Hochschule Düsseldorf
University of Applied Sciences

Fachbereich Maschinenbau
und Verfahrenstechnik
Faculty of Mechanical
and Process Engineering

Stand: Juni 2019 / Last updated: June 2019

Module Guide Master „Mechanical Engineering“

General Studies

Course
Engineering Mathematics
Simulation of Mechanical Systems
Computer-Based Measurement Technology
Finite Element Method (FEM)
Computational Fluid Dynamics

Abbreviations:

sem. = semester
SS = summer semester; WS = winter semester
SWS = credit hours per week
ECTS = credits according to the European Credit Transfer System
SET = Simulation and Experimental Engineering; ME = Mechanical Engineering; IWI = International Industrial Engineering

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Engineering Mathematics

Modulnummer (Module number)	Workload	Präsenzzeit (Attendance)	Selbststudium (Self-study)	Studiensemester (Semester)	Angebot im (Offered in)	Dauer (Duration)
MV_MASTV_Eng Math.16	180 h	75 h	105 h	Sem. 1	SS	1 sem.

Lehrveranstaltungen (Courses)	Credits	Zuordnung zu den Curricula (Allocation to study programme)
(a) Lecture 3 SWS (b) Practical Training 2 SWS	6 ECTS	Master ME, SET

1	**Lernergebnisse (Learning outcomes) / Kompetenzen (Competences)** The participants have a solid understanding of and scientific insight into the mathematical foundations of computational engineering – including numerical and algorithmic aspects of modern software tools. Moreover, the participants have acquired competences and skills to solve typical problems of the engineering routine by means of advanced engineering mathematics.
2	**Inhalte (Contents)** • Linear and non-linear systems of equations (properties, numerical solution method, algorithmic aspects) • The engineering eigenvalue problem (algebraic properties, solution strategies, numerical solution methods and algorithmic aspects) • Numerical algorithms (numerical interpolation, numerical differentiation, numerical integration in 1D, 2D and 3D) • Algebra of relations (Boolean algebra, transitive closure) • Graph theory (types of graphs and applications) • Paths in networks (path algebra, weighted graphs)
3	**Lehrformen (Forms of teaching)** Lecture, exercise, seminar, discussion
4	**Empfohlene Voraussetzungen (Recommended prerequisites)** Bachelor's degree in engineering; Java-programming skills, fundamentals of engineering mathematics and mechanics
5	**Prüfungsformen (Types of examination)** Assessment in two parts according to the following weighting for the final grade: I. Worked and defended practical (= 30% of the final grade) II. Written exam (duration: 90 min.) (=70% of the final grade) The students must pass each of the two parts with a minimum of 50% of the used grading scheme.
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** Passed examination (100%)
7	**Modulverantwortliche(r) (Person responsible for the module)** Prof. Dr.-Ing. habil. Martin Ruess
8	**Sprache (Language of instruction)** English
9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)**

	Lecture slides & lecture notes (partly)

Simulation of Mechanical Systems						
Modulnummer (Module number) MV_MASTV_ SimMech.16	**Workload** 180 h	**Präsenzzeit (Attendance)** 75 h	**Selbststudium (Self-study)** 105 h	**Studiensemester (Semester)** Sem. 1	**Angebot im (Offered in)** WS	**Dauer (Duration)** 1 sem.
Lehrveranstaltungen (Courses) a) Lecture 2 SWS b) Exercise 2 SWS c) Practical Training 1 SWS		**Credits** 6 ECTS	**Zuordnung zu den Curricula (Allocation to study programmes)** Master ME			

1	**Lernergebnisse (Learning outcomes) / Kompetenzen (Competences)** The students know • the theoretical and practical foundations for modelling of mechanical systems. They can • build and simulate models of kinematic chains, open or closed by kinematic or control means, as well as optimise them by simple parameter variation. • carry out scientific work in this area.
2	**Inhalte (Contents)** Modelling and simulating mechanical systems
3	**Lehrformen (Forms of teaching)** • Oral presentation with slides, computer-based simulations • Programming samples and exercises • Practical simulation evaluation by the students themselves • Guidance to independent scientific work
4	**Empfohlene Voraussetzungen (Recommended prerequisites)** Study of mechanics or technical mechanics (approximately 12 ECTS on bachelor's level)
5	**Prüfungsformen (Types of examination)** • Modelling and simulating a given mechanical system using software, at home or in the laboratory • Oral examination and presentation of simulation results • Examination duration: 30 min.
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** Passed examination (100%)
7	**Modulverantwortliche(r) (Person responsible for the module)** Prof. Dr.-Ing. Andreas Jahr, lecturer
8	**Sprache (Language of instruction)** English
9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)** • Pdf-files of lecture slides on MOODLE learning platform • Pdf-files of exercises on MOODLE learning platform • Pdf-files of former exercises, partly with solutions on MOODLE learning platform

	Recommended literature (latest edition): • Henning, Jahr, Mrowka: Technische Mechanik mit Mathcad, Matlab und Maple, Vieweg Verlag, Wiesbaden, 2004 • John J. Craig: Introduction to Robotics, Pearson Prentice Hall, Upper Saddle River, 2005 • Specific software literature, relevant scientific papers • MATLAB Simmechanics: http://de.mathworks.com/help/physmod/sm/getting-started-with-simmechanics.html

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Computer-Based Measurement Technology

Modulnummer (Module number)	Workload	Präsenzzeit (Attendance)	Selbststudium (Self-study)	Studiensemester (Semester)	Angebot im (Offered in)	Dauer (Duration)
MV_MASTV_CMT.16	180 h	75 h	105 h	Sem. 1	SS	1 sem.

Lehrveranstaltungen (Courses)	Credits	Zuordnung zu den Curricula (Allocation to study programmes)
a) Lecture 2 SWS b) Laboratory 3 SWS	6 ECTS	Master ME, SET

1	**Lernergebnisse (Learning outcomes) / Kompetenzen (Competences)** Students are able to • handle hardware and software (i.e. calibration of accelerometers and microphones or oscilloscopes), • differ between steady-state, transient and dynamic data, • analyse signals in time and frequency domain, • verify overall levels in time and frequency domains (Parseval theorem), • use the correlation measurement technique and know the concept of coherence, phase spectrum and time delay.
2	**Inhalte (Contents)** • Overview of the typical measure principles for measuring position, flow and current, pressure, sound pressure and vibration • Data acquisition, sampling-rate • Analogue-to-digital converters • Windowing, frequency analysis, averaging • Sound and vibration analysis • Rotating machinery, Campbell diagram • Discrete frequency analysis and fast Fourier analysis
3	**Lehrformen (Forms of teaching)** • Lecture (PC with projector, overhead slides, blackboard), • Practical computer training (Dasylab, Matlab, Scilab, PAK), discussing the experiments • Practical training with digital oscilloscopes
4	**Empfohlene Voraussetzungen (Recommended prerequisites)** • Basics of data acquisition and numerical mathematics
5	**Prüfungsformen (Types of examination)** • Term paper (= 60% of the final grade) • Feedback talk with PC demonstrations (= 40% of the final grade)
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** • Passed examination (feedback talk)
7	**Modulverantwortliche(r) (Person responsible for the module)** • Prof. Dr.-Ing. Frank Kameier
8	**Sprache (Language of instruction)** • English

9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)** • Lecture notes (translation in progress), software applications at http://ifs.mv.hs-duesseldorf.de/Vorlesung/master/ Recommended literature: • Karrenberg, Ulrich, Signals, Processes, and Systems, An Interactive Multimedia Introduction to Signal Processing, 3rd edition, Berlin 2013.

Finite Element Method (FEM)

Modulnummer (Module number)	Workload	Präsenzzeit (Attendance)	Selbststudium (Self-study)	Studiensemester (Semester)	Angebot im (Offered in)	Dauer (Duration)
MV_MASTV_ FEM.16	180 h	75 h	105 h	Sem. 1	WS	1 sem.

Lehrveranstaltungen (Courses)	Credits	Zuordnung zu den Curricula (Allocation to study programmes)
a) Lecture 3 SWS b) Practical Training 2 SWS	6 ECTS	Master ME, SET (Elective Module)

1	**Lernergebnisse (Learning outcomes) / Kompetenzen (Competences)** The attendees have acquired a basic understanding of and the ability to apply FEM to solve engineering problems. They are aware of relevant possibilities, assumptions and challenges. They have in-depth knowledge of the often-used element types in technical problems and are able to interpret and rate the results.
2	**Inhalte (Contents)** • Numerical Solutions of differential equations using the Galerkin method • Virtual work principle for a deformable body • Displacements, strain tensors, stress tensors, material models • One, two and three-dimensional element types • Principal transformation, invariants and equivalent stress
3	**Lehrformen (Forms of teaching)** Lecture (PowerPoint or overhead slides)
4	**Empfohlene Voraussetzungen (Recommended prerequisites)** Bachelor's degree in mechanical engineering (or in a related discipline)
5	**Prüfungsformen (Types of examination)** Assessment in two parts according to the following weighting for the final grade : I. Worked and defended practical (= 30% of the final grade) II. Written exam (duration: 90 min.) (= 70% of the final grade) The students must pass each of the two parts with a minimum of 50% of the used grading scheme.
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** Passed examination
7	**Modulverantwortliche(r) (Person responsible for the module)** Prof. Dr.-Ing. habil. Martin Ruess
8	**Sprache (Language of instruction)** English
9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)** None

Computational Fluid Dynamics (CFD)

Modulnummer (Module number)	Workload	Präsenzzeit (Attendance)	Selbststudium (Self-study)	Studiensemester (Semester)	Angebot im (Offered in)	Dauer (Duration)
MV_MASTV_ CFD.16	180 h	75 h	105 h	Sem.1	SS	1 sem.

Lehrveranstaltungen (Courses)	Credits	Zuordnung zu den Curricula (Allocation to study programmes)
a) Lecture 3 SWS b) Exercise 1 SWS c) Practical Training 1 SWS	6 ECTS	Master ME, SET

1 **Lernergebnisse (Learning outcomes) / Kompetenzen (Competences)**

The attendees have acquired a basic understanding of and the ability to apply CFD to solve engineering problems. They are aware of relevant potentials, limitations and challenges. They are familiar with and have a deep understanding of

- the differential equations that describe the transport of momentum, heat and mass in Newtonian fluids,
- their boundary conditions for a single-phase, steady or unsteady as well as compressible or incompressible flow.

They have fundamental knowledge of

- different physical flow states with corresponding mathematical and numerical implications, flow turbulence and turbulence modelling,
- discretisation principles, gridding techniques and numerical solution procedures including the intricacies involved in modelling highly connective flows and Navier-Stokes solution techniques.

At the end of the course, the attendees are able to apply a general-purpose CFD software to solve technical problems involving a laminar or turbulent single-phase flow, with or without heat transfer, and analyse the results competently. Furthermore, the attendees are able to follow the course and communicate in English.

2 **Inhalte (Contents)**

- Overview of fluid mechanics applications in engineering
- Basic ideas of Computational Fluid Dynamics (CFD)
- The role of CFD in solving engineering problems
- Review of the relevant basic knowledge
- Derivation of the unsteady, three-dimensional differential balance equations for a fluid
- Discussion of the physical and mathematical meanings of the terms and their interrelationship
- Boundary conditions
- Assumptions and simplifications
- The general convective-diffusive transport equation
- Main ingredients of a numerical solution method
- Overview of grid generation
- Overview of discretisation methods including finite difference, finite volume and finite element methods
- Discretisation of the general transport equation by the method of finite volumes
- Accuracy estimation
- Direct and iterative methods for the solution of the discretisation equations
- Convergence control

	• Unstructured meshes • Discretisation in time • Stability conditions • Treatment of flows with strong convection • Pressure correction and other methods for treating velocity-pressure coupling in solving the Navier-Stokes equations for incompressible and compressible flows • Turbulent flows with and without heat transfer • Turbulence modelling
3	**Lehrformen (Forms of teaching)** Lecture, seminar, discussion, independent elaboration
4	**Empfohlene Voraussetzungen (Recommended prerequisites)** Bachelor's degree in mechanical engineering (or in a related discipline), fluid mechanics, heat transfer, mathematics, differential equations, English
5	**Prüfungsformen (Types of examination)** • Written multiple-choice examination (duration: 90 min., 80% of the final grade) • Practical training (oral examination, 20% of the final grade)
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** Passed examination
7	**Modulverantwortliche(r) (Person responsible for the module)** Prof. Dr.-Ing. Ali Cemal Benim
8	**Sprache (Language of instruction)** English
9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)** • Hirsch, Numerical Computation of Internal and External Flows, Volume I: Fundamentals of Discretization, Wiley, 1994 • Hirsch, Numerical Computation of Internal and External Flows, Volume II: Computational Methods for Inviscid and Viscous Flows, Wiley, 1995

Specialisation

Course
Elective Course I (to be chosen from the list of elective courses)
Elective Course II (to be chosen from the list of elective courses)
Elective Course III (to be chosen from the list of elective courses)
Elective Course IV (to be chosen from the list of elective courses)

Projects, R&D

Course
Project incl. Project Seminar (Research & Development)
Engineering Conferences
Master Thesis incl. Colloquium

Studienprojekt inkl. Seminar (Forschung & Entwicklung)
Project incl. Project seminar (Research & Development)

Modulnummer (Module number)	Workload	Präsenzzeit (Attendance)	Selbststudium (Self-study)	Studiensemester (Semester)	Angebot im (Offered in)	Dauer (Duration)
MV_MASTV_ Projekt.16	180 h	30 h	150 h	Sem. 2	SS / WS	1 sem.

Lehrveranstaltungen (Courses)	Credits	Zuordnung zu den Curricula (Allocation to study programmes)
Seminar 2 SWS	6 ECTS	Masterstudiengänge: SET, IWI, ME Master ME, SET, IWI

1 **Lernergebnisse (Learning outcomes) / Kompetenzen (Compentences)**

Die Studierenden können das im Studium erlernte fachliche und methodische Wissen anwenden und erweitern. Sie wurden mit fachübergreifenden Fragestellungen, Erfahrung ziel- und terminorientierten Arbeitens im Team und damit Stärkung der sozialen Kompetenzen, Förderung des strukturierten und vernetzten Denkens, Außendarstellung und Präsentation konfrontiert.

(The students can apply and extend the methodical and specialised technical knowledge acquired during their studies. They have faced interdisciplinary questions, goal and deadline-oriented work in teams and, thus, strengthening of their social competences, promotion of structured, cross-disciplinary thinking, rhetoric and presentation.)

2 **Inhalte (Contents)**

Selbstständige Bearbeitung einer konkreten, praxisnahen und motivierenden Aufgabenstellung aus den Gebieten Prozesstechnik, Energietechnik, Umwelttechnik, Produktion oder eines gebietsübergreifenden Themas im Rahmen von Arbeitsgruppen. Besondere Betonung liegt auf Teamarbeit, auf der Notwendigkeit, sich viele Daten und Unterlagen selbst beschaffen zu müssen und auf der Verpflichtung, die Ergebnisse schriftlich und mündlich zu präsentieren.

(Either independent work on a specific, motivating task with a practical orientation from the fields of production, process, energy or environmental technology; or an interdisciplinary task in groups.
Special emphasis is on
- *teamwork,*
- *the necessity of obtaining data and documents by themselves and*
- *the obligation of presenting the results in written and oral form.)*

3 **Lehrformen (Forms of teaching)**

Einführende Vorstellung und Erläuterungen, Selbststudium, Teamarbeit, regelmäßige Betreuung und Diskussion mit den Dozenten

(Introductory presentation and explanations, self-study, teamwork, regular supervision and discussion with the lecturer)

4 **Empfohlene Voraussetzungen (Recommended prerequisites)**

Fachbezogener Bachelor sowie die für das konkrete Projekt relevanten Teilmodule aus den Gebieten Prozess- Energie- und/oder Umwelttechnik, Managementtechniken, Produktion.

(Subject-related bachelor's degree as well as courses relevant to the specific project from the fields of process, energy and/or environmental technology, management techniques, production)

5	**Prüfungsformen (Types of examination)** Schriftliche Dokumentation der Projektarbeit, Präsentation, mündliche Prüfung *(Written documentation, project work, presentation, oral examination)*
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** Teilnahme am Projekt sowie bestandene Präsentation der Ergebnisse *(Participation in the project and successful presentation of the results)*
7	**Modulverantwortliche(r) (Person responsible for the module)** Verschiedene *(Various)*
8	**Sprache (Language of Instruction)** Deutsch und Englisch *(German and English)*
9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)** Spezielle Literatur wird je nach Aufgabenstellung empfohlen. *(Relevant literature will be recommended depending on the task)*

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Engineering Conferences						
Modulnummer (Module number)	**Workload**	**Präsenzzeit (Attendance)**	**Selbststudium (Self-study)**	**Studiensemester (Semester)**	**Angebot im (Offered in)**	**Dauer (Duration)**
30031	180 h	60 h	120 h	Sem. 3	WS/SS	1 sem.
Lehrveranstaltungen (Courses)		**Credits**	**Zuordnung zu den Curricula (Allocation to study programmes)**			
Seminar 4 SWS		6 ECTS	Master SET, IWI, ME			

1	**Lernergebnisse (Learning outcomes) / Kompetenzen (competences)** The students • understand how scientific and engineering conferences work, • know what to do to submit their own work to an international conference, • can employ common techniques of producing a scientific paper, • can identify relevant work of other researchers in relation to their own work and extract similarities and distinctions, • can digest, condense, select and express information relevant to produce a thread of their own research work, • can assess a scientific paper in oral form or as a poster.
2	**Inhalte (Contents)** • Group work on selected conference papers, to train the technical understanding, recognition of structure, distillation of core content and critical review • Exercises in writing up scientific or technical work • Exercises in scientific (poster and oral) presentation, using modern technical means • Discussion and assessment of scientific presentations • Tutorials and exercises in online search for relevant information in connection with publishing research at an international conference • Small mock conference with poster session and short oral presentations
3	**Lehrformen (Forms of teaching)** Seminar
4	**Empfohlene Voraussetzungen (Recommended prerequisites)** None
5	**Prüfungsformen (Types of examination)** Submission of a scientific paper, participation in review process, poster preparation and presentation
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** • Completed paper and poster, successful short oral presentation of the poster • Attendance at the following mandatory sessions: introduction and registration, conference session day, poster presentation day
7	**Modulverantwortliche(r) (Person responsible for the module)** Prof. Dr.-Ing. Thomas Zielke, Prof. Dr.-Ing. Matthias Neef
8	**Sprache (Language of instruction)** English

9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)** Recommended literature: • Alley, Michael (2013): The craft of scientific presentations. Critical steps to succeed and critical errors to avoid. 2nd ed. New York: Springer. • Alley, Michael (2014): The craft of scientific writing. 4th ed. New York, NY: Springer. • Cargill, Margaret; O'Connor, Patrick (2013): Writing scientific research articles. Strategy and steps. 2nd ed. Chichester: Wiley-Blackwell. • Hofmann, Angelika H. (2014): Scientific writing and communication. Papers, proposals, and presentations. 2nd ed. New York, NY: Oxford Univ. Press. • Holst, Bodil: (2015): Scientific Paper Writing - A Survival Guide, CreateSpace Independent Publishing Platform, Bergen List of important/popular conferences within the scope of our master courses: • http://icpr-eame.com • CIRP Conference on Industrial Product Service Systems • ISES Solar World Congress • Solar Heating and Cooling for Buildings and Industry conference (SHC) • ASME Turbo Expo (https://www.asme.org) IEEE engineering publications: http://ieeexplore.ieee.org

Masterarbeit
(Master's Thesis)

Modulnummer (Module number)	Workload	Präsenzzeit (Attendance)	Selbststudium (Self-study)	Studiensemester (Semester)	Angebot im (Offered in)	Dauer (Duration)
MV_MASTV_ Master.16	630 h	0 h	630 h	Sem. 3	WS/SS	1 sem.

Lehrveranstaltungen (Courses)	Credits	Zuordnung zum Curriculum (Allocation to study programmes)
n/a	21 ECTS	Master ME, IWI, SET

1	**Lernergebnisse (Learning outcomes) / Kompetenzen (Competences)** Die Kandidatin/der Kandidat ist in der Lage, innerhalb einer vorgegebenen Frist ein anspruchsvolles Problem aus ihrem/seinem Fach selbständig nach wissenschaftlichen Methoden auf hohem Niveau zu bearbeiten. *(The students are able to work on a complex problem from their field – independently and in a professional manner, in accordance with scientific methods, within a prescribed period of time.)*
2	**Inhalte (Contents)** Die Abschlussarbeit dient zur Bearbeitung einer wissenschaftlichen Aufgabenstellung mit einem festgelegten Umfang und in einem vorgegebenen Zeitraum (16 Wochen). Das Thema der Abschlussarbeit kann theoretischer oder experimenteller Natur sein und kann aus allen Lehr- und Forschungsgebieten des Fachbereichs stammen. *(The thesis serves to work on a scientific assignment, within a prescribed extent and period of time: 16 weeks. The subject of the thesis can be of theoretical or experimental nature and can originate from any teaching or research field of the faculty.)*
3	**Lehrformen (Forms of teaching)** Keine *(None)*
4	**Teilnahmevoraussetzungen (Recommended prerequisites)** Es müssen alle Module mit Ausnahme der Module, die nach dem jeweiligen Studienverlaufs- und Prüfungsplan für das letzte Fachsemester vorgesehen sind, erfolgreich bestanden sein. *(The students must have successfully passed all modules, except the ones scheduled for the last semester.)*
5	**Prüfungsformen (Types of examination)** Die Abschlussarbeit ist eine schriftliche Prüfungsarbeit. *(The thesis is a piece of written examination work.)*
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** Keine *(None)*

7	**Modulverantwortliche(r) (Person responsible for the module)** Dekan *(Dean)*
8	**Dozent(in) (Lecturer)** Verschiedene Betreuer*innen *(Various supervisors)*
9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)** Die Abschlussarbeit kann auch in der Forschungsabteilung eines Industrieunternehmens oder einer anderen wissenschaftlichen Einrichtung des Berufsfeldes durchgeführt werden, wenn sie dort ausreichend betreut werden kann. *(Alternatively, the students can write their theses in the research department of an industrial enterprise or in another scientific organisation of the professional field, if the thesis can be sufficiently supervised.)*

Kolloquium **(*Colloquium)***						
Modulnummer (Module number)	**Workload**	**Präsenzzeit (Attendance)**	**Selbststudium (Self-study)**	**Studiensemester (Semester)**	**Angebot im (Offered in)**	**Dauer (Duration)**
MV_MASTV_ MKolloq.16	n/a	n/a	n/a	Sem. 3	SS / WS	1 sem.
Lehrveranstaltungen (Courses) n/a		**Credits** 3 ECTS	**Zuordnung zum Curriculum (Allocation to study programmes)** Master ME, IWI, SET			

1	**Lernergebnisse (Learning outcomes) / Kompetenzen (Competences)** Die Kandidatin/der Kandidat ist befähigt, die Ergebnisse der Abschlussarbeit, ihre fachlichen Grundlagen, ihre fächerübergreifenden Zusammenhänge und ihre außerfachlichen Bezüge mündlich darzustellen, selbständig zu begründen, gegen Einwände zu verteidigen und ihre Bedeutung für die Praxis einzuschätzen. *(The candidates are able to present the results of their theses incl. technical principles, interdisciplinary correlations and non-technical references orally, justify the theses independently, defend them against objections and assess its importance for the practical application.)*
2	**Inhalte (Contents)** Das Kolloquium ergänzt die Abschlussarbeit, wird als mündliche Prüfung durchgeführt und von den Prüferinnen und Prüfern der Abschlussarbeit gemeinsam abgenommen und bewertet. Das Kolloquium kann ein Kurzreferat des Studierenden zu den Inhalten und Ergebnissen der Abschlussarbeit beinhalten. *(The colloquium is an oral examination complementing the thesis. The examiners of the thesis jointly conduct and evaluate the colloquium. The colloquium can include a short presentation by the student on the thesis contents and results.)*
3	**Lehrformen (Forms of teaching)** Keine *(None)*
4	**Teilnahmevoraussetzungen (Recommended prerequisites)** Bestätigung einer mindestens ausreichenden Leistung in der Thesis durch die Prüfer. *(Examiners' confirmation that they graded the thesis with the minimum passing grade or better.)*
5	**Prüfungsformen (Types of examination)** Das Kolloquium ist eine mündliche Prüfung und dauert 45 Minuten. *(The colloquium is an oral examination; duration: 45 min.)*
6	**Voraussetzungen für die Vergabe von Leistungspunkten (Requirements for award of credits)** Keine *(None)*

7	**Modulverantwortliche(r) (Person responsible for the module)** Dekan *(Dean)*
8	**Dozent(in) (Lecturer)** Verschiedene Betreuer*innen *(Various supervisors)*
9	**Sonstige Informationen / Literaturempfehlungen (Further information / references)** Keine *(None)*