

Master Mathematics TU Ilmenau (120 CP) – Field of Study: Mathematics

Mandatory Modules (20 CP)

Functional Analysis
(10 CP)

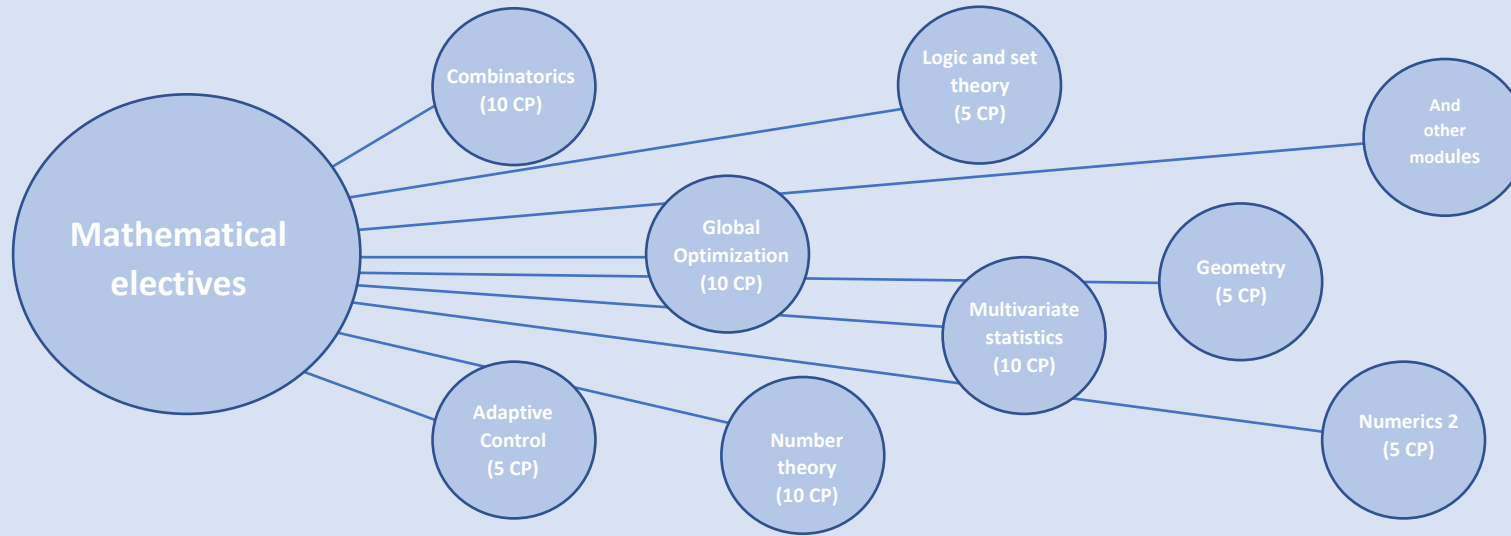
Seminar 1
(5 CP)

Seminar 2
(5 CP)

1 oral exam (see below)

20
CP

Math electives (60 CP)

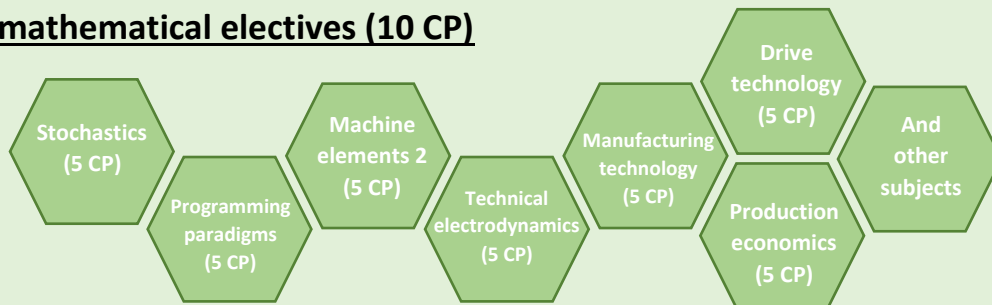


Select as many subjects from the mathematic offerings until you reach 60 CP.

1 oral exam per subject taken (see below)

60
CP

Non-mathematical electives (10 CP)



Choose from the range of subjects (not from the mathematic range) until you reach 10 CP.

1 oral exam per subject taken (see below)

10
CP

Master thesis and colloquium (30 CP)

30
CP

$\Sigma = 120$

Semester

1

2

3

4

Functional Analysis

Math. Elective
(10 LP)

Non-math. Elective
(10 CP)

Seminar 1

Math. Elective
(25 CP)

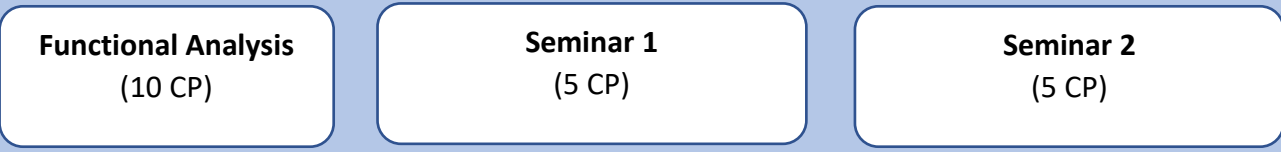
Seminar 2

Math. Elective
(25 CP)

Master thesis and
colloquium

Master Mathematics TU Ilmenau (120 CP) – Field of Study: Mathematics with application subject

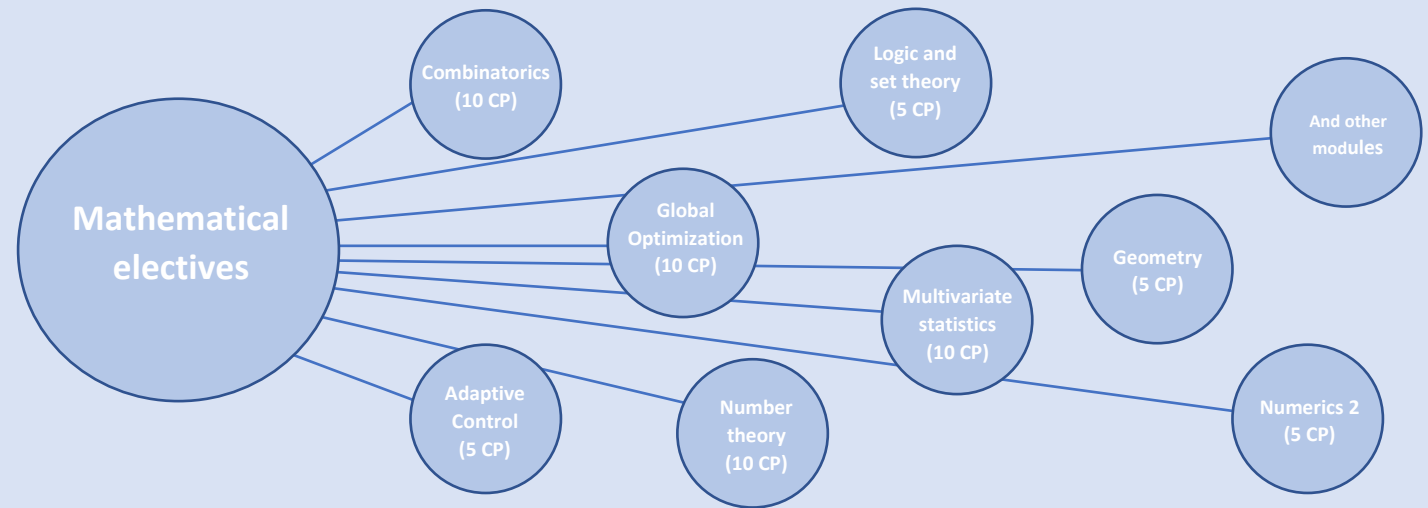
Mandatory Modules (20 CP)



1 oral exam (see below)

20 CP

Math electives (50 CP)

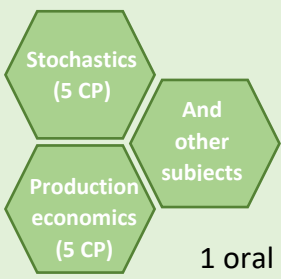


Select as many subjects from the ma-thematic offerings until you reach 50 CP.

1 oral exam per subject taken (see below)

50 CP

Non-mathematical elective (5 CP)

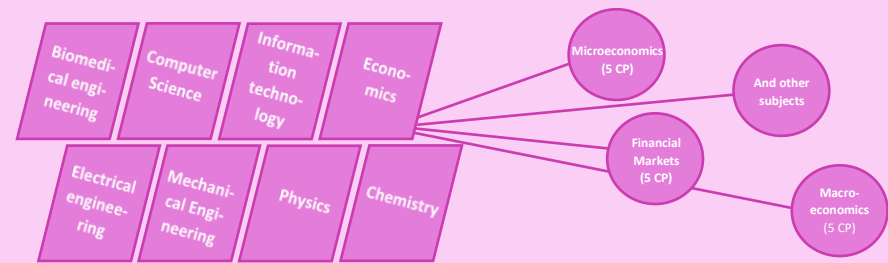


Select one subject (not from the mathematics offering) with an amount of 5 CP.

1 oral exam (see below)

5 CP

Elective Non-Math. Application subject (15 CP)



Choose an application subject and take as many subjects in it until you reach 15 CP.

1 oral exam per subject taken (see below)

15 CP

Master thesis and colloquium (30 CP)

30 CP

$\Sigma = 120$

Semester

1

Functional Analysis

Math. Elective
(10 CP)

Non-math. Elective
(5 CP)

Elective Non-Math.
App subject (5 CP)

2

Seminar 1

Math. Elective
(20 CP)

Elective Non-Math.
App subject (5 CP)

3

Seminar 2

Math. Elective
(20 CP)

Elective Non-Math.
App subject (5 CP)

4

Master thesis and
colloquium

Master Mathematics TU Ilmenau (120 CP) – Field of Study: Business Mathematics

Mandatory Modules (20 CP)

Functional Analysis
(10 CP)

Seminar 1
(5 CP)

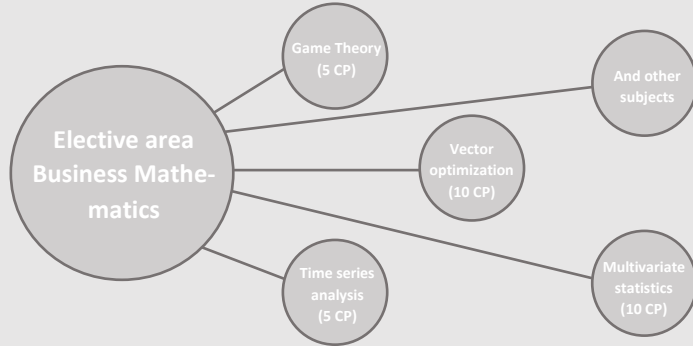
Seminar 2
(5 CP)

1 oral exam (see below)

20 CP

Elective area of business mathematics (25 CP)

(25 CP)



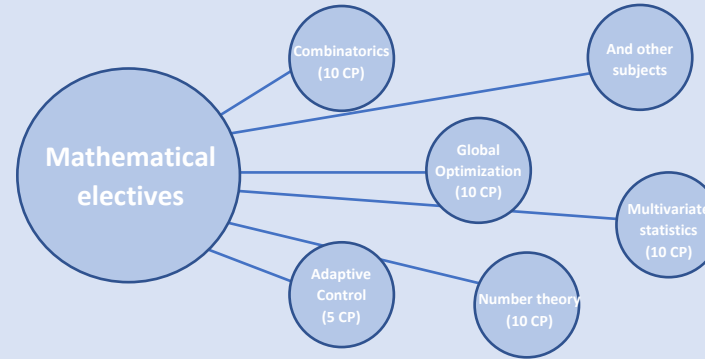
Select as many subjects from the business mathematics offerings until you reach 20 CP.

1 oral exam per subject taken (see below)

+
25 CP

Math electives (20 CP)

(20 CP)

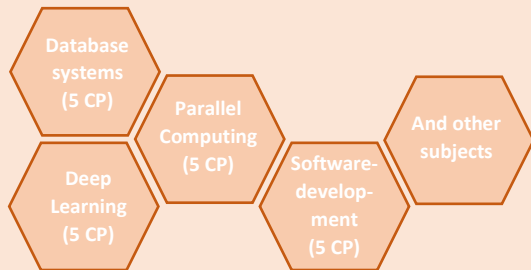


Select as many subjects from the range of topics until you reach 20 CP.

1 oral exam per subject taken (see below)

+
20 CP

Elective Computer Science (5 CP)

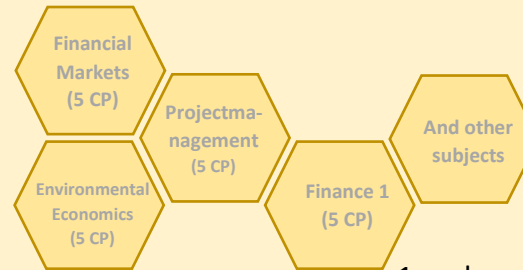


Select one subject from the computer science offering in the amount of 5 CP.

1 oral exam (see below)

5 CP

Electives Economics (20 CP)



Select as many subjects from the economics offerings until you reach 20 CP.

1 oral exam per subject taken (see below)

+
20 CP

Master thesis and colloquium (30 CP)

30 CP

Σ = 120

Semester

1

Functional Analysis

**Elective Business
Mathematics (10 CP)**

**Computer Science
(5 CP)**

**Elective area
Economics (5 CP)**

2

Seminar 1

**Elective Business
Mathematics (10 CP)**

**Math. Elective
(5 CP)**

**Elective area
Economics (10 CP)**

3

Seminar 2

**Elective Business
Mathematics (5 CP)**

**Math. Elective
(15 CP)**

**Elective area
Economics (5 CP)**

4

**Master thesis and
colloquium**

Subjects Master Mathematics

Mandatory modules

Modules	Form of exam	CP	Semester
Functional Analysis	<i>Functional Analysis is an oral examination. Participation in the seminar must be certified.</i>	10	1
Mathematical Seminar 1		5	2
Mathematical Seminar 2		5	3

Mathematical electives

Modules	Form of exam	CP	Semester
Logic and set theory	<i>Each subject is conducted as an oral examination.</i>	5	
Graph theory		10	
Combinatorics		10	
Combinatorial Optimization		10	
Number theory		10	
Coding theory		5	
Matroid theory		5	
Order and lattice theory		5	
Game theory		5	
Topology		10	
Number theory		10	
Special topics of algebra	5		
Geometry	5		
Differential geometry	10		
Mathematical statistics	10		
Stochastic processes	10		
Time series analysis	5		
Stochastic analysis	5		
Multivariate statistics	10		
Special topics in stochastics	5		
Theory of nonlinear optimization	5		
Numerical methods of convex optimization	5		
Global optimization	10		
Vector optimization	10		
Special topics of optimization	5		
Adaptive control	5		
Diff. algebraic equations: theory, system theory and numerics	5		
Math. system theory of ordinary differential equations	10		
Math. system theory of infinite dimensional systems	5		

Optimal control of partial differential equations	10
Special topics in systems theory	5
Extension and perturbation theory	5
Partial differential equations and semigroups	10
Quadratic forms and Schrödinger operators	5
Spectral theory for ordinary differential equations	5
Special topics in calculus	5
Numerics 2	5
Model predictive control	5
Numerics of partial differential equations	5
Calculus of variations and optimal control	10
Special topics in numerics and math.	5
Algebraic combinatorics	10
The probabilistic method	10
Discrete analysis	10
Large Networks & Random Graphs	5
Mathematics of Data Science	5
Special Topics in Discrete Mathematics	5

Non-mathematical electives

Module	Form of exam	CP	Semester
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Selection from the entire catalog of subjects at the TU Ilmenau possible with the exception of the Institute of Mathematics (recommended for the first semester).

Electives Non-Math. Application subject

Module	Form of exam	CP	Semester
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Non-mathematical application: Biomedical engineering	<i>Each subject is conducted as an oral examination.</i>		
Anatomy and Physiology		5	1
Modeling in Biomedical Engineering		5	3
Fundamentals of Biosignal Processing		5	3
Biosignal Processing 1		5	4
Neuroinformatics and Machine Learning		5	2
Clinical Methods		5	3
Image Processing in Medicine 1		5	3
Image Processing in Medicine 2		5	
Biosignal Processing 2		5	
KIS, telemedicine, eHealth		5	
Non-mathematical application: Computer Science	<i>Each subject is conducted as an oral examination.</i>		

Database systems	5	1
Operating systems	5	1
Telematics 1	5	2
Computer Graphics	5	3
Algorithms and Data Structures 1	5	4
Neuroinformatics and Machine Learning	5	2
Automata and Formal Languages	5	3
Computability and Complexity	5	2
Software Engineering 1	5	
Performance evaluation of technical systems	5	
Efficient Algorithms	5	
Software Engineering (Introduction for Non-Computer Scientists)	5	1

**Non-mathematical application:
Information Technology**

Each subject is conducted as an oral examination.

Signals and Systems 1	5	1
Information Technology	5	2
Signals and Systems 2	5	3
Communications Engineering	5	3
Adaptive and Array Signal Processing (Part 1)	5	1
Adaptive and Array Signal Processing (Complete Course)	10	1
Mobile Communications (Part 1)	5	2
Mobile Communications (Complete Course)	10	2

**Non-mathematical application:
Economics**

Each subject is conducted as an oral examination.

Marketing Management and Technology	5	1
Marketing or Marketing Management and Online Marketing		
Business Management	5	2
External Accounting	5	3
Internal Accounting	5	2
Finance and Investment	5	4
Microeconomics	5	1
Macroeconomics	5	2
Competition, Strategy, and Institutions	5	2
Media Economics: Theory, Competition, and Regulation	5	1
Motivation and Leadership	5	2
Organization and Corporate Governance	5	1
Strategic Management & Entrepreneurship	5	1
Production Management	5	1
Decision-making	5	2

Business Ethics and Sustainability Management	5	2
Project Management	5	2
Finance 1	5	1
Finance 2	5	2
Resource Economics	5	1
Environmental Economics	5	2
Financial markets	5	1
Derivative financial instruments	5	1
Advanced methods of investment appraisal and business valuation	5	2
Classical and modern analytical approaches to finance	5	2
Accounting and Management Control 1	5	1
Accounting and Management Control 2	5	2
Accounting and Management Control 3	5	2
External Accounting	5	1
Internal Accounting	5	2
Empirical Research I	5	1
Empirical Research II	5	2
Economic Policy	5	1
International Trade	5	2
Fundamentals of Innovation Management	5	2

**Non-mathematical application:
Electrical engineering**

Each subject is conducted as an oral examination.

General electrical engineering 1	5	1 a. 2
General electrical engineering 2	5	2 a. 3
Theoretical electrical engineering 1	5	2
Theoretical Electrical Engineering 2	5	3
Signals and Systems 1	5	1
Electronics	5	2
Fundamentals of analog circuit technology	5	3
Technical electrodynamics	5	3
Pattern Recognition / Machine Learning	5	4

**Non-mathematical application:
Mechanical Engineering**

Each subject is conducted as an oral examination.

Engineering Mechanics 3.1	5	
Engineering Mechanics 3.2	5	1
Engineering Mechanics 3.3	5	2
Engineering Thermodynamics 1	5	3
Fluid Mechanics 1	5	4
Introduction to Microsystems Engineering	5	4
Image Processing for Quality Assurance		

Basics of Image Processing and Pattern Recognition
 Higher strength theory and finite element methods
 Process measurement and sensor technology
 Fluid Mechanics 2
 Aerodynamics
 Magnetofluid Dynamics
 Technical Thermodynamics 2

**Non-mathematical application:
 Physics**

Each subject is conducted as an oral examination.

Experimental physics 1 (mechanics and thermodynamics)	6	1
Experimental physics 2 (oscillations, waves and fields)	6	2
Experimental Physics 3 (Electricity and Optics)	6	3
Experimental physics 4 (atoms, nuclei, particles)	6	4
Theoretical physics 1	6	3
Theoretical physics 1		
Theoretical Physics 2		
Theoretical physics 3		
Technical Physics 1		
Technical Physics 2		
Experimental physics 3		
Experimental physics 4		

**Non-mathematical application:
 Chemistry**

Each subject is conducted as an oral examination.

Chemistry for Engineers	5	1
Fundamentals of physical chemistry	5	2
Analytics	5	4
Basics of cell biology	5	3
Electrochemistry and corrosion	5	3
Physical Chemistry 2	10	3 a. 4
Technical Chemistry	5	4
Biotechnical micro- and nanosystems	5	1
Introduction to Quantum Mechanics	5	1
Introduction to Quantum Chemistry	5	2
Bioinstrumental analytics and microanalysis systems	5	1

Elective area of business mathematics

Modules	Form of exam	CP	Semester
Combinatorial Optimization	<i>Each subject is conducted as an oral examination</i>	10	1
Game theory		5	2
Stochastic Processes		10	1 a. 3
Time Series Analysis		5	1 a. 3
Stochastic Analysis		5	2 a. 4
Multivariate Statistics		10	2 a. 4
Numerical methods of convex optimization		5	1 o. 3
Global Optimization		10	1 o. 3
Vector Optimization		10	1 o. 3
Large Networks & Random Graphs		5	1 a. 3
Mathematics of Data Science		5	1 a. 3

Computer science electives

Modules	Form of exam	CP	Semester
Data Science: Basics		5	2
Data Science: Methods and Techniques		5	
Database Systems		5	
Deep Learning		5	
Advanced database models and systems		5	
Knowledge Engineering		5	
Object-Oriented Modeling		5	
Parallel Computing		5	
Programming paradigms		5	
Software Architectures		5	
Software Development		5	
Software Engineering (Introduction for Non-Computer Scientists)		5	
Software Quality Assurance		5	

Elective area of Economics

Modules	Form of exam	CP	Semester
Competition, Strategy, and Institutions	<i>Each subject is conducted as an oral examination</i>	5	2
Media Economics: Theory, Competition, and Regulation		5	1
Motivation and Leadership		5	2
Organization and Corporate Governance		5	1
Strategic Management & Entrepreneurship		5	1
Production Economics		5	1
Decision Sciences		5	2

Business Ethics and Sustainability Management	5	2
Project Management	5	2
Finance 1	5	1
Finance 2	5	2
Resource Economics	5	1
Environmental economics	5	2
Financial markets	5	1
Derivative financial instruments	5	1
Advanced methods of investment appraisal and business valuation	5	2
Classical and modern analytical approaches to finance	5	2
Accounting and Management Control 1	5	1
Accounting and Management Control 2	5	2
Accounting and Management Control 3	5	2
External Accounting	5	1
Internal Accounting	5	2
Empirical Research I	5	1
Empirical Research II	5	2
Economic Policy	5	1
International Trade	5	2
Fundamentals of Innovation Management	5	2