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# GAZETTE

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- Subject-Specific Schedule 6.4b Major Management & Engineering with regard Examinations Regulations for the Master's Programme Management & Entrepreneurship at the Graduate School of Leuphana University of Lüneburg for students starting their studies as from winter semester 2016/17

## **Subject-Specific Schedule 6.4b Major Management & Engineering with regard Examinations Regulations for the Master's Programme Management & Entrepreneurship at the Graduate School of Leuphana University of Lüneburg for students starting their studies as from winter semester 2016/2017**

On 10<sup>th</sup> February 2016, the Council of the Faculty of Business and Economics of Leuphana University of Lüneburg has, pursuant to Section 44 (1,2) of Lower Saxony Higher Education Act, passed the following Subject-Specific Schedule 6.4b Management & Engineering with respect Examinations Regulations for the Master's Programmes at the Graduate School of Leuphana University of Lüneburg dated 18<sup>th</sup> February 2015 (Leuphana Gazette No 22/15 of 25<sup>th</sup> June 2015). Pursuant to Section 37 (1,3,5b) of Lower Saxony Higher Education Act, the Board of Governors has approved this version on 24<sup>th</sup> February 2016.

### **CHAPTER I**

#### **Subject-Specific Schedule 6.4b Major Management & Engineering with regard Examinations Regulations for the Master's Programme Management & Entrepreneurship at the Graduate School of Leuphana University of Lüneburg**

The Examination Regulations for the Master's Programmes of the Graduate School of Leuphana University of Lüneburg are amended by complementary matters as follows:

**with regard Section 3(6), Detailed information on the structure and contents of the Major:**

#### **Module overview for the Major Management & Engineering**

(also see the Subject-Specific Schedule 6.1 Management Studies, as well as Subject-Specific Schedule 8 Complementary Studies)

4 <sup>th</sup> Semester	Master's Forum	Master's Thesis				
3 <sup>rd</sup> Semester	Management Studies	Elective Module	Elective Module	Specialisation module	Specialisation module	Complementary Studies
2 <sup>nd</sup> Semester	Management Studies	Specialisation module	Teaching Research project	Specialisation module	Specialisation module	Complementary Studies
1 <sup>st</sup> Semester	Management Studies	Specialisation module	Specialisation module	Specialisation module	Specialisation module	Complementary Studies

Major Management & Engineering students must select one of the following specialisation modules:

- Materials & Engineering
- Production Technology

At registration, students must make a binding decision for one of the specialisation modules. The relevant Examination Board will decide on changes of specialised subject made at a later stage.

In the **Materials & Engineering** specialisation, the following modules must be completed:

- in the 1<sup>st</sup> semester: Photonic Systems, Materials & Engineering, Numerical Methods in Engineering Science, as well as Material Characterization.
- in the 2<sup>nd</sup> semester: Advanced Manufacturing Technology, Computational Material Design, Sensors and Intelligent Systems.
- in the 3<sup>rd</sup> semester: Product Development and Technology Management, as well as Industry 4.0.

In the **Production Technology** specialisation, the following modules must be completed:

- in the 1<sup>st</sup> semester: Production Management, Engineering Basics, Production Simulation, as well as Engineering Methods and Processes.
- in the 2<sup>nd</sup> semester: Manufacturing Technology, Special Aspects of Industrial Engineering, as well as Production Logistics.
- in the 3<sup>rd</sup> semester: Strategic Production Networks, as well as Special Aspects of Technology Management.

Furthermore, for every specialisation, the following compulsory module must be completed.

- in the 2<sup>nd</sup> semester: Teaching Research Project

In the **3<sup>rd</sup> semester**, two of the following elective modules independent of specialisation must be completed.

- Special Aspects of Manufacturing
- Special Aspects of Product Innovation
- Special Aspects of Nano- and Micro Technology
- Special Aspects of Modelling and Simulation in Engineering
- Special Aspects of the Information Technology of Networked Systems
- Special Aspects of Supply Chain Management

Alternatively, a maximum of one from the two elective modules independent of specialisation from the elective modules of the other Majors of the Master's programme Management & Entrepreneurship may be completed, if and when the Course Leader of the Major of the Programme of Studies in Management & Engineering of approves that selection. The corresponding authorisation must be submitted to Students Services before the registration deadline. It is important here to take into consideration the contribution of these modules for the attainment of the overall qualification the student is aiming at (according to the accreditation documents).

#### **with respect to Section 5 Determination of the academic degree**

Master of Science

#### **with respect to Section 7(1) Examination performance in the Master's Forum (Colloquium)**

The examination required in the Master's Forum (Colloquium) of the Major Management & Engineering is held at a time and place mutually agreed, it is not graded, and carries, therefore, either a "pass" or a "fail".

**with respect to Section 8 Master's Thesis**

The Master's Thesis module of the Major Management & Engineering generally comprises a practical phase of ten weeks' duration. It is integrated into, and thematically linked to, the composition of the Master's Thesis. The Master's thesis shall be completed within twenty weeks.

**with respect to Section 8(8) *viva voce* / oral examination**

The Master's Thesis of the Major Management & Engineering is complemented by a *viva voce* examination. The grade is included at the rate of one fifth of the total grade for the Master's Thesis.

**Modules of the 1<sup>st</sup> Semester of the Major Management & Engineering**

Module	Content	Types of taught components (number, type and AHWS)	Module requirements and examination performance	CP	Commentary
<b>Specialisation modules</b>					
<b>Photonic Systems</b> Photonic Systems (Ma-Eng-4a)	This module comprehends basic knowledge of the structure of matter composed of the basic units called the atomic nucleus and electrons on the basis of Schrödinger's Wave Equation; further topics are the description of photons by means of Feynman's diagram of quantum electrodynamics, the interaction of atoms and photons as well as laser and semiconductors.	1 Lecture (4 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 oral examination	5	Specialisation: Materials & Engineering
<b>Materials &amp; Engineering</b> Materials & Engineering (Ma-Eng-1a)	This module provides the relevant fundamental aspects of the structure and characteristics of materials relevant to engineering (Industry). This comprises an overview of the atomic structure, microstructures, phase transformations and the mechanisms resulting from this, electrical and magnetic properties. The module serves, furthermore, as a stepping stone into the fundamentals of engineering.	1 Lecture (4 AHWS)	1 written examination (90 Min.)	5	Specialisation: Materials & Engineering
<b>Engineering Basics</b> Grundlagen der Ingenieurwissenschaften (Ma-Eng-1b)	This lecture imparts fundamental knowledge of engineers' activities from an engineering point of view. Engineering mathematics; Mechanics; Electrical technology; Energy; materials (metallic, non-metallic, alloys); Information technology. By teaching these knowledge and skills, the lecture brings students who do not hold a previous engineering degree up to the required level.	1 Lecture (4 AHWS)	1 written examination (90 Min.)	5	Specialisation: Production technology

<b>Engineering Methods &amp; Processes</b> Ingenieurmethoden & -prozesse (Ma-Eng-3)	This module treats relevant methods and processes of engineering as well as points of decision, development of a product, innovation management, project management, methods to increase efficiency, planning and controlling, risk management, quality management and information processing in the context of engineering.	1 Lecture (4 AHWS)	1 written examination (90 Min.) <i>or</i> 1 written academic assignment	5	Specialisation: Production technology
<b>Production Management</b> Produktionsmanagement (Ma-Eng-4b)	In this module, students get to know relevant methods for the strategical conception and operative optimisation of production systems. Further topics are production strategies; evaluation of the methodical maturity of production systems and evaluation of the functional efficiency of production systems.	1 Lecture (4 AHWS)	1 written examination (90 Min.) <i>or</i> 1 written academic assignment	5	Specialisation: Production technology
<b>Production Simulation</b> Produktionssimulation (Ma-Eng-2b)	Simulation methods make it possible to simulate physical processes on the basis of true-to-life models. It comprises all the processes ranging from product and material behaviour, as well as manufacturing and assembly processes, up to logistic procedures. This lecture provides an overview of the various fields of application and expands on special applications in production technology.	1 Lecture (4 AHWS)	1 written examination (120 Min) <i>or</i> 1 combined academic assignment	5	Emphasis: Production Technology
<b>Numerical Methods in Engineering Science)</b> Numerische Verfahren in den Ingenieurwissenschaften (Ma-Eng-3a)	This module provides in-depth knowledge of processes for the numerical solution of partial differential equations. Various numerical simulation procedures (for example the finite elements method) are derived and the students apply and implement them independently within the framework of the module.	1 Lecture (4 AHWS)	1 written examination (120 Min) <i>or</i> 1 combined academic assignment	5	Specialisation: Materials & Engineering
<b>Material Characterisation</b> Materialcharakterisierung (Ma-Eng-2a)	This module provides a fundamental understanding of the experimental possibilities of the determination of material properties and behaviour. This module imparts the theory and practice of these contents in the form of experiments on material testing and characterisation. The connection is made between the fundamental concepts governing the determination of the material parameters necessary for the simulation models and material design.	1 Lecture (4 AHWS)	1 written examination (90 Min.) <i>or</i> 1 combined academic assignment	5	Specialisation: Materials & Engineering

### Modules of the 2<sup>nd</sup> Semester of the Major Management & Engineering

Module	Content	Types of taught components (number, type and AHWS)	Module requirements and examination performance	CP	Commentary
<b>Compulsory modules</b>					
<b>Teaching Research Project</b> Lehrforschungsprojekt  (Ma-Eng-5)	Students will elaborate on a research question or a question from the field of practice under guided instruction. The research project is linked in terms of content to the major subject and/or the chosen specialisation.	1 Seminar (2 AHWS)	1 written academic assignment	5	
<b>Specialisation modules</b>					
<b>Advanced Manufacturing Technology</b> Innovative Fertigungstechnologien  (Ma-Eng-6)	This module provides knowledge on ultra-modern manufacturing processes, combined with new materials, as well as their common development. It treats and discusses the topics of additive manufacturing, as well as hybrid production processes.	1 Lecture (2 AHWS)	1 written examination (90 Min.)	5	Specialisation: Materials & Engineering
<b>Special Aspects of Industrial Engineering</b> Ausgewählte Themen des Industrial Engineering  (Ma-Eng-8b)	This module provides in-depth knowledge on a selection of issues of production technologies and the shaping of industrial production systems.	1 Seminar (2 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 written academic assignment	5	Specialisation: Production technology
<b>Computational Material Design</b> Digitales Materialdesign (Ma-Eng-8)	This module imparts the skills necessary to reconstruct experimentally observed material behaviour by applying the laws of continuum mechanics. The material laws provide the basis of each and every material, structure or process simulation. The content taught closes the gap between the qualitative understanding of materials and the capacity to incorporate them into calculations in practice, in order to optimise and design new materials.	1 Lecture (4 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 combined academic assignment		Specialisation: Materials & Engineering
<b>Sensors and Intelligent Systems</b> Sensoren und intelligente Systeme  (Ma-Eng-7a)	In this module, students learn the conception, development and application of multi-sensor systems (MS); complex, dynamic production processes in the area of representative industrial applications; It provides an introduction into the fundamentals and technologies of autonomous systems in relation with MS-Systems as well as the development, implementation, and application of MS-Systems within the scope of an exercise.	1 Lecture (4 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 combined academic assignment	5	Specialisation: Materials & Engineering

<b>Manufacturing Technology</b> Fertigungstechnik (Ma-Eng-6b)	In this module, students acquire knowledge about modern materials, complex manufacturing processes and the framework conditions required for efficient manufacturing processes. Various manufacturing processes are studied in depth.	1 Lecture (4 AHWS)	1 written examination (90 Min.)	5	Specialisation: Production technology
<b>Production Logistics</b> Produktionslogistik (Ma-Eng-7b)	In this module, students become acquainted with the principles of shaping production in accordance with the requirements of material flows as well as principles of production control and of materials and information logistics in production.	1 Lecture (4 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 written academic assignment	5	Specialisation: Production technology

### Modules of the 3<sup>rd</sup> Semester of the Major Management & Engineering

Module	Content	Types of taught components (number, type and AHWS)	Module requirements and examination performance	CP	Commentary
<b>Specialisation modules</b>					
<b>Strategic Production Networks</b> Strategische Produktionsnetzwerke (Ma-Eng-9b)	In this module, students acquire knowledge about the design of production networks: Optimisation of manufacturing penetration, site selection, specialisation, complexity, supply chain. Current trends are integrated.	1 Lecture (4 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 written academic assignment	5	Specialisation: Production technology
<b>Product Development and Technology Management</b> Produktentwicklung und Technologie-management (Ma-Eng-9)	Development and innovation processes and their control, digital development tools for mechanics, electronics, optics and software, simulation tools, standards.	1 Lecture (2 AHWS)	1 written examination (90 Min.)	5	Specialisation: Materials & Engineering
<b>Industry 4.0</b> Industrie 4.0 (Ma-Eng-10)	This module provides knowledge on all aspects of industrial production, covered by the term "Industry 4.0". "Internet of Things", Cyber-Physical Production Systems (CPPS), Smart Factory and other methods, systems and products of automation technology for consistent engineering covering the entire life cycle of a product (including its production system).	1 Lecture (4 AHWS)	1 written examination (90 Min.)	5	Specialisation: Materials & Engineering

<b>Special Aspects of Technology Management</b> Ausgewählte Themen des Technologie-managements  (Ma-Eng-10b)	This module provides in-depth knowledge on the design and management of the main processes and functions in industrial companies.	1 Lecture (2 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 combined academic assignment	5	Specialisation: Production technology
<b>Elective modules (Linked to the specialisation)</b>					
<b>Special Aspects of Product Innovation</b> Ausgewählte Themen der Produktinnovation  (Ma-Eng-10a)	This module provides knowledge on a selection of aspects of the design, simulation and optimisation of new products.	1 Seminar (2 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 combined academic assignment	5	
<b>Special Aspects of Supply Chain Management</b> Ausgewählte Themen des Supply Chain Managements  (Ma-Eng-10e)	This module treats principles and methods of supply chain management as corporate strategy: strategies to shape business organisations; main processes in supply chain, methods of analysis and optimisation; IT systems and their network as well as performance management systems for the evaluation of SCM performance.	1 Lecture (2 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 combined academic assignment	5	
<b>Special Aspects of Nano- and Microtechnology</b> Ausgewählte Themen der Nano- und Mikrotechnologie  (Ma-Eng-10f)	This module imparts in-depth knowledge on the topics of nano- and micro-technology, as well as their design, development, production and use for material characterisation. It also includes the integration of micro-systems in macro-systems by expanding on the knowledge in micro-technical production, assembly and packaging technology, micro-systems and integrated optics.	1 Lecture (2 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 combined academic assignment	5	
<b>Special Aspects of Information Technology of Networked Systems</b> Ausgewählte Themen der Informations-technologie vernetzter Systeme  (Ma-Eng-10g)	This seminar provides knowledge for enterprise-wide machine and system networking based on open industry-standard technologies, such as Ethernet, cross-linkable as a prerequisite for a flexible, transparent and efficient production reaching across all boundaries. It also explains more specifically the function of the network, of its design and configuration.	1 Seminar (2 AHWS)	1 written examination (90 Min.)  <i>or</i>  1 combined academic assignment	5	



<b>Special Aspects of Modelling and Simulation in Engineering</b> Ausgewählte Themen der Modellierung und Simulation in den Ingenieurwissenschaften (Ma-Eng-10h)	The module also imparts special topics of mathematical modelling in the numerical simulation in engineering sciences. It also contains themes on modelling in various disciplines of engineering sciences, as well as the numerical processing of solution models with the computer. It applies different analytical or numerical processes to optimally solve various models. The models observed from the various disciplines refer to examples from industrial praxis.	1 Lecture (2 AHWS)	1 written examination (90 Min.) <i>or</i> 1 combined academic assignment	5	
<b>Special Aspects of Manufacturing</b> Ausgewählte Themen der Fertigungstechnik (Ma-Eng-10i)	This module provides knowledge on special innovations and modern industrial processes, for example laser material processing, joining, additive or similar methods. Application examples from the fields of medicine, lightweight construction, the automotive and aircraft industries.	1 Lecture (2 AHWS)	1 written examination (90 Min.) <i>or</i> 1 combined academic assignment		

### Modules of the 4<sup>th</sup> Semester of the Major Management & Engineering

Module	Content	Types of taught components (number, type and AHWS)	Module requirements and examination performance	CP	Commentary
<b>Compulsory modules</b>					
<b>Master's Forum</b> Masterforum (Ma-Eng-11)	The Master's Forum serves to coordinate the practical project with the Master's Thesis, as well as establish a link between the supervisor and the student founded on the academic, methodical and contents-related aspects of the work.	1 Colloquium (1 WSH)	1 written academic assignment <i>or</i> 1 oral examination (pass / fail)	5	
<b>Master's Thesis</b> <b>Master-Arbeit</b> (Ma-Eng-12)	Master's Thesis: Individual composition of an academic thesis by the students.	no class	1 Master's Thesis <i>and</i> 1 oral examination	25	

## CHAPTER II

### Entry into force

This Subject-specific Schedule shall enter into force following approval by the Board of Governors of Leuphana University of Lüneburg, following its publication in the Official Gazette of Leuphana University of Lüneburg on 1<sup>st</sup> October 2016 for students who started their Master's studies in the winter semester of 2016/17.

