: particularly suitable

Grade 2.0: suitable

Grade 3.0: suitable to a limited extent

Grade 4.0: not suitable

3.3 The overall grade of the Aptitude Test is calculated as follows:

Arithmetic mean of the grade of the higher education entrance qualification rounded to one decimal place and the grade according to 3.2.

3.4 The Aptitude Test is passed if the overall assessment is 2.0 or better.

**Please note:**

**Changes other than the implementation of measures are to enter into force from April 1, 2024.**