First amendment dated February 19, 2025

First amendment dated February 19, 2025 to the degree program and examination regulations for the degree program "Business Mathematics" leading to the degree "Master of Science (M.Sc.)" at Philipps-Universität Marburg dated January 25, 2023 (Amt.Mit. 54/2023)

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The Departmental Council of the Department of "Mathematics and Computer Science" at Philipps-Universität Marburg in accordance with § 50 (1) of the Hessian Higher Education Act (HessHG) in the version of December 14, 2021 (GVBI, p. 931), last amended by Article 1 of the Act dated October 10, 2024 (GVBI. 2024 No. 56), has adopted the following amendment to the degree program and examination regulations:

Article 1

1. § 4 is amended as follows:

§ 4   Admission requirements

(1) The general admission requirement for the Master's degree program is proof of completion of the specific Bachelor's degree program in "Business Mathematics", proof of completion of a relevant Bachelor's degree program in the field of "Mathematics" or proof of a comparable domestic or foreign professionally qualifying university degree. In addition to a Bachelor's degree in the degree program "Business Mathematics" or "Mathematics", a degree for teaching in grammar schools (First State Examination or Master's degree) with mathematics as a subject in the teacher education program entitles the holder to admission. A Bachelor's degree in another discipline qualifies for admission if qualifications in business mathematics disciplines amounting to at least 90 credit points have been acquired as part of the completed degree program or another degree program. This must include at least 60 credit points (*Leistungspunkte*, LP), which demonstrate competences from subjects that can be found in the subject range of the study areas Mathematics Basic Modules, Mathematics Advanced Modules and Free Compulsory Elective Modules of the Bachelor's degree program "Business Mathematics" at Philipps-Universität Marburg. In particular, competences from theory-heavy (proof-based) lectures (Linear Algebra I, Linear Algebra II, Analysis I and Analysis II) as well as competences from abstract measure and integration theory should have been acquired. Furthermore, at least 18 LP must have been completed in business and economics modules.

If no degree certificate with an overall grade is available by the application deadline yet, enrollment may be conditional. In the case of an underlying Bachelor's degree program with a scope of 180 credit points, the prerequisite is that proof of passed module examinations or partial module examinations amounting to at least 80% of the credit points required for the relevant Bachelor's degree is provided. The proof must include an average grade determined on the basis of the graded module examinations and partial

module examinations within the scope of the 80% of the credit points required for the Bachelor's degree. Enrollment can only take place subject to the proviso that all course work and examinations for the Bachelor's degree program have been completed before the start of the Master's degree program (deadline March 31 if the Master's degree program starts in the summer semester or deadline September 30 if the Master's degree program starts in the winter semester) and that proof of the degree certificate is submitted by the end of the lecture period of the first semester.

(2) The examination committee (§ 16) shall decide on the question of the relevance of the previous studies within the meaning of (1).

(3) The question of the comparability of the university degree within the meaning of (1) shall be decided by the examination committee (§ 16).

(4) The examination committee (§ 16) may make admission subject to the condition that additional coursework and/or examinations of no more than 30 LP are completed. In this case, the program may be prolonged accordingly. The required competences in business and economics modules to be demonstrated in accordance with (1) may not be completed retrospectively through conditions in accordance with sentence 1.

(5) The modules and courses of the degree program are generally offered in English. A German-language offer is possible as an exception if all students of the module or course so wish. The coursework and examinations can be taken in either German or English at the student's discretion. Optional offers and compulsory elective areas may include import modules from Bachelor's degree programs or other departments in German, so that the choice may be limited here.
The special admission requirements are: Proof of either
  a) English language proficiency at least at level C1 of the "Common European Framework of Reference for Languages" or
  b) English language proficiency at least at level B1 of the "Common European Framework of Reference for Languages" and German language proficiency at least equivalent to the "DSH-2" language examination.

(6) In addition to the general admission requirements for the degree program, participation in individual modules or parts of modules may be made dependent on the fulfillment of specific module admission requirements.
In this case, the prerequisites are listed in the module list (Appendix 2) under "Prerequisites for participation".

2. § 6 is amended as follows:

§ 6   Degree program: Structure, content, curriculum and information
(1) The Master's degree program in "Business Mathematics" is divided into the study areas Compulsory Elective Modules in Mathematics, Business and Economics Focus Area: Accounting and Finance, Business and Economics Focus Area: Market-Oriented Management, Business and Economics Focus Area: Information and Innovation Management, Business and Economics Focus Area: Economics, Free Compulsory Elective Modules and Final Module.

(2) The degree program consists of modules that are assigned to the various study areas in accordance with (1). The following program structure results from the assignment of the modules, the degree to which they are compulsory and the calculated student workload in credit points (LP):

	Compulsory [PF] / Compulsory Elective [WP]	Credit points	Comment
Compulsory Elective Modules in Mathematics		***27-30***	
Empirical processes	WP	6	
Financial Mathematics II	WP	6	
Financial Optimization	WP	6	
Forecasting: Theory and Practice	WP	9	
High-dimensional Statistics and Machine Learning	WP	6	
Large Specialization Module Business Mathematics	WP	9	
Large Specialization Module Stochastics	WP	9	
Mathematical and Nonparametric Statistics	WP	9	
Non-Life Insurance Mathematics	WP	3	
Nonsmooth Analysis and Optimization	WP	9	
Optimization II	WP	6	
Probabilistic Combinatorics	WP	9	
Probability Theory	WP	9	
Quantitative Risk Management	WP	6	
Selected Topics on Financial Mathematics	WP	3	
Small Specialization Module Business Mathematics a	WP	6	
Small Specialization Module Business Mathematics b	WP	6	
Small Specialization Module Business Mathematics without Tutorial a	WP	3	
Small Specialization Module Business Mathematics without Tutorial b	WP	3	
Small Specialization Module Stochastics	WP	6	
Small Specialization Module Stochastics without Tutorial	WP	3	
Special Topics of Insurance Mathematics	WP	3	
Statistics and Statistical Learning	WP	9	
Stochastic Processes	WP	6	
Stochastic Analysis	WP	9	
Import modules with content or methodological reference to the subject area of mathematics*, **	WP	0-30	
Business and Economics Focus Area : Accounting and Finance		***0 or 24***	one of the four economic focus areas is to be selected
Import modules from the specialization Accounting and Finance from the M.Sc. in Betriebswirtschaftslehre*	WP	24	
Business and Economics Focus Area: Market-Oriented Management		***0 or 24***	
Import modules from the Market-Oriented Management focus area from the M.Sc. in Betriebswirtschaftslehre*	WP	24	

Business and Economics Focus Area : Information and Innovation Management		*0 or 24*	
Import modules from the Information and Innovation Management focus area from the M.Sc. in Betriebswirtschaftslehre*	WP	24	
Business and Economics Focus Area: Economics		*0 or 24*	
Import modules from the M.Sc. Economics and Institutions/Volkswirtschaftslehre*	WP	24	
Free Compulsory Elective Modules		*36-39*	
Selected Advanced Topics in Business Mathematics A (Seminar)	WP	3	
Selected Advanced Topics in Business Mathematics B (Seminar)	WP	3	
Seminar module from the M.Sc. Betriebswirtschaftslehre*	WP	6	1 to 3****
Seminar module from the M.Sc. Economics and Institutions*	WP	6	
Advanced Software Project in Business Mathematics	WP	6	
Industrial Internship	WP	6	0 to 1*****
Internship in Stochastics*	WP	6	
Empirical processes	WP	6	
Financial Mathematics II	WP	6	
Financial Optimization	WP	6	
Forecasting: Theory and Practice	WP	9	
High-dimensional Statistics and Machine Learning	WP	6	
Large Specialization Module Business Mathematics	WP	9	
Large Specialization Module Stochastics	WP	9	
Mathematical and Nonparametric Statistics	WP	9	
Non-Life Insurance Mathematics	WP	3	
Nonsmooth Analysis and Optimization	WP	9	
Optimization II	WP	6	
Probabilistic Combinatorics	WP	9	
Probability Theory	WP	9	
Quantitative Risk Management	WP	6	
Selected Topics on Financial Mathematics	WP	3	
Small Specialization Module Business Mathematics a	WP	6	
Small Specialization Module Business Mathematics b	WP	6	
Small Specialization Module Business Mathematics without Tutorial a	WP	3	
Small Specialization Module Business Mathematics without Tutorial b	WP	3	
Small Specialization Module Stochastics	WP	6	
Small Specialization Module Stochastics without Tutorial	WP	3	
Special Topics of Insurance Mathematics	WP	3	
Statistics and Statistical Learning	WP	9	
Stochastic Processes	WP	6	
Stochastic Analysis	WP	9	

Import modules with content or methodological reference to the subject area of Business Mathematics*,***	WP	0-36	
Final Module		**30**	
Master Thesis	PF	30	
Total		**120**	

* Import modules according to Appendix 3 Import module list.

** A maximum of one advanced module may be completed in the area Compulsory Elective Modules in Mathematics. Modules amounting to 27 LP or 30 LP must be included, so that 66 LP are acquired together with the Free Compulsory Elective Modules area. For the specialization modules, at least 9 LP each in the field of stochastics and in the field of optimization are recommended. In addition, the module Financial Mathematics I should be taken if this has not already been done in the Bachelor's degree.

*** All selected business and economics modules except for one must be from the selected specialization (Focus Area). A maximum of two modules can be chosen from the field of computer science. A maximum of two advanced modules from Bachelor's degree programs may be completed.

**** If two mathematics seminars are completed, they must be taken in two different mathematical areas.

***** If no industrial internship has been completed in the Bachelor's program, the internship should be completed as an external internship module (Industrial Internship), otherwise it is also possible to complete it as an internal internship.

(3) In the study area Compulsory Elective Modules in Mathematics, students deepen and expand their knowledge and competences in various mathematical disciplines. This broadens their mathematical spectrum and introduces them to modern mathematical application methods.

(4) The study areas Business and Economics Focus Area must be chosen within one of the four specializations (Focus Areas) "Accounting and Finance", "Market-Oriented Management", "Information and Innovation Management" or "Economics". The chosen focus area is shown on the diploma in accordance with § 33 (1). The specialization in Accounting and Finance provides students with in-depth application skills and the ability to further develop solutions in the field of internal and external accounting as well as decision-making and investment theory. The specialization Market-Oriented Management provides students with in-depth application skills and the ability to further develop solutions in the area of a market-oriented perspective on companies. The specialization Information and Innovation Management provides students with in-depth application skills and the ability to further develop solution approaches in the area of a resource-based perspective on companies. Upon completion of the Economics specialization, students will have gained an introductory understanding of central economic core fields and will be able to apply this knowledge to the analysis of economic theory and economic policy problems. One focus is on the analysis of economic institutions, i.e. the formal and informal rules that influence economic behavior.

(5) In the study area Free Compulsory Elective Modules, modules from Mathematics and Business and Economics can be completed largely freely according to individual preferences. In this way, students deepen and broaden their skills and knowledge from the Bachelor's degree program and thus acquire the necessary prerequisites for writing their Master's thesis. In one to three seminars, the ability to communicate mathematics or business and economics statements is deepened and the analysis and description of essential content from academic texts is practiced. Furthermore, an internship must be completed in this area; in the external internship module (Industrial Internship), students learn how to apply the skills acquired during their studies in the professional field of business mathematics, while the internal internships (modules Advanced Software Project in Business Mathematics or Internship in Stochastics) focus on acquiring skills in the algorithmic implementation of complex mathematical content in software.

(6) The exemplary sequence of the modularized degree program is shown in the degree program curriculum (see Appendix 1).

(7) General information and regulations in their current form can be found on the degree program website at

https://www.uni-marburg.de/de/fb12/studium/studiengaenge/m-sc-wirtschaftsmathematik

In particular, the module handbook and the degree program curriculum can also be viewed there. Furthermore, a list of the current import and export offers of the degree program is published.

(8) The assignment of the individual courses to the modules of the degree program can be found in the course catalog of the Philipps-Universität Marburg, which is available on the university's website.

3. Appendix 2 is amended as follows:

Appendix 2:   Module list

Module name *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
Free Compulsory Elective Modules						
Advanced Software Project in Business Mathematics *Fortgeschrittenes Wirtschaftsmathematisches Praktikum*	6	Compulsory elective module	Practical module	The students - can implement mathematical algorithms in small working groups under supervision, but largely independently, - can model mathematical objects in suitable data structures, - can acquire the necessary, more detailed knowledge of the methods used and the development environment. - have in-depth skills in the implementation of mathematical methods in software, the organization of a software project and teamwork.	None. The competences taught in the basic modules, in the module Object-Oriented Programming or Declarative Programming, as well as in the relevant specialization module are recommended.	Coursework: Software development Examination: Presentation ***Ungraded module***
Compulsory Elective Modules in Mathematics and Free Compulsory Elective Modules						
Empirical Processes *Empirische Prozesse*	6	Compulsory elective module	Specialization module	The students - are able to present and apply the theory of empirical processes and the convergence of stochastic processes in a fundamental way, - master applications to statistical problems, - can describe fundamental concepts and questions of a current scientific field and explain their relevance for scientific practice, - can apply more complex mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - are able to present and discuss technical topics freely in front of a professional audience.	None. The competences taught in the basic modules and in the specialization module Probability Theory are recommended.	Coursework: Reaching at least 50 percent of the points from the exercises to be completed each week. Examination: Oral examination (individual examination) or written exam (*Klausur*)
Financial Mathematics II *Finanzmathematik II*	6	Compulsory elective module	Specialization module	The students - can present and discuss the principles of continuous financial market modeling, - can represent stock price processes, - can present and discuss selected products and the functioning of the interest rate market, - can price basic equity and interest rate derivatives and derive corresponding risk figures.	None. The competences taught in the modules Financial Mathematics I and Probability Theory are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)

Module name *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
Financial Optimization *Financial Optimization*	6	Compulsory elective module	Specialization module	The students - can explain and apply the main approaches in portfolio optimization, - can explain basic theories of the respective classes of optimization problems and use solution methods, - have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.	None. The competences taught in the module Continuous Optimization are recommended.	Coursework: Reaching at least 50 percent of the points from the exercises to be completed each week. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Forecasting: Theory and Practice *Vorhersagen in Theorie und Praxis*	9	Compulsory elective module	Specialization module	The students - know important methods of statistics and machine learning for making predictions as well as mathematical methods for their evaluation and can analyze them mathematically, - can apply the methods to data sets using the statistical software R, - understand data analysis and statistics.	None. The competences taught in the modules Elementary Stochastics, Internship on Stochastics, the Mathematics basic modules and the module Statistics and Statistical Learning are recommended.	Coursework(s): Reaching at least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)
High-dimensional Statistics and Machine Learning *Hochdimensionale Statistik und maschinelles Lernen*	6	Compulsory elective module	Specialization module	The students - can explain theories of current research areas of high-dimensional statistics and machine learning, - can describe and use important algorithms and explain how they work in the R programming language, - have deepened mathematical working methods (developing mathematical intuition and its formal justification, abstraction, reasoning), - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.	None. The competences taught in the modules Elementary Stochastics and Practical Course in Stochastics, in the Mathematics basic modules and in the module Statistics and Statistical Learning are recommended.	Coursework: Reaching at least 50 percent of the points from the exercises to be completed each week. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Large Specialization Module Business Mathematics *Großes wirtschafts-mathematisches Vertiefungsmodul*	9	Compulsory elective module	Specialization module	The students - can describe current research results, - can deal with research literature, - can use new applications of mathematical methods for economic problems, - have deepened their knowledge of business mathematics in a special field, which enables them to develop and apply complex mathematical models in order to deal analytically with economic issues.	None. The competences taught in the Mathematics basic modules and in advanced modules (in relation to the respective topic)are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises. Examination: Written exam (*Klausur*) or oral examination

Module name *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
						(individual examination)
Large Specialization Module Stochastics *Großes Vertiefungsmodul Stochastik*	9	Compulsory elective module	Specialization module	The students - can report extensively on current research results in stochastics and categorize them, - can deal with research literature in the field of stochastics, - can describe the emergence of new stochastic results, - can explain more complex mathematical concepts in a specific area of stochastics, - can independently access current scientific articles from national and international journals, - have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.	None. The competences taught in the basic modules and advanced modules (in relation to the respective topic) are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Mathematical and Nonparametric Statistics *Mathematische und nichtparametrische Statistik*	6	Compulsory elective module	specialization module	The students - can describe the basic concepts of mathematical and non-parametric statistics, - can explain some important statistical methods and apply them with the statistical software R, - have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.	None. The competences taught in the basic modules, as well as in the modules Probability Theory and Statistics and Statistical Learning, are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Non-Life Insurance Mathematics *Schadenversicherungs-mathematik*	3	Compulsory elective module	Specialization module	The students - can describe the basic concepts and models of non-life insurance mathematics, - can assess the appropriateness of models/methods of non-life insurance mathematics.	None. The competences taught in the basic modules Analysis and Linear Algebra and in the advanced module Elementary Stochastics are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises. Examination: Oral examination (individual examination) or written exam (*Klausur*)
Nonsmooth Analysis and Optimization *Nichtglatte Analysis und Optimierung*	9	Compulsory elective module	Specialization module	The students - understand the necessity of considering non-smooth functions in mathematical optimization and can provide examples of this,	None. The competences taught in the basic modules	Coursework: Reaching at least 50 percent of the points from the weekly

Module name / *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
				- are able to describe the meaning of central terms and recognize them in the discussion of non-smooth optimization problems and systems of equations, - can explain methods of non-smooth optimization, - can differentiate non-smooth mappings in an application-specific way in a generalized sense, - can apply more complex mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - are able to present and discuss technical topics freely in front of a professional audience.	Linear Algebra I, Linear Algebra II, Analysis I and Analysis II or Fundamentals of Linear Algebra, Fundamentals of Analysis and Fundamentals of Higher Mathematics are recommended. In addition, knowledge of the module Continuous Optimization is advantageous.	exercises to be completed. Examination: Oral examination (individual examination) or written exam (*Klausur*)
Optimization II *Optimierung II*	6	Compulsory elective module	Specialization module	The students - can report on current research results in the field of optimization and classify them, - can deal with research literature in the field of optimization, - can describe the emergence of new mathematical results in the field of optimization, - can explain more complex mathematical concepts in the field of optimization, - can independently access current scientific articles from national and international journals, - have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.	None. The competences taught in the basic modules and in the advanced module Continuous Optimization are recommended. Depending on the course, further competences may be recommended.	Coursework: Reaching at least 50 percent of the points from the exercises to be completed each week. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Probabilistic Combinatorics *Probabilistische Kombinatorik*	9	Compulsory elective module	Specialization module	The students - can derive basic properties of combinatorial structures using probabilistic methods, - can recognize combinatorial structures in different contexts and analyze them using probabilistic methods - have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - have improved their oral communication skills in the exercises through discussion and free speech in front of an audience.	None. The competences taught in the modules Elementary Stochastics and Discrete Mathematics are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Probability Theory *Wahrscheinlichkeitstheorie*	9	Compulsory elective module	Specialization module	The students - can explain the fundamentals of probability theory based on measure theory in a mathematically rigorous way,	None.	Coursework: Reaching at least 50 percent of the points

Module name *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
				- have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.	The competences taught in the basic modules and in the advanced modules Measure and Integration Theory and Elementary Stochastics are recommended.	from the exercises to be completed each week. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Quantitative Risk Management *Quantitatives Risikomanagement*	6	Compulsory elective module	Specialization module	The students - can describe the basic concepts of quantitative risk management, especially for the financial industry, - can explain methods for estimating market risk and credit risk, - can implement these using the statistical software R, - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.	None. The competences taught in the basic modules, in the advanced module Elementary Stochastics, in the specialization module Probability Theory and in the internship on stochastics are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Selected Topics on Financial Mathematics *Ausgewählte Themen der Finanzmathematik*	3	Compulsory elective module	specialization module	The students - can explain complex concepts of a special topic in financial mathematics, - can explain the practice of financial mathematical modeling in this field and are able to critically question models.	None. The competences taught in the modules Elementary Stochastics and Financial Mathematics I are recommended.	Coursework: Reaching at least 50 percent of the points from the exercises to be completed each week. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Small Specialization Module Business Mathematics a *Kleines wirtschafts-mathematisches Vertiefungsmodul a*	6	Compulsory elective module	Specialization module	The students - can explain central theories and models of a special field of business mathematics, - can apply mathematical methods to economic problems, - can report on current research results and describe and classify developments in a specialized field of Business and Economics, - are able to independently access the contents of mathematical economics publications in a specialized field, - can critically scrutinize economic information and make well-founded decisions for economic scenarios based on data and analyses,	None. The competences taught in the Mathematics basic modules and advanced modules (in relation to the respective topic) are recommended.	Coursework(s): Reachingat least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)

Module name *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
				- can assess the usefulness of business mathematics methods for various practical areas of application.		
Small Specialization Module Business Mathematics b *Kleines wirtschafts-mathematisches Vertiefungsmodul b*	6	Compulsory elective module	Specialization module	The students - can further develop and expand the skills acquired in the previously completed module "Small Specialization Module Business Mathematics a" and relate them to another special field of business mathematics.	None. The competences taught in the Mathematics basic modules and advanced modules (in relation to the respective topic) are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Small Specialization Module Business Mathematics without Tutorial a **Tutorial a** *Kleines wirtschafts-mathematisches Vertiefungsmodul ohne Tutorium a*	3	Compulsory elective module	Specialization module	The students - can explain concepts and methods of a special field of business mathematics and their application to economic problems, - can explain the genesis of economic mathematical concepts, - can describe current developments in a specialized field.	None. The competences taught in the Mathematics basic modules and advanced modules (in relation to the respective topic) are recommended.	Examination: Written exam (*Klausur*) or oral examination (individual examination)
Small Specialization Module Business Mathematics without Tutorial b **Tutorial a** *Kleines wirtschafts-mathematisches Vertiefungsmodul ohne Tutorium b*	3	Compulsory elective module	Specialization module	The students - can further develop and expand the skills acquired in the previously completed module "Small Specialization Module Business Mathematics without Tutorial a" and relate them to another special field of business mathematics.	None. The competences taught in the Mathematics basic modules and in advanced modules (in relation to the respective topic) are recommended.	Examination: Written exam (*Klausur*) or oral examination (individual examination)
Small Specialization Module Stochastics *Kleines Vertiefungsmodul Stochastik*	6	Compulsory elective module	Specialization module	The students - can report on current research results in stochastics, - can deal with research literature in the field of stochastics, - can describe the development of new mathematical results using examples, - can explain more complex stochastic theories in a special area of stochastics, - can independently access current scientific articles from national and international journals in the field of stochastics, - have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof),	None. The competences taught in the basic modules and advanced modules (in relation to the respective topic) are recommended.	Coursework: Reaching at least 50 percent of the points from the weekly exercises to be completed. Examination: Written exam (*Klausur*) or oral examination (individual examination)

Module name *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
				- have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.		
Small Specialization Module Stochastics without Tutorial *Kleines Vertiefungsmodul Stochastik ohne Tutorium*	3	Compulsory elective module	Specialization module	The students - can report on current research results in stochastics, - can deal with research literature in the field of stochastics, - can describe the development of new mathematical results using examples, - can explain more complex stochastic theories in a special area of stochastics.	None. The competences taught in the basic modules and advanced modules (in relation to the respective topic) are recommended.	<u>Examination</u>: Written exam (*Klausur*) or oral examination (individual examination)
Special Topics of Insurance Mathematics *Spezialthemen der Versicherungsmathematik*	3	Compulsory elective module	Specialization module	The students - can transfer and apply the skills acquired in the modules "Personal Insurance Mathematics" and "Non-Life Insurance Mathematics" to important special topics in insurance mathematics.	The competences taught in the basic modules Analysis and Linear Algebra and in the advanced module Elementary Stochastics are recommended. The lecture builds on the basic knowledge of the modules Personal Insurance Mathematics and Non-Life Insurance Mathematics.	<u>Coursework</u>: Reaching at least 50 percent of the points from the weekly exercises. <u>Examination</u>: Oral examination (individual examination) or written exam (*Klausur*)
Statistics and Statistical Learning *Statistik und statistische Lernverfahren*	9	Compulsory elective module	Specialization module	The students - can explain important methods of statistics and statistical learning and can analyze them mathematically, - can apply the methods to data sets using the statistical software R, - understand data analysis and statistics.	None. The competences taught in the modules Elementary Stochastics and Internship in Stochastics as well as in the Mathematics basic modules are recommended.	<u>Coursework</u>: Reaching at least 50 percent of the points from the exercises to be completed each week. <u>Examination</u>: Oral examination (individual examination) or written exam (*Klausur*)
Stochastic Processes *Stochastische Prozesse*	6	Compulsory elective module	Specialization module	The students - can explain the basics of the theory of stochastic processes in continuous time, - master techniques for constructing and analyzing stochastic processes, - can explain concepts of a current scientific field,	None. The competences taught in the basic modules and in the specialization module Probability Theory are recommended.	<u>Coursework</u>: Reaching at least 50 percent of the points from the exercises to be completed each week. <u>Examination</u>:

Module name *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
				- have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.		Written exam (*Klausur*) or oral examination (individual examination)
Stochastic Analysis *Stochastische Analysis*	9	Compulsory elective module	Specialization module	The students - can explain questions and concepts of the research field of stochastic analysis, - can explain basic structures of stochastic analysis and apply techniques, - can describe selected applications of stochastic analysis, - have deepened mathematical working methods (development of mathematical intuition and its formal justification, abstraction, proof), - have improved their oral communication skills in the exercises by practicing free speech in front of an audience and in discussions.	None. The competences taught in the basic modules and in the specialization module Probability Theory are recommended.	Coursework: Reachingat least 50 percent of the points from the exercises to be completed each week. Examination: Written exam (*Klausur*) or oral examination (individual examination)
Free Compulsory Elective Modules						
Industrial Internship *Industriepraktikum*	6	Compulsory elective module	Practical module	The students - can apply typical course content to solve problems that arise in business or technical practice, - have improved their teamwork skills through the necessary integration into external working groups in a company, - can prove themselves in an environment outside the university, - have developed their own initiative in searching for internship positions and researching the companies or institutions offering them, as well as in selecting a supervising university teacher.	None.	Examination: Internship report ***Ungraded module***
Selected Advanced Topics in Business Mathematics A ("Seminar") *Ausgewählte fortgeschrittene Themen der Wirtschaftsmathematik A („Seminar")*	3	Compulsory elective module	Profile module	The students - can work independently on a special mathematical topic in business mathematics, - have developed their ability to work independently and scientifically, - can prepare and divide up mathematical relationships and supplement them with explanatory content, - can deal with scientific literature and carry out targeted research, - can give structured presentations tailored to the skills of the audience, - can use presentation media in a targeted manner, - can discuss complex mathematical content in groups in a structured manner,	None.	Two partial examinations: Seminar presentation Written elaboration ***Ungraded module***

Module name *German translation*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation*	Prerequisites for the awarding of LP
				- can use mathematical typesetting programs.		
Selected Advanced Topics in Business Mathematics B ("Seminar") *Ausgewählte fortgeschrittene Themen der Wirtschaftsmathematik B („Seminar")*	3	Compulsory elective module	Profile module	The students - can further develop the skills acquired in the previously completed module "Selected Advanced Topics in Business Mathematics A ("Seminar")" develop and expand the skills acquired in the previous module "Selected Advanced Topics in Business Mathematics A ("Seminar")" and apply them to another area of business mathematics.	None.	Two partial examinations: Seminar presentation Written elaboration ***Ungraded module***
Final Module						
Master Thesis *Masterarbeit*	30	Compulsory module	Final module	Students are able to work on a comprehensive task from the field of business mathematics using scientific methods under supervision and to present a thesis and the results contained therein appropriately in writing and orally.	Admission to the Master's thesis requires that 12 credit points have been completed in the chosen specialization in the area of Business and Economics and that a seminar module has been completed in the same department as the Master's thesis. A total of at least 66 LP must have been acquired in the modules of the Master's degree program.	Two partial examinations: Master's thesis (weighting: 27 LP) and disputation (weighting: 3 LP)

Module title *German module title*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation	Requirements for the awarding of LP
Conditional Modules Note: the LPs are used exclusively to fulfill the requirements and are not counted towards the 120 LPs required for the degree.						
Conditional Module 1 (small) *Small conditional module 1*	6	--- (*conditional module*)	--- (*conditional module*)	Students have already acquired the ability to develop knowledge and skills independently as part of their Bachelor's degree program. As part of this module, students should close competence deficits that exist in a subject area that has been specified in more detail as part of a condition in accordance with § 4 (4) of these degree program and examination regulations. They acquire these skills by reading specialist literature and/or participating in (online) courses.	This module requires that it be specified as a condition for admission to the degree program as part of a condition in accordance with § 4 (4).	Examination: Oral examination (individual examination) or written exam (*Klausur*).
Conditional Module 2 (small) *Small conditional module 2*	6	--- (*conditional module*)	--- (*condition	Students have already acquired the ability to develop knowledge and skills independently as part of their Bachelor's degree program. As part of this module, students should close	This module requires that it be specified as a condition for admission	Examination: Oral examination (individual

Module title *German module title*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation	Requirements for the awarding of LP
			al module)	competence deficits that exist in a subject area that has been specified in more detail as part of a condition in accordance with § 4 (4) of these degree program and examination regulations. They acquire these skills by reading specialist literature and/or participating in (online) courses.	to the degree program as part of a condition in accordance with § 4 (4).	examination) or written exam (*Klausur*).
Conditional Module 3 (small) *Small conditional module 3*	6	--- (*conditional module*)	--- (*conditional module*)	Students have already acquired the ability to develop knowledge and skills independently as part of their Bachelor's degree program. As part of this module, students should close competence deficits that exist in a subject area that has been specified in more detail as part of a condition in accordance with § 4 (4) of these degree program and examination regulations. They acquire these skills by reading specialist literature and/or participating in (online) courses.	This module requires that it be specified as a condition for admission to the degree program as part of a condition in accordance with § 4 (4).	Examination: Oral examination (individual examination) or written exam (*Klausur*).
Conditional Module 4 (small) *Small conditional module 4*	6	--- (*conditional module*)	--- (*conditional module*)	Students have already acquired the ability to develop knowledge and skills independently as part of their Bachelor's degree program. As part of this module, students should close competence deficits that exist in a subject area that has been specified in more detail as part of a condition in accordance with § 4 (4) of these degree program and examination regulations. They acquire these skills by reading specialist literature and/or participating in (online) courses.	This module requires that it be specified as a condition for admission to the degree program as part of a condition in accordance with § 4 (4).	Examination: Oral examination (individual examination) or written exam (*Klausur*).
Conditional Module 5 (small) *Small conditional module 5*	6	--- (*conditional module*)	--- (*conditional module*)	Students have already acquired the ability to develop knowledge and skills independently as part of their Bachelor's degree program. As part of this module, students should close competence deficits that exist in a subject area that has been specified in more detail as part of a condition in accordance with § 4 (4) of these degree program and examination regulations. They acquire these skills by reading specialist literature and/or participating in (online) courses.	This module requires that it be specified as a condition for admission to the degree program as part of a condition in accordance with § 4 (4).	Examination: Oral examination (individual examination) or written exam (*Klausur*).
Conditional Module 1 (large) *Large conditional module 1*	9	--- (*conditional module*)	--- (*conditional module*)	Students have already acquired the ability to develop knowledge and skills independently as part of their Bachelor's degree program. As part of this module, students should close competence deficits that exist in a subject area that has been specified in more detail as part of a condition in accordance with § 4 (4) of these degree program and examination regulations. They acquire these skills by reading specialist literature and/or participating in (online) courses.	This module requires that it be specified as a condition for admission to the degree program as part of a condition in accordance with § 4 (4).	Examination: Oral examination (individual examination) or written exam (*Klausur*).
Conditional Module 2 (large) *Large conditional module 2*	9	--- (*conditional module*)	--- (*conditional module*)	Students have already acquired the ability to develop knowledge and skills independently as part of their Bachelor's degree program. As part of this module, students should close competence deficits that exist in a subject area that has been specified in more detail as part of a condition in accordance with § 4 (4) of these degree program and examination regulations. They	This module requires that it be specified as a condition for admission to the degree program as part of a condition in accordance with § 4 (4).	Examination: Oral examination (individual examination) or written exam (*Klausur*).

Module title *German module title*	LP	Degree of obligation	Level	Qualification goals	Prerequisites for participation	Requirements for the awarding of LP
				acquire these skills by reading specialist literature and/or participating in (online) courses.		
Conditional Module 3 (large) *Large conditional module 3*	9	--- (*conditional module*)	--- (*conditional module*)	Students have already acquired the ability to develop knowledge and skills independently as part of their Bachelor's degree program. As part of this module, students should close competence deficits that exist in a subject area that has been specified in more detail as part of a condition in accordance with § 4 (4) of these degree program and examination regulations. They acquire these skills by reading specialist literature and/or participating in (online) courses.	This module requires that it be specified as a condition for admission to the degree program as part of a condition in accordance with § 4 (4).	Examination: Oral examination (individual examination) or written exam (*Klausur*).

* Module references in the column "Prerequisites for participation" were translated from German automatically. For originial module names, please refer to the original Degree Program and Examination Regulations published in Amtliche Mitteilungen der Philipps-Universität Marburg (No. 27/2025) on April 10, 2025.

4. Appendix 3 is amended as follows:

Appendix 3:   Import module list

The following modules can be selected at the time of the resolution on these degree program and examination regulations. In accordance with § 14 (1) General Regulations, the details of the degree program and examination regulations in which the modules are offered apply to these modules (particularly with regard to qualification objectives, prerequisites, credit points and examination modalities). The possible combinations of modules may be determined by the teaching unit offering them.

The examination committee may change or supplement the catalog of selectable study programs, in particular if the range of degree programs offered by the offering departments at Philipps-Universität Marburg changes. Such changes will be published by the examination committee on the respective degree program website. In individual cases or in general, taking advantage of the study programs listed below may be subject to prior academic advising or binding registration. In the event of capacity restrictions, the corresponding regulations of the degree program and examination regulations apply. Otherwise, no guarantee is given that the courses listed below will actually be offered and can be attended.

Upon justified request by the student, it is permissible to approve additional import modules beyond the regular offer in individual cases; this requires the consent of the department or institution offering the course.

The current import offer is published as an export offer on the degree program website of the department offering the module.

Students should take advantage of the relevant information and advisory services offered by the department offering the module before taking up the course.

Any participation requirements or recommendations as well as combination regulations must be observed. If the module provider has specified combination regulations and created export packages, only a limited range of modules is actually available, depending on the scope of your own import window.

The import module list in its current form can be found on the degree program website at https://www.uni-marburg.de/de/fb12/studium/studiengaenge/m-sc-wirtschaftsmathematik.

<mark>Article 2</mark>

With the exception of the changes in § 4, the first amendment applies from winter semester 2025/2026 to all students studying in the degree program "Business Mathematics" leading to the degree "Master of Science (M.Sc.)" at Philipps-Universität Marburg from 25 January 2023.

Completed and ongoing module examination procedures are not affected; modules that were started before the winter semester 2025/2026 must be completed in accordance with the regulations of January 25, 2023, as amended.

The changes in § 4 apply to all students who have started their studies in the Master's degree program "Business Mathematics" leading to the degree "Master of Science (M.Sc.)" from winter semester 2025/26.

The amendment comes into force on the day after its publication in the Amtliche Mitteilungen der Philipps-Universität Marburg.

Marburg, April 08, 2025

signed.

Prof. Dr. István Heckenberger
Deputy Dean of the Department of
Mathematics and Computer Science
Philipps-Universität Marburg