

Module Handbook (<https://modhb.uni-kl.de/>)

[TUK \(https://www.uni-kl.de\)](https://www.uni-kl.de)   [MODHB \(https://modhb.uni-kl.de/\)](https://modhb.uni-kl.de/)   [Homepage \(/\)](#)

## Course of Study "Mathematics" (M.Sc.)

Department	[MAT] Mathematik
Degree	[M.Sc.] Master (M.Sc.)
Course of Study	Mathematics
State	[NORM] Active
Short Name	<b>M.Sc. Mathematics</b>
Additional informations	<a href="http://www.uni-kl.de/fileadmin/ha-4/42-Pruefung/Pruefungsordnungen/Master/Master-PO_Mathematik_TMathe_WMathe_MatheInt.pdf">Examination regulations</a> ( <a href="http://www.uni-kl.de/fileadmin/ha-4/42-Pruefung/Pruefungsordnungen/Master/Master-PO_Mathematik_TMathe_WMathe_MatheInt.pdf">http://www.uni-kl.de/fileadmin/ha-4/42-Pruefung/Pruefungsordnungen/Master/Master-PO_Mathematik_TMathe_WMathe_MatheInt.pdf</a> ) <a href="https://www.mathematik.uni-kl.de/studium/studiengaenge/msc/mathematik/">Homepage of the Course of Study</a> ( <a href="https://www.mathematik.uni-kl.de/studium/studiengaenge/msc/mathematik/">https://www.mathematik.uni-kl.de/studium/studiengaenge/msc/mathematik/</a> )

### Section *Pure Mathematics*

Core Modules (non specialised)

In this section, modules amounting to 18 - 21 credit points (CP) from the list below are to be successfully completed. With approval of the examination board, other modules from the area of Pure Mathematics may be selectable.

The choice of the modules is limited by the chosen mathematical specialisation:

- Modules that are directly attributable to the chosen specialisation may not be included in the section "Pure Mathematics".
- In the sections "Pure Mathematics" and "Applied Mathematics", a total of modules amounting to at least 18 CP must be provided outside the focus area which the specialisation belongs to.
- When choosing a specialisation that is wholly or partially attributable to the field of stochastics (e.g. "Stochastic Analysis", "Financial Mathematics" or "Statistics"), at least 24 CP must be provided in the sections "Pure Mathematics", "Applied Mathematics" and "Specialisation" outside of stochastics.

WP	MAT-40-11-M-4 (/mhb/modules/MAT-40-11-M-4/)	Commutative Algebra Not possible if the chosen specialisation is "Algebra and Number Theory" or "Algebraic Geometry and Computer Algebra".	9.0 CP
WP	MAT-40-14-M-4 (/mhb/modules/MAT-40-14-M-4/)	Cryptography	9.0 CP
WP	MAT-40-28-M-4 (/mhb/modules/MAT-40-28-M-4/)	Plane Algebraic Curves Not possible if the chosen specialisation is "Algebraic Geometry and Computer Algebra".	4.5 CP
WP	MAT-60-11-M-4 (/mhb/modules/MAT-60-11-M-4/)	Probability Theory Not possible if the chosen specialisation is "Financial Mathematics", "Statistics" or "Stochastic Analysis".	9.0 CP
WP	MAT-70-11-M-4 (/mhb/modules/MAT-70-11-M-4/)	Functional Analysis Not possible if the chosen specialisation is "Stochastic Analysis".	9.0 CP
WP	MAT-80-11B-M-4 (/mhb/modules/MAT-80-11B-M-4/)	Introduction to PDE Not possible if the chosen specialisation is "Modelling and Scientific Computing", "Partial Differential Equations", or "Systems and Control Theory".	4.5 CP
WP	MAT-40-24-M-4 (/mhb/modules/MAT-40-24-M-4/)	p-adic Numbers Not possible if the chosen specialisation is "Algebra and Number Theory".	4.5 CP
WP	MAT-40-25-M-4 (/mhb/modules/MAT-40-25-M-4/)	Character Theory of Finite Groups Not possible if the chosen specialisation is "Algebra and Number Theory".	4.5 CP
WP	MAT-40-29-M-4 (/mhb/modules/MAT-40-29-M-4/)	Quadratic Number Fields Not possible if the chosen specialisation is "Algebra and Number Theory".	4.5 CP
WP	MAT-40-16-M-6 (/mhb/modules/MAT-40-16-M-6/)	Algebraic Topology	9.0 CP
WP	MAT-40-19-M-6 (/mhb/modules/MAT-40-19-M-6/)	Elliptic Functions and Elliptic Curves	3.0 CP
WP	MAT-40-20-M-6 (/mhb/modules/MAT-40-20-M-6/)	Multilinear Algebra	3.0 CP
WP	MAT-40-21-M-6 (/mhb/modules/MAT-40-21-M-6/)	Manifolds	9.0 CP
WP	MAT-40-26-M-6 (/mhb/modules/MAT-40-26-M-6/)	Riemannian Surfaces	3.0 CP
WP	MAT-40-27-M-6 (/mhb/modules/MAT-40-27-M-6/)	Elliptic Curves in Positive Characteristics	3.0 CP
WP	MAT-49-11-M-6 (/mhb/modules/MAT-49-11-M-6/)	Categories	3.0 CP
WP	MAT-49-15-M-6 (/mhb/modules/MAT-49-15-M-6/)	Introduction to Tensor Categories	3.0 CP
WP	MAT-RM-MPOOL-7 (/mhb/modulepools/MAT-RM-MPOOL-7/)	Pure Mathematics (Advanced Modules M.Sc.)	[4.5 - 9.0] CP

In this section, modules amounting to 18 - 21 credit points (CP) from the list below are to be successfully completed. With approval of the examination board, other modules from the area of Applied Mathematics may be selectable.

The choice of the modules is limited by the chosen mathematical specialisation:

- Modules that are directly attributable to the chosen specialisation may not be included in the section "Applied Mathematics".
- In the sections "Pure Mathematics" and "Applied Mathematics", a total of modules amounting to at least 18 CP must be provided outside the focus area which the specialisation belongs to.
- When choosing a specialisation that is wholly or partially attributable to the field of stochastics (e.g. "Stochastic Analysis", "Financial Mathematics" or "Statistics"), at least 24 CP must be provided in the sections "Pure Mathematics", "Applied Mathematics" and "Specialisation" outside of stochastics.

WP	MAT-40-14-M-4 (/mhb/modules/MAT-40-14-M-4/)	Cryptography	9.0 CP
WP	MAT-50-11-M-4 (/mhb/modules/MAT-50-11-M-4/)	Integer Programming: Polyhedral Theory and Algorithms Not possible if the chosen specialisation is "Optimisation".	9.0 CP
WP	MAT-50-12-M-4 (/mhb/modules/MAT-50-12-M-4/)	Nonlinear Optimization Not possible if the chosen specialisation is "Optimisation".	9.0 CP
WP	MAT-60-11-M-4 (/mhb/modules/MAT-60-11-M-4/)	Probability Theory Not possible if the chosen specialisation is "Financial Mathematics", "Statistics" or "Stochastic Analysis".	9.0 CP
WP	MAT-60-12-M-4 (/mhb/modules/MAT-60-12-M-4/)	Regression and Time Series Analysis Not possible if the chosen specialisation is "Financial Mathematics" or "Statistics".	9.0 CP
WP	MAT-60-14-M-6 (/mhb/modules/MAT-60-14-M-6/)	Monte Carlo Algorithms Not possible if the chosen specialisation is "Financial Mathematics" or "Statistics".	9.0 CP
WP	MAT-60-15-M-4 (/mhb/modules/MAT-60-15-M-4/)	Foundations in Financial Mathematics Not possible if the chosen specialisation is "Financial Mathematics" or "Statistics".	3.0 CP
WP	MAT-70-11-M-4 (/mhb/modules/MAT-70-11-M-4/)	Functional Analysis Not possible if the chosen specialisation is "Stochastic Analysis".	9.0 CP
WP	MAT-80-11-M-4 (/mhb/modules/MAT-80-11-M-4/)	Differential Equations: Numerics of ODE & Introduction to PDE Not possible if the chosen specialisation is "Modelling and Scientific Computing", "Partial Differential Equations", or "Systems and Control Theory".	9.0 CP
WP	MAT-80-11A-M-4 (/mhb/modules/MAT-80-11A-M-4/)	Numerics of ODE Not possible if the chosen specialisation is "Modelling and Scientific Computing", "Partial Differential Equations", or "Systems and Control Theory".	4.5 CP

WP	MAT-80-11B-M-4 (/mhb/modules/MAT-80-11B-M-4/)	Introduction to PDE Not possible if the chosen specialisation is "Modelling and Scientific Computing", "Partial Differential Equations", or "Systems and Control Theory".	4.5 CP
WP	MAT-80-12A-M-4 (/mhb/modules/MAT-80-12A-M-4/)	Introduction to Systems and Control Theory Not possible if the chosen specialisation is "Modelling and Scientific Computing" or "Systems and Control Theory".	4.5 CP
WP	MAT-59-14-M-6 (/mhb/modules/MAT-59-14-M-6/)	Mathematics of Quantum Computing	4.5 CP
WP	MAT-65-10-M-4 (/mhb/modules/MAT-65-10-M-4/)	Foundations in Mathematical Image Processing Not possible if the chosen specialisation is "Image Processing and Data Analysis".	9.0 CP
WP	MAT-80-17-M-6 (/mhb/modules/MAT-80-17-M-6/)	Dynamical Systems Not possible if the chosen specialisation is "Modelling and Scientific Computing".	4.5 CP
WP	MAT-80-18-M-4 (/mhb/modules/MAT-80-18-M-4/)	Introduction to Systems and Control Theory & Dynamical Systems Not possible if the chosen specialisation is "Modelling and Scientific Computing" or "Systems and Control Theory".	9.0 CP
WP	MAT-81-23-M-4 (/mhb/modules/MAT-81-23-M-4/)	Differential-Algebraic Equations Not possible if the chosen specialisation is "Modelling and Scientific Computing".	4.5 CP
WP	INF-14-56-M-6 (/mhb/modules/INF-14-56-M-6/)	Optimization in Fluid Mechanics	4.5 CP
WP	INF-14-55-M-6 (/mhb/modules/INF-14-55-M-6/)	Topology Optimization	4.5 CP
WP	MAT-70-10-M-6 (/mhb/modules/MAT-70-10-M-6/)	Spline Functions	3.0 CP
WP	MAT-80-13A-M-4 (/mhb/modules/MAT-80-13A-M-4/)	Introduction to Neural Networks Not possible if the chosen specialisation is "Modelling and Scientific Computing" or "Systems and Control Theory".	4.5 CP
WP	MAT-80-12-M-6 (/mhb/modules/MAT-80-12-M-6/)	Systems and Control Theory Not possible if the chosen specialisation is "Modelling and Scientific Computing" or "Systems and Control Theory".	9.0 CP
WP	MAT-AM-MPOOL-7 (/mhb/modulepools/MAT-AM-MPOOL-7/)	Applied Mathematics (Advanced Modules M.Sc.)	[4.5 - 13.5] CP

## Section *Specialisation*

Specialisation

In this section, modules associated to lectures resp. lectures with exercise classes amounting to 18 - 21 credit points (CP) from the module catalogue for the chosen specialisation (see below) have to be completed .

In addition, reading courses amounting to 12 CP have to be completed. The latter usually take place with semester-changing topics that are often based on current mathematical research. Towards the end of the lecture period of each semester, the reading courses offered in the following semester for the respective specialisation areas will be presented as part of the information sessions of the individual research focuses.

### Modules associated to lectures (with or without exercise classes)

WP	MAT-43-MPOOL-7 (/mhb/modulepools/MAT-43-MPOOL-7/)	Specialisation Algebra and Number Theory (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-41-MPOOL-7 (/mhb/modulepools/MAT-41-MPOOL-7/)	Specialisation Algebraic Geometry and Computer Algebra (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-52-MPOOL-7 (/mhb/modulepools/MAT-52-MPOOL-7/)	Specialisation Mathematical Optimisation (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-61-MPOOL-7 (/mhb/modulepools/MAT-61-MPOOL-7/)	Specialisation Financial Mathematics (M.Sc.)	[4.5 - 13.5] CP
WP	MAT-62-MPOOL-7 (/mhb/modulepools/MAT-62-MPOOL-7/)	Specialisation Statistics (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-65-MPOOL-7 (/mhb/modulepools/MAT-65-MPOOL-7/)	Specialisation Image Processing and Data Analysis (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-70-MPOOL-7 (/mhb/modulepools/MAT-70-MPOOL-7/)	Specialisation Stochastic Analysis (M.Sc.)	[4.5 - 13.5] CP
WP	MAT-8x-MPOOL-7 (/mhb/modulepools/MAT-8x-MPOOL-7/)	Specialisation Modelling and Scientific Computing (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-81-MPOOL-7 (/mhb/modulepools/MAT-81-MPOOL-7/)	Specialisation Partial Differential Equations (M.Sc.)	[4.5 - 9.0] CP
WP	MAT-82-MPOOL-7 (/mhb/modulepools/MAT-82-MPOOL-7/)	Specialisation Systems and Control Theory (M.Sc.)	[4.5 - 9.0] CP

### Reading Courses

P	MAT-RC-M-7 (/mhb/modules/MAT-RC-M-7/)	Reading Course (Mathematics)	12.0 CP
---	---------------------------------------	------------------------------	---------

### Section *Seminare*

Core Modules (non specialised)

In this section, two seminars must be selected, at least one of which must be on a topic from the chosen mathematical specialisation.

P	MAT-VSEM-M-7 (/mhb/modules/MAT-VSEM-M-7/)	Seminar (Mathematical Specialisation)	3.0 CP
P	MAT-SEM-M-7 (/mhb/modules/MAT-SEM-M-7/)	Seminar (Mathematics)	3.0 CP

### Section *Master Thesis*

Thesis

P	MAT-MA-MAT-M-7 (/mhb/modules/MAT-MA-MAT-M-7/)	Master Thesis (Mathematics, M.Sc.)	30.0 CP
---	---	------------------------------------	---------

### Section *Subsidiary Topic (Minor)*

Subsidiary Topic

The (elective) modules to be completed in the chosen subsidiary subject (minor) are usually modules from a Bachelor's or Master's programme offered by the respective department of TUK. They build on the modules provided for the respective subsidiary topics in the Bachelor's programme [MAT-82.105-SG] (/mhb/FB-MAT/cos-509/). In these cases, the achievements to be completed can be found in the examination regulations of the corresponding course of study.

Modules for courses with mainly mathematical content are not permitted here if they substantially overlap with other modules of the Bachelor's or Master's examination, or if the examination board states that they do not have a sufficiently advanced character.

## Biology

In this subsidiary topic (minor), elective compulsory modules to a total of 18 - 21 CP from the following list or other advanced modules from the study programmes offered by the Department of Biology (or at least equivalent achievements) must be selected:

<b>WP</b>	<b>BIO-GM13-M-2</b> (/mhb/modules/BIO-GM13-M-2/)	Grundmodul 13: Mikrobiologie <small>This module can only be chosen if it has not already been part (as compulsory elective module) of the Bachelor examination in Mathematics.</small>	<b>6.0 CP</b>
<b>WP</b>	<b>MAT-BIO-G11-M-2</b> (/mhb/modules/MAT-BIO-G11-M-2/)	Biochemistry (for Mathematics Students) <small>This module can only be chosen if it has not already been part (as compulsory elective module) of the Bachelor examination in Mathematics.</small>	<b>6.0 CP</b>
<b>WP</b>	<b>BIO-GM10-M-2</b> (/mhb/modules/BIO-GM10-M-2/)	Grundmodul 10: Tierphysiologie	<b>10.0 CP</b>
<b>WP</b>	<b>MAT-BIO-GM10-M-2</b> (/mhb/modules/MAT-BIO-GM10-M-2/)	Animal Physiology (for Mathematics Students)	<b>6.0 CP</b>
<b>WP</b>	<b>BIO-GM16-M-2</b> (/mhb/modules/BIO-GM16-M-2/)	Grundmodul 16: Molekulare Biotechnologie	<b>6.0 CP</b>
<b>WP</b>	<b>BIO-GM14-M-2</b> (/mhb/modules/BIO-GM14-M-2/)	Grundmodul 14: Neuro-/Entwicklungsbiologie	<b>6.0 CP</b>

## Chemistry

In this subsidiary topic (minor), elective compulsory modules to a total of 18 - 21 CP from the following list or other advanced modules from the study programmes offered by the Department of Chemistry (or at least equivalent achievements) must be selected:

<b>WP</b>	<b>CHE-BaCh-10-M-1</b> (/mhb/modules/CHE-BaCh-10-M-1/)	Grundmodul: Organische Chemie II	<b>6.0 CP</b>
<b>WP</b>	<b>CHE-BaCh-16-M-1</b> (/mhb/modules/CHE-BaCh-16-M-1/)	Grundmodul: Physikalische Chemie III	<b>5.0 CP</b>
<b>WP</b>	<b>CHE-BaCh-17-M-1</b> (/mhb/modules/CHE-BaCh-17-M-1/)	Grundmodul: Theoretische Chemie	<b>5.0 CP</b>
<b>WP</b>	<b>CHE-BaCh-191-M-1</b> (/mhb/modules/CHE-BaCh-191-M-1/)	Grundmodul: Biochemie I	<b>5.0 CP</b>
<b>WP</b>	<b>CHE-BaCh-192-M-1</b> (/mhb/modules/CHE-BaCh-192-M-1/)	Grundmodul: Biochemie II	<b>3.0 CP</b>
<b>WP</b>	<b>CHE-MM-Ch_BC_GM-M-5</b> (/mhb/modules/CHE-MM-Ch_BC_GM-M-5/)	Biochemie (Mastergrundmodul)	<b>5.0 CP</b>
<b>WP</b>	<b>CHE-MM-Ch_OC_GM-M-5</b> (/mhb/modules/CHE-MM-Ch_OC_GM-M-5/)	Organische Chemie	<b>5.0 CP</b>

(Mastergrundmodul)

WP	CHE-MM-Ch_PC_GM-M-5 (/mhb/modules/CHE-MM-Ch_PC_GM-M-5/)	Physikalische Chemie (Mastergrundmodul)	5.0 CP
----	---	--	--------

## Electrical Engineering

In this subsidiary topic (minor), elective compulsory modules to a total of 18 - 21 CP must be chosen from one or two of the advanced study areas

- Automation & Control (AUT)
- Embedded Systems (ESY)
- Power Engineering (ENT)
- Integrated systems
- Communication technology (COM)
- Mechatronics (MET)

of the bachelor's degree course [\[EIT-82.781-SG#2019\]](#) (/mhb/FB-EIT/cos-523/) *Electrical and Computer Engineering* (EIT), whereby in each of the selected areas at least 6 CP are to be completed on modules from the corresponding section "Major-Specific Advanced Subjects" of the bachelor's degree course or the master's degree course [\[EIT-88.781-SG#2010\]](#) (/mhb/FB-EIT/cos-556/) *Electrical and Computer Engineering* (EIT) or at least equivalent achievements.

The module [\[EIT-LRS-504-M-3\]](#) (/mhb/modules/EIT-LRS-504-M-3/) *Linear Control* can be selected in each of the areas.

WP	EIT-LRS-504-M-3 (/mhb/modules/EIT-LRS-504-M-3/)	Linear Control	5.0 CP
----	---	----------------	--------

## Computer Science

In this subsidiary topic (minor), elective compulsory modules to a total of 18 - 21 CP must be chosen from one or two of the research and study areas

- Visualisation and Scientific Computing
- Information Systems
- Software Engineering
- Distributed and Networked Systems
- Algorithmics and Deduction
- Embedded Systems and Robotics
- Intelligent Systems

of the Department of Computer Science. In each of the chosen areas, modules associated to lectures or lectures with exercise classes or project modules from the section Computer Science Specialisation of the Bachelor's programme [\[INF-82.79-SG\]](#) (/mhb/FB-INF/cos-506/) *Computer Science* or from the Master's programme [\[INF-88.79-SG\]](#) (/mhb/FB-INF/cos-536/) *Computer Science* or at least equivalent achievements are admissible.

In particular, the modules or module catalogues listed can be selected.

WP	INF-VIS_Ba_V-MPOOL-4 (/mhb/modulepools/INF-VIS_Ba_V-MPOOL-4/)	Specialization Bachelor TA Visualization and Scientific Computing	[4.0 - 8.0] CP
----	---	---	-------------------

WP	INF-14-53-M-6 (/mhb/modules/INF-14-53-M-6/)	High Performance Computing (Introduction)	5.0 CP
----	---	--	--------

If a specialised module with a total of 12 LP is selected, this module can be taken as [\[INF-14-53\\_MAT-M-6\]](#) (/mhb/modules/INF-14-53-M-6/) *Introduction to HPC (for Mathematics Students)*.

WP	INF-14-54-M-6 (/mhb/modules/INF-14-54-M-6/)	High Performance Computing with GPUs	6.0 CP
----	---	---	--------

WP	INF-10-45-M-4 (/mhb/modules/INF-10-45-M-4/)	Visualization and Scientific Computing (Project)	8.0 CP
WP	INF-14-57-M-6 (/mhb/modules/INF-14-57-M-6/)	Algorithmic Differentiation	5.0 CP
WP	INF-INSY_Ba_V-MPOOL-4 (/mhb/modulepools/INF-INSY_Ba_V-MPOOL-4/)	Specialization Bachelor TA Information Systems	[8.0] CP
WP	INF-20-45-M-4 (/mhb/modules/INF-20-45-M-4/)	Information Systems (Project)	8.0 CP
WP	INF-SE_Ba_V-MPOOL-4 (/mhb/modulepools/INF-SE_Ba_V-MPOOL-4/)	Specialization Bachelor TA Software Engineering	[4.0 - 8.0] CP
WP	INF-30-45-M-4 (/mhb/modules/INF-30-45-M-4/)	Software Engineering (Bachelor-Project)	8.0 CP
WP	INF-VVS_Ba_V-MPOOL-4 (/mhb/modulepools/INF-VVS_Ba_V-MPOOL-4/)	Specialization Bachelor TA Distributed and Networked Systems	[4.0] CP
WP	INF-40-45-M-4 (/mhb/modules/INF-40-45-M-4/)	Distributed and networked systems (Project)	8.0 CP
WP	INF-56-51-M-6 (/mhb/modules/INF-56-51-M-6/)	Concurrency Theory	8.0 CP
WP	INF-56-52-M-6 (/mhb/modules/INF-56-52-M-6/)	Advanced Automata Theory	8.0 CP
WP	INF-56-53-M-5 (/mhb/modules/INF-56-53-M-5/)	Complexity Theory	8.0 CP
WP	INF-50-45-M-4 (/mhb/modules/INF-50-45-M-4/)	Algorithms and Deduction (Project)	8.0 CP
WP	INF-ES_Ba_V-MPOOL-4 (/mhb/modulepools/INF-ES_Ba_V-MPOOL-4/)	Specialization Bachelor TA Embedded Systems and Robotics	[4.0 - 8.0] CP
WP	INF-60-45-M-4 (/mhb/modules/INF-60-45-M-4/)	Embedded Systems (Project)	8.0 CP
WP	INF-KI_Ba_V-MPOOL-4 (/mhb/modulepools/INF-KI_Ba_V-MPOOL-4/)	Specialization Bachelor TA Intelligent Systems	[4.0 - 8.0] CP
WP	INF-75-51-M-6 (/mhb/modules/INF-75-51-M-6/)	Machine Learning II - Statistical ML	8.0 CP
WP	INF-70-45-M-4 (/mhb/modules/INF-70-45-M-4/)	Intelligent Systems (Project)	8.0 CP

## Mechanical Engineering

In this subsidiary topic (minor), elective compulsory modules to a total of 18 - 21 CP must be chosen from one or two of the areas of expertise (KF)

- KF1: Product Development in Mechanical Engineering
- KF2: Vehicle Engineering
- KF3: Material Science and Technology
- KF4: Production Technology
- KF5: Computational Engineering

of the bachelor's programme **[MV-82.103-SG]** (/mhb/FB-MV/cos-508/) *Mechanical Engineering*. In each of the selected areas at least 6 CP have to be completed on modules from the corresponding section of the bachelor's degree course or one of the master's programmes of the Department Mechanical and Process Engineering (MV) or at least equivalent achievements.

Instead of a second area of expertise the module **[MV-MTS-23-M-4]** (/mhb/modules/MV-MTS-23-M-4/) *Measurement and control Theory* can be selected, too.



<b>WP</b>	<b>MV-MTS-23-M-4</b> (/mhb/modules/MV-MTS-23-M-4/)	Measurement and control Theory	<b>8.0 CP</b>
-----------	--	--------------------------------	---------------

## Physics

In this subsidiary topic (minor), elective compulsory modules to a total of 18 - 21 CP from the following list or other advanced modules (resp. module parts) from the study programmes offered by the Department of Physics (or at least equivalent achievements) must be selected:

<b>WP</b>	<b>PHY-G3-M-2</b> (/mhb/modules/PHY-G3-M-2/)	Fundamentals of quantum physics	<b>18.0 CP</b>
<b>WP</b>	<b>PHY-E1-M-3</b> (/mhb/modules/PHY-E1-M-3/)	Physics of condensed matter and statistical physics	<b>20.0 CP</b>
<b>WP</b>	<b>PHY-E2-M-3</b> (/mhb/modules/PHY-E2-M-3/)	atomic physics	<b>5.0 CP</b>

## Economics and Business Sciences

In this subsidiary topic (minor), elective compulsory modules to a total of 18 - 21 CP must be chosen from one or two of the research and study areas

- Business Information Systems and Operations Research
- Controlling,
- Economic Theory,
- Entrepreneurship,
- Financial Economics,
- Financial and Banking Management,
- Human Resource Management and Organizational Behavior,
- Industrial Economics,
- Logistics,
- Marketing,
- Production Management,
- Environment, Resources, Energy: Economics and Policy,
- Taxation and Auditing,
- Strategy, Innovation and Cooperation,
- Sustainability Management

of the Master's programme **[WIW-88.21-SG]** (/mhb/FB-WIW/cos-534/) *Business Studies* or at least equivalent achievements. In each of the selected areas, modules to a total of at least 6 LP must be completed.

In particular, the modules associated to lectures or lectures with exercise classes of the module catalogues listed below can be selected:

<b>WP</b>	<b>WIW-WIN-MPOOL-7</b> (/mhb/modulepools/WIW-WIN-MPOOL-7/)	Field of Specialization: Business Information Systems & OR	<b>[4.0 - 6.0] CP</b>
<b>WP</b>	<b>WIW-CON-MPOOL-7</b> (/mhb/modulepools/WIW-CON-MPOOL-7/)	Field of Specialization: Management Accounting	<b>[4.0 - 9.0] CP</b>
<b>WP</b>	<b>WIW-ET-MPOOL-7</b> (/mhb/modulepools/WIW-ET-MPOOL-7/)	Field of Specialization: Economic Theory	<b>[4.0 - 4.5] CP</b>
<b>WP</b>	<b>WIW-EPS-MPOOL-7</b> (/mhb/modulepools/WIW-EPS-MPOOL-7/)	Field of Specialization: Entrepreneurship	<b>[3.0 - 6.0] CP</b>
<b>WP</b>	<b>WIW-FE-MPOOL-7</b> (/mhb/modulepools/WIW-FE-MPOOL-7/)	Field of Specialization: Financial Economics	<b>[4.0 - 6.0] CP</b>
<b>WP</b>	<b>WIW-FUB-MPOOL-7</b> (/mhb/modulepools/WIW-FUB-MPOOL-7/)	Field of Specialization: Finance and Banking Management	<b>[4.0 - 4.5] CP</b>

<b>WP</b>	<b>WIW-HRMOB-MPOOL-7</b> (/mhb/modulepools/WIW-HRMOB-MPOOL-7/)	Field of Specialization: Human Resource Management and Organizational Behavior	<b>[4.0 - 9.0]</b> CP
<b>WP</b>	<b>WIW-IOE-MPOOL-7</b> (/mhb/modulepools/WIW-IOE-MPOOL-7/)	Field of Specialization: Industrial Economics	<b>[4.0 - 4.5]</b> CP
<b>WP</b>	<b>WIW-LOG-MPOOL-7</b> (/mhb/modulepools/WIW-LOG-MPOOL-7/)	Field of Specialization: Logistics	<b>[4.0 - 4.5]</b> CP
<b>WP</b>	<b>WIW-MKT-MPOOL-7</b> (/mhb/modulepools/WIW-MKT-MPOOL-7/)	Field of Specialization: Marketing	<b>[3.0 - 6.0]</b> CP
<b>WP</b>	<b>WIW-POM-MPOOL-7</b> (/mhb/modulepools/WIW-POM-MPOOL-7/)	Field of Specialization: Produktionsmanagement	<b>[4.0 - 9.0]</b> CP
<b>WP</b>	<b>WIW-RE-MPOOL-7</b> (/mhb/modulepools/WIW-RE-MPOOL-7/)	Field of Specialization: Environment, Resources, Energy: Economics and Policy	<b>[4.0 - 4.5]</b> CP
<b>WP</b>	<b>WIW-SWP-MPOOL-7</b> (/mhb/modulepools/WIW-SWP-MPOOL-7/)	Field of Specialization: Taxation and Auditing	<b>[4.0 - 6.0]</b> CP
<b>WP</b>	<b>WIW-SIC-MPOOL-7</b> (/mhb/modulepools/WIW-SIC-MPOOL-7/)	Field of Specialization: Strategy, Innovation and Cooperation	<b>[4.0 - 9.0]</b> CP
<b>WP</b>	<b>WIW-SMG-MPOOL-7</b> (/mhb/modulepools/WIW-SMG-MPOOL-7/)	Field of Specialization: Sustainability Management	<b>[4.0 - 9.0]</b> CP