Hochschule Esslingen
University of Applied Sciences

Module Descriptions

Course of Study „Engineering Management" V3

Module 633 Basics of Engineering

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	633	WNB	1	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Material Science and Design Engineering	Lecture	German	4 60	60	4
	b) Technical Drawing	Lecture with Tutorials	German	1 15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☐	☐	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

To a) Material Science and Design Engineering:

- know technically important materials with respect to structure, properties, significance and usability.
- understand the relationship between internal structure and usability of materials.
- understand the processes of the most common testing methods of metallic materials and know the test results.
- understand the basics of systematical designing.
- know the phases of planning, conceptualizing, designing and finishing the construction.

To b) Technical Drawing:

- read and understand technical drawings.

Applying Knowledge and Understanding (Skills)

To a) Material Science and Design Engineering:

- select suitable materials for technical constructions.
- assess the possibilities for further treatment and processing of materials.
- decide reasonable possibilities and limitations of the various material groups.
- select a suitable material testing method to obtain desired essential material parameters of steel.
- apply the methods of the four design phases.

To b) Technical Drawing:

- draw simple structural designs themselves.

Making Judgements and Analyzing (Competences)

- none

Creating and Extending Knowledge (Competences)

- none

5 **Syllabus/Contents**

To a) Material Science and Design Engineering:
The basics of material science. The atomistic structure of matter, metal grate and state diagrams. Deepened knowledge of the materials steel, aluminum and copper. The main material testing methods for metallic materials. Design Engineering, design and systematic construction. The construction methods in planning, conceptualizing, designing and finishing the technical products.
To b) Technical Drawing:
Views, sections, dimensioning. Model beginning. Tolerances for dimension, shape, fit and surface. Drawing of some construction elements.

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- none

Module 633 Basics of Engineering

7	**Type of Assessment (Examinations) and Requirements for Credits** To a) Material Science and Design Engineering: Exam of 90 minutes To b) Technical Drawing: attestation
8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Prof. Dr.-Ing. Markus Kirchner
10	**Recommended Reading** • Roos, E.; Maile, K.: Werkstoffkunde für Ingenieure. Berlin: Springer • Feldhusen, J.; Grote, K.-H.: Pahl/Beitz Konstruktionslehre. Berlin: Springer • Conrad, K.-J.: Grundlagen der Konstruktionslehre. München: Hanser
11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 30.09.2019

Module 602 Physics 1

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	602	WNB	1	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Physics 1	Lecture	German	5 75	75	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☒	☐	☐
	Creating & Extending Knowledge	☐	☐	☐

4 Learning Outcomes and Competences

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Comprehension and Explanation of physical issues

Applying Knowledge and Understanding (Skills)
- Application of physical formulas and calculations

Making Judgements and Analyzing (Competences)
- Analyzing technical issues and problems as well as solution strategies

Creating and Extending Knowledge (Competences)
- none

5 Syllabus/Contents

Mechanics: kinematics, dynamics, force, momentum, work, energy, power, impacts, laws of conservation, circular motion.

Fluid mechanics: hydrostatics, gravitational pressure in liquids and gases, continuity equation, BERNOULLI-principle, friction, viscosity, darcy friction, turbulent flow.

Thermodynamics: equation of state and change of state, laws of thermodynamics, thermodynamic engines, transport phenomena.

6 Prerequisites

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- basic knowledge in mathematics, notably vector analysis, differential and integral calculus

7 Type of Assessment (Examinations) and Requirements for Credits

Exam of 90 minutes

8 Module can be used in the following Degree Programs

WNB

9 Module Director and other Lecturers involved

Prof. Dr.-Ing. Ulrich Braunmiller

Module 602 Physics 1

10	**Recommended Reading** • E. Hering, R. Martin, M. Stohrer: Physik für Ingenieure, Springer, Heidelberg • D. Halliday, R. Resnick, J. Walker: Physik, VCH-Wiley, Weinheim; fundamentals of physics, Wiley&Sons • P. Tipler, E. Mosca: Physik, Spektrum Akademischer Verlag, Heidelberg (German); physics for scientists and engineers, Freeman • U. Harten: Physik, Springer, Heidelberg • F. Kuyers: Physik für Ingenieure und Naturwissenschaftler, Band 1, VCH-Wiley, Weinheim
11	**Contribution of the Module to the Educational Aims of the Degree Program** Improving the physical basics for subjects like technical mechanics or mechanical engineering
12	**Date of last Modifications** 23.09.2019

Module 656 Introduction Business Administration and Economics

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	656	WNB	1	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total		Self Study (h)	ECTS Credits
	a) Business Administration	Lecture	German	2	30	30	2
	b) Economics	Lecture	German	2	30	30	2
	c) Introduction into Law	Lecture	German	1	15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☒	☒	☒

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- To know, understand different functional areas and mechanisms of business administration and economics and to understand their differences

Applying Knowledge and Understanding (Skills)
- To apply business techniques and tools and basic economic models
- To apply basic norms in German contract and company law

Making Judgements and Analyzing (Competences)
- To analyze economical implication and managerial decisions and to evaluate their impact on economical and management key figures and internal and external processes.

Creating and Extending Knowledge (Competences)
- To derive recommendations for actions through combination of different instruments.
- To develop economical thinking and acting.
- To apply basic knowledge of the German law system

5 **Syllabus/Contents**

The students get an overview on the different aspects of Business Administration and Economics and are able to apply fundamental instruments and methods.
Part Business Administration: the students understand corporations as economical units forced by internal and external expectations and requirements. They understand the relevance of horizontal and vertical structures and processes in corporations and are able to apply fundamental methods.
Part Economics: The students understand the relationship between macroeconomic processes and are able to judge the impact of economic constellations and decisions in economic policy on managerial activities.
Part Law: Students know the function of basic norms and laws, especially the German BGB, HGB, GmbHG, AktG. Apart from that they will get an introduction into data proection and terms and conditions regulations.

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- none

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam consisting of two parts a) and b) (in total 90 minutes, 5 credits)

8 **Module can be used in the following Degree Programs**

Only WNB

Module 656 Introduction Business Administration and Economics

9	**Module Director and other Lecturers involved** Module director and lecturer for business administration: Prof. Dr. Rainer Elste Economics: Prof. Dr. Simone Zeuchner
10	**Recommended Reading** • Wöhe, Einführung in die Allgemeine Betriebswirtschaftslehre, 25. Auflage, Vahlen/München ISBN 978-3-8006-4687-6 • Thommen/Achleitner, Allgemeine Betriebswirtschaftslehre, 7. Auflage, Springer-Gabler/Wiesbaden, ISBN 978-3834934161 • Becker, Einführung in die Betriebswirtschaftslehre, Springer, Wiesbaden, ISBN 978-3540282136 • Bofinger, Grundzüge der Volkswirtschaftslehre, Pearson, München, ISBN 978-3-8273-7354-0 • Bofinger/Mayer, Grundzüge der Volkswirtschaftslehre, Das Übungsbuch, Pearson, München, ISBN 978-3-8273-7355-7 • Mankiv/Taylor, Grundzüge der Volkswirtschaftslehre, Schäffer Poeschel, Stuttgart, ISBN 978-3-7910-3098-2 • BGB, HGB, AktG, GmbHG, AGBG
11	**Contribution of the Module to the Educational Aims of the Degree Program** Knowledge and application of management related instruments
12	**Date of last Modifications** 16.03.2019

Module 635 English

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	635	WNB	1	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Technical English	Language Lessons	English	2 30	30	2
	b) Business English	Language Lessons	English	2 30	60	3

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☐	☐
	Applying Knowl. & Understanding	☒	☐	☒
	Making Judgements & Analyzing	☒	☐	☐
	Creating & Extending Knowledge	☒	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- name terms of the areas of technology and business

Applying Knowledge and Understanding (Skills)
- use English vocabulary in order to describe techincal and business situations

Making Judgements and Analyzing (Competences)
- analyse and discuss technical and business texts

Creating and Extending Knowledge (Competences)
- conduct arguments in English

5 **Syllabus/Contents**

Technical and business vocabulary

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- if applicable: optional module „English Refresher“

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam and assignment, which can be done in either of the sub-modules

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr.-Ing. Ben Marx

10 **Recommended Reading**

Lecture notes

11 **Contribution of the Module to the Educational Aims of the Degree Program**

This is the first obligatory English module of the programme. It lays the foundation for modules of the fourth course which are held in English. A business fluent general and specific English is of great importance in the business life of an engineer.

12 **Date of last Modifications**

27.06.2019

Module 657 Mathematics 1

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	657	WNB	1	☒Winter Term ☒Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly	Contact Time (h) total	Self Study (h)	ECTS Credits
	a) Mathematics 1	Lecture	German	4	60	60	4
	b) Fundamentals	Laboratory	German	1	15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☒	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Identification of Systems of equations
- Knowing vectors and vector-operations, knowing which operation belongs to which situation
- Knowing fundamental functions
- Knowing of applications for differential calculus and integral calculus

Applying Knowledge and Understanding (Skills)
- Solving all kinds of systems of linear equations by applying the elimination method, solving simple kinds of non-linear equations
- Applying vector-operations
- Using calculation rules for fundamental function without errors
- Differentiate and integrate functions by applying rules

Making Judgements and Analyzing (Competences)
- Classifying systems of equations if they can be solved without using numerical mathematics
- Modelling technical and economic questions by mathematical functions/equations

Creating and Extending Knowledge (Competences)
- Assembling known components for solving complicated questions

5 **Syllabus/Contents**

Linear and nonlinear systems of equations, vector-calculus, functions, differential calculus, integral calculus

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) and b) Exam of 90 minutes
b) Proof of attendance by solving assignments with tools like Excel

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr. Joachim Gaukel

10 **Recommended Reading**

- Richard Mohr, Mathematische Formeln für das Studium an Fachhochschulen
- Jürgen Tietze, Einführung in die angewandte Wirtschaftsmathematik

Module 657 Mathematics 1

11	**Contribution of the Module to the Educational Aims of the Degree Program** Basics for technical and economical modules
12	**Date of last Modifications** 18.10.2019

Module 606 Soft Skills 1

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	606	WNB	1	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Soft Skills 1	Lecture	German	3 45	105	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☐	☒	☒
	Making Judgements & Analyzing	☐	☒	☒
	Creating & Extending Knowledge	☐	☐	☒

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- The students know the basic relationships of multiple methods to assess individual responsibility for their actions.
- The students know how efficient time management works.
- They know the interactive processes in teamwork.

Applying Knowledge and Understanding (Skills)
- The students can apply basic planning methods as well as multiple and type-based learning techniques and principles.

Making Judgements and Analyzing (Competences)
- The students are able to assess the impact of verbal and body language behavior on other people.
- The students are able to analyze university internal organization structures and optional variations of the course of the degree program.

Creating and Extending Knowledge (Competences)
- The students are able to classify relationships and effects in intercultural group structures according to ethical principles.

5 **Syllabus/Contents**

- Time management
- Learning techniques and learning styles
- Documents (library introduction, examination regulations and mentoring, internationalization)
- Project work and presentation

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- none

7 **Type of Assessment (Examinations) and Requirements for Credits**

Project work and presentation

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr.-Ing. Ulrich Nepustil

Module 606 Soft Skills 1

10	**Recommended Reading** • Planungsinstrumente erfolgreich anwenden, Verlag Bibliographisches Institut • Einführung in die Lern- und Arbeitstechniken, Merkur Verlag Rinteln • Erfolgsbaustein für Studium und Karriere, Deutscher Betriebswirte-Verlag
11	**Contribution of the Module to the Educational Aims of the Degree Program** • Creativity techniques • Training of new topics • Time management
12	**Date of last Modifications** 14.10.2014

Module 636 Engineering Mechanics

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	636	WNB	2	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total		Self Study (h)	ECTS Credits
	a) Engineering Mechanics	Lecture	German	2	30	30	2
	b) Exercises Engineering Mechanics	Lecture and Excercises	German	2	30	30	2
	c) CAD	Lecture and Excercises	German	1	15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☐	☐
	Applying Knowl. & Understanding	☒	☐	☐
	Making Judgements & Analyzing	☒	☐	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- The students will be able to analyze force systems and to recognize and calculate the resultant effect of multiple forces and moments. They can analyze and solve planar static problems of rigid bodies. Furthermore, they can calculate stresses in a component for the basic loading cases and assess the failure mechanisms of components and their impacts.

Applying Knowledge and Understanding (Skills)

- Based on the fundamentals of engineering drawing, the students can generate components using CAD, assemble sub-assemblies from several components and create drawings of the parts and assemblies.

Making Judgements and Analyzing (Competences)

- The students can analyze and assess simple planar static problems and failure mechanisms. They can create and assess simple components, assemblies and drawings using a CAD tool.

Creating and Extending Knowledge (Competences)

- none

5 **Syllabus/Contents**

Planar statics of rigid bodies and fundamentals on strength of materials: Analysis of force systems, Calculation of two-dimensional static problems of rigid bodies, calculation of internal stresses of a component for the basic load cases, analysis of failure mechanisms of components.
CAD: Creation of components, assemblies and drawings.

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- none

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) + b) Exam of 90 minutes
b) Attestation
c) Constructive Design

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dipl.-Ing. Doerte Laing-Nepustil

Module 636 Engineering Mechanics

10	**Recommended Reading** • Russell C. Hibbeler, Technische Mechanik 1, Statik, Pearson Studium • Russell C. Hibbeler, Technische Mechanik 2, Festigkeitslehre, Pearson Studium • Oliver Romberg, N. Hinrichs, Keine Panik vor Mechanik!, Vieweg+Teubner • Ulrich Gabbert, Ingo Raecke, Technische Mechanik für Wirtschaftsingenieure, Carl Hanser Verlag
11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 12.11.2019

Module 608 Physics 2

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	608	WNB	2	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total		Self Study (h)	ECTS Credits
	a) Physics 2	Lecture	German	4	60	60	4
	b) Physics laboratory	Laboratory	German	1	15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☒	☐	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Comprehension and Explanation of physical issues

Applying Knowledge and Understanding (Skills)
- Application of physical formulas and calculations, performance of physical experiments

Making Judgements and Analyzing (Competences)
- Analyzing technical issues and problems as well as solution strategies

Creating and Extending Knowledge (Competences)
- none

5 **Syllabus/Contents**

- Vibrations: periodical processes, equations of motion, undamped harmonical vibrations, damped vibrations, forced vibrations
- Waves: basics, transport of energy, wave propagation, interference
- Optics: optical imaging, mirrors, lenses, optical equipment, reflection, refraction, dispersion, interference, defraction, polarization

- laboratory experiments on selected topics of physics 1 und physics 2

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 602 Physics 1, 605 Mathematics 1

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam of 90 minutes

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr.-Ing. Ulrich Braunmiller

Module 608 Physics 2

10	**Recommended Reading** • E. Hering, R. Martin, M. Stohrer: Physik für Ingenieure, Springer, Heidelberg • D. Halliday, R. Resnick, J. Walker: Physik, VCH- Wiley, Weinheim; fundamentals of physics, Wiley&Sons • P. Tipler, E. Mosca: Physik, Spektrum Akademischer Verlag, Heidelberg; physics for scientists and engineers, Freeman • J. Rybach: Physik für Bachelors, Hanser, München
11	**Contribution of the Module to the Educational Aims of the Degree Program** Improving the physical basics for subjects like technical mechanics or mechanical engineering
12	**Date of last Modifications** 23.09.2019

Module 672 Logistics 1

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	672	WNB	2	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Supply and Logistics	Lecture and Excercises	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☐	☐
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Knowing the goals, tasks, processes and methods of logistics
- Knowing the goals, tasks, processes and methods of purchasing
- Basic knowledge in the field of lean manufacturing

Applying Knowledge and Understanding (Skills)
- Basic skills to solve simple logistic tasks and tasks in the area of purchasing and manufacturing

Making Judgements and Analyzing (Competences)
- Capability to analyze, categorize and compare different approaches and methods in the area of logistics and purchasing

Creating and Extending Knowledge (Competences)
- none

5 **Syllabus/Contents**

- Basics of logistics (history, goals, conflict of goals, areas, organization, approaches, tools and methods)
- Basics of supply chain management
- Basics of purchasing (goals, organization, determination of materials requirement, make-or-buy, sourcing strategies, management of purchasing and supplier management)
- Basics of lean manufacturing (value stream mapping, push vs. pull, quick die change)

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 656 Business Administration and Economics

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam of 90 minutes

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr.-Ing. Hannes Winkler

10 **Recommended Reading**

- Kummer, Grün, Jammerneg: „Grundzüge der Beschaffung, Produktion und Logistik“, 2013.
- Schulte: „Logistik: Wege zur Optimierung der Supply Chain“, 2012.
- Rother, Shook: „Sehen Lernen: Mit Wertstromdesign die Wertschöpfung erhöhen und Verschwendung beseitigen“, 2004.

Module 672 Logistics 1

11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 16.10.2019

Module 637 Financial Accounting

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	637	WNB	2	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Financial Accounting	Lecture and Excercises	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☐	☐
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Knowing the organization of financial accounting, legal requirements, tasks, rules, methods and stakeholders
- Knowing the tasks of bookkeeping and the different positions of a company's balance sheet

Applying Knowledge and Understanding (Skills)
- Basic skills regarding the creation and analysis of financial statements
- Advanced skills regarding the use of the double-entry bookkeeping system: Opening/closing balance sheet, turnover tax, materials administration, finished and semi-finished goods, asset management, financial management, temporal delimitation, human resources management

Making Judgements and Analyzing (Competences)
- Basics of balance sheet analysis and comparison

Creating and Extending Knowledge (Competences)
- none

5 **Syllabus/Contents**

- Organization of financial accounting
- Double-entry bookkeeping
- Annual financial statement
- Annual financial statement analysis

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 656 Introduction to Business Administration and Economics

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam of 90 minutes

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

- Module Director: Prof. Dr. Fabian Diefenbach
- Lecturer: Klaus-H. Stein

10 **Recommended Reading**

- Bornhofen: „Buchführung 1" und „Buchführung", Springer, latest version
- Schäfer-Kunz: „Buchführung und Jahresabschluss", Schäffer-Poeschel, latest version

Module 637 Financial Accounting

11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 13.09.2019

Module 611 Mathematics 2

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	611	WNB	2	☒ Winter T. ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Mathematics 2	Lecture and Excercises	German	5 75	75	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☒	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- Basic principles of matrices and determinants as well as their application to systems of linear equations
- Basic principles of financial mathematics
- Basic principles of complex numbers
- Basic principles of differential equations as well as their solution
- Basis principles of functions with several variables, their illustration as well as methods to determine extreme values

Applying Knowledge and Understanding (Skills)

- Basic operations with matrices and determinants as well as the application to systems of linear equations
- Interest calculation as well as present values and future values of cash-flows
- Basic operations with complex numbers as well as solving equations with complex numbers
- Solving basic differential equations
- Determine extreme values of functions with several variables

Making Judgements and Analyzing (Competences)

- Asses applicability of mathematical methods and tools to economical and technical problems as well as assessing solutions

Creating and Extending Knowledge (Competences)

- Develop, adapt or extend solutions and strategies for economical and technical problems

5 **Syllabus/Contents**

- Matrices
- Financial mathematics
- Complex numbers
- Functions with several variables
- Differential equations

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- 657 Mathematics 1

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam or 90 minutes

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr. Marcel Wiedemann

Module 611 Mathematics 2

10	**Recommended Reading** • Richard Mohr, Mathematische Formeln für das Studium an Fachhochschulen • Jürgen Tietze, Einführung in die angewandte Wirtschaftsmathematik
11	**Contribution of the Module to the Educational Aims of the Degree Program** Basis for technical and economic modules
12	**Date of last Modifications** 16.10.2019

Module 612 Information Technology 1

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	612	WNB	2	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Introduction to Information Technology	Lecture and Excercises	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☒	☒	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- describe basic principles and techniques of information technology
- name elements of IT solutions
- name and explain risks of / for information technology

Applying Knowledge and Understanding (Skills)
- use methods of information technology, e. g. conversion between numeral systems, encodings or addressing in computer networks
- use the Linux operating system

Making Judgements and Analyzing (Competences)
- recognise advantages and disadvantages of methods of information technology
- assess limitations and risks of IT based systems

Creating and Extending Knowledge (Competences)
- create IT structures, e. g. develop data models

5 **Syllabus/Contents**

- the subject matter of information technology
- hardware operation modes: input-process-output pattern, computing unit, data ingestion and files, components of IT systems
- numeral systems
- data and information: encodings, character sets, graphics formats, data compression and encryption
- operating systems and file systems
- computer networks and protocols: Internet, addressing, TCP/IP, http, ftp
- web technology: HTML, XML, JavaScript, PHP
- data bases: normalisation, SQL
- IT management
- ethical and social implications of information systems: system quality, quality of live, information protection rights, intellectual property, accountability and responsibility

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 605 Mathematics 1

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam of 90 minutes, part of which is staken in form of midterm tests

8 **Module can be used in the following Degree Programs**

WNB

Module 612 Information Technology 1

9	**Module Director and other Lecturers involved** Prof. Dr.-Ing. Ben Marx
10	**Recommended Reading** • Stahlknecht, Peter, Hasenkamp, Ulrich: "Einführung in die Wirtschaftsinformatik", Berlin, 2002, Springer, Berlin Heidelberg, 978-3-540-41986-0 • Gumm, Heinz-Peter, Sommer, Manfred: "Einführung in die Informatik", 10th ed., 2013, Oldenbourg, München, 978-3-486-70641-3
11	**Contribution of the Module to the Educational Aims of the Degree Program** IT solutions are essential in almost all areas of business and technology. This module lays the foundations for understanding and harnessing of such solutions.
12	**Date of last Modifications** 16.10.2019

Module 659 Mechanical Engineering

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	638	WNB	3	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly	Contact Time (h) total	Self Study (h)	ECTS Credits
	a) Machine Elements	Lecture	German	2	30	30	2
	b) Manufacturing Technology	Lecture	German	2	30	30	2
	c) Laboratory Mechanical Engineering	Lecture with Tutorials	German	1	15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☐	☐	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

To a) Machine Elements:

- distinguish and use appropriately the variations of machine elements.
- check constructive designs in terms of static stress and fatigue strength of the essential machine elements of an assembly.

To b) Manufacturing Technology:

- understand the functioning of important manufacturing processes from the main groups of manufacturing technology - original forming, forming, cutting, joining, coating and changing material properties.
- know something well-founded about the traditional manufacturing technologies and the innovative technologies and evaluate alternative methods in terms of their advantages and disadvantages.
- understand the interaction of several manufacturing technologies to a process chain and identify dependencies between process steps.

To c) Laboratory Mechanical Engineering:

- understand the selection and arrangement of manufacturing technologies in the process chains of companies in the mechanical engineering industry.

Applying Knowledge and Understanding (Skills)

To a) Machine Elements:

- do the design calculations of selected machine elements.
- modify situationally the machine elements.

To b) Manufacturing Technology:

- select a suitable manufacturing technology for a technical product for a given function and quantity and optimize thereupon the detailed design.
- form self process chains for the manufacturing of technical components.

To c) Laboratory Mechanical Engineering:

- apply the main features of selected manufacturing technologies.

Making Judgements and Analyzing (Competences)

- none

Creating and Extending Knowledge (Competences)

- none

Module 659 Mechanical Engineering

5	**Syllabus/Contents** To a) Machine Elements: Design and dimensioning of main machine elements, for example shaft-hub connections, bearings, screws, gear wheels and springs. Functions of the various machine elements. Shapes and variants of the individual machine elements and the associated technical characteristics. To b) Manufacturing Technology: The basic idea of economic manufacturing. Manufacturing technologies and their proper selection. Applications, possibilities and limitations of the manufacturing technologies original forming, forming, cutting and joining. Constructive examples of manufacturing -oriented design. To c) Laboratory Manufacturing Technology: Manufacturing process chains in the industry. Practical fundamentals of manufacturing technologies such as casting, turning, cutting, milling and drilling.
6	**Prerequisites** According to the Examination Regulations (Studien- und Prüfungsordnung): • none Recommended: • 633 Basics of Engineering
7	**Type of Assessment (Examinations) and Requirements for Credits** To a) Machine Elements and b) Manufacturing Technology: Exam of 90 minutes To c) Laboratory Mechanical Engineering: attestation
8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Prof. Dr.-Ing. Markus Kirchner
10	**Recommended Reading** • Wittel, H.;Muhs, D.; Jannasch D.; Voßiek, J.: Roloff/Matek Maschinenelemente. Berlin: Springer • Schlecht, B.: Maschinenelemente 1 & 2. Hallbergmoos: Pearson • Koether, R.; Rau, W.: Fertigungstechnik für Wirtschaftsingenieure. München: Hanser • Westkämper, E.; Warnecke, H.: Einführung in die Fertigungstechnik. Berlin: Vieweg+Teubner
11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 30.09.2019

Module 660 Sustainability 1

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	660	WNB	3	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Sustainability 1	Lecture	German	2 45	45	3
	b) Laboratory Sustainability 1	Laboratory	German	2 30	30	2

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☐	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☐	☒	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- Name definition of sustainability, knowledge of sustainability triangle with its deficiencies and further developments.
- Know of basic terms of the energy sector
- Know of systems for renewable power and heat generation.
- Know of most relevant (electro-)chemical, thermal and mechanical storage technologies.

Applying Knowledge and Understanding (Skills)

- Transfer of sustainability options to diverse applications.
- Ability to select overall concepts for conversion, storage and usage of renewable energy.

Making Judgements and Analyzing (Competences)

- Compare different renewable energy conversion concepts.
- Evaluate concepts for decentralized conversion and usage of renewable energy.

Creating and Extending Knowledge (Competences)

- none

5 **Syllabus/Contents**

- Get to know the standard definition of sustainability, of the sustainability triangle and its deficiencies and advancements.
- Discussion of sustainability aspects in diverse areas of live.
- Know of basic terms of the energy sector.
- Basis of energy sector in the context of the “Energiewende”.
- Fundamentals of energy conversion.
- Possibilities of renewable power production with photovoltaic, concentrated solar thermal powerplant, hydropower and windpower.
- Overview of function and application areas of existing energy storage technologies ((electro-) chemical, thermal and mechanical).
- Ecological and sociological interdependencies of power production and storage.
- Laboratory experiments related to renewable energy conversion and storage.
- Independent study of sustainability aspects in diverse areas of live.

Excursions to renewable and fossil power plants.

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- none

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) and b) exam of 90 minutes
b) attestation

Module 660 Sustainability 1

8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Prof. Dipl.-Ing. Doerte Laing-Nepustil
10	**Recommended Reading** • M. Kaltschmitt, A. Wiese, W. Streicher (Hrsg.): Erneuerbare Energien – Systemtechnik, Wirtschaftlichkeit, Umweltaspekte; Springer, Berlin, Heidelberg 2003 • Volker Quaschning: Regenerative Energiesysteme - Technologie - Berechnung – Simulation; Carl Hanser, München 2007
11	**Contribution of the Module to the Educational Aims of the Degree Program** Basis for sustainability considerations in all fields.
12	**Date of last Modifications** 12.11.2019

Module 614 Electrical Engineering

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	614	WNB	3	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Electrical Engineering	Lecture	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☐	☐	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Determination and meaningful usage of electrical systems, devices and networks.
- Check behavior of selected types of networks, devices and systems.

Applying Knowledge and Understanding (Skills)
- Dimension of selected networks, devices and systems.

Creating and Extending Knowledge (Competences)
- none

5 **Syllabus/Contents**

- Fundamental terms: el. charge, current, el. potential, voltage, resistance, el. energy und el. power
- Network analysis: Ohm's law, Kirchhoff's laws, basic methods.
- Electrical field: base items, ideal capacitor.
- Magnetic field: base items, ideal inductor, La Pace law (1. Maxwell Eq.), magnetic induction law (2. Maxwell Eq.).
- Introduction to AC calculations, complex analysis, three-phase alternating current.
- Measurement fundamentals
- Simulation of circuits

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 657 Mathematics 1, 611 Mathematics 2

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam of 90 minutes

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr.-Ing. Stephan Thiel

10 **Recommended Reading**

- Lunze, Einführung in die Elektrotechnik, Hüthing Verlag
- Führer/ Heidemann/ Nerreter, Grundgebiete der Elektrotechnik, Bände 1 und 2, Hanser Verlag 2003
- Frohne/Löcherer/Müller/Moeller, Grundlagen der Elektrotechnik, 19. Auflage, Teubner Verlag Stuttgart 2002

Module 614 Electrical Engineering

11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 22.10.2019

Module 639 Management Accounting

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	639	WNB	1	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Management Accounting	Lecture and practice	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- The students have a basic understanding of instruments of corporate finance and financial markets
- The students know the standard methods of internal accounting and their application.

Applying Knowledge and Understanding (Skills)
- The students rare able to apply the established techniques of static and dynamic calculation of investments. They are able to evaluate the economic feasibility and to calculate the optimal amortization period.

Making Judgements and Analyzing (Competences)
- The students are able to assess the financial situation of a company and to evaluate different financial instruments. They are to able to determine capital structure, liquidity and capital needed for a company or investment.
- The students are able to categorize and analyze established finance forms.
- They are able to determine costs for investment projects and analyze budgets autonomously.

Creating and Extending Knowledge (Competences)
- none

5 **Syllabus/Contents**

- Static and dynamic methods of investments
- Analysis of economical feasibility
- Capital structure and financing of companies
- Capital market products, introduction to capital market theory
- Enterprise valuation
- Cost accounting
- Full cost accounting, direct cost accounting
- Type of costs, cost centers, cost units and period costing

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- none

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam of 90 minutes

8 **Module can be used in the following Degree Programs**

Only WNB

9 **Module Director and other Lecturers involved**

Prof. Dr. Simone Zeuchner

Module 639 Management Accounting

10	**Recommended Reading** • Investition und Finanzierung; Günther, Schittenhelm; Schäffer-Poeschel; Stuttgart • Investition und Finanzierung; Becker; Gabler; Wiesbaden • Grundlagen und Probleme der Betriebswirtschaft; Schmalen, Pechtl, Schäffer-Poeschel, Stuttgart • Kosten- und Leistungsrechnung; Jórasz; Schäffer-Poeschel; Stuttgart
11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 11.11.2014

Module 617 Statistics

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	617	WNB	3	☒WinterTerm ☒Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Statistics	Lecture	German	4 60	60	4
	b) Tutorial with electronic tool	Laboratory	German	1 15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☒	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Importance of data cleansing
- Adequately presentation of big amounts of data
- Concepts of calculus of probability
- Understanding different methods for confidence intervals and testing of hypothesises
- Basic knowledge of statistical quality control
- Basic knowledge of statistical tools like Excel

Applying Knowledge and Understanding (Skills)
- Translating practical questions into statistical terminology
- Answering statistical questions by applying statistical algorithms
- Processing big amounts of data by using statistical tools like Excel

Making Judgements and Analyzing (Competences)
- Deciding if and which statistical method fits for a given question

Creating and Extending Knowledge (Competences)
- Assembling known components for solving complicated questions

5 **Syllabus/Contents**

Descriptive statistics, calculus of probability, inferential statistics, statistical quality control

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 657 Mathematics, 611 Mathematics

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) and b) Exam of 90 minutes
b) Proof of attendance by solving assignments with tools like Excel

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr. Joachim Gaukel

10 **Recommended Reading**

- Richard Mohr, Mathematische Formeln für das Studium an Fachhochschulen
- Jürgen Tietze, Einführung in die angewandte Wirtschaftsmathematik

Module 617 Statistics

11	**Contribution of the Module to the Educational Aims of the Degree Program** Basics for modules like quality management
12	**Date of last Modifications** 30.10.2019

Module 618 Informatics 2

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	618	WNB	3	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Fundamentals of programing	Lecture and Excercises	German	4 60	60	4
	b) Programming Lab	Project Work	German	1 15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☒	☒	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- Students know and understand the basic concepts of a programming language.
- Students have advanced technical knowledge to the object-oriented concepts: classes, objects, encapsulation, inheritance, overwriting, polymorphism.
- Students know and understand the software development process/lifecycle, process models, UML (Unified Modeling Language) and requirements engineering.
- Students can explain the techniques, methods and concepts dealt with in the lecture in their own words clearly and correctly.

Applying Knowledge and Understanding (Skills)

- Students can independently create an object-oriented program with an IDE.
- Students can independently apply in practice techniques and procedures dealt with in the lecture on small, manageable examples.
- Students can develop results as a member of a team and present in front of other students.
- Students can handle and apply the technical language and technical terms from the lecture correctly and accurately.
- Students can independently carry out and control a software project.

Making Judgements and Analyzing (Competences)

- Students can independently test an object oriented program using an IDE.
- Students evaluate a software project independently.

Creating and Extending Knowledge (Competences)

- Students can independently modify and extend an object-oriented program using an IDE.

5 **Syllabus/Contents**

- Fundamentals of a programming language (elementary components, data types, variables, assignments, operators, branches, loops, methods)
- Object-oriented concepts of a programming language (classes, objects, encapsulation, inheritance, overwriting, polymorphism)
- Software development processes, process models, requirements engineering.

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- basic study period completed

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) and b) Exam of 90 minutes
b) Project Work

Module 618 Informatics 2

8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Prof. Dr. Christian Cseh
10	**Recommended Reading** ▪ Java-Grundkurs für Wirtschaftsinformatiker, Deck; Neuendorf, Vieweg, 2007 ▪ Konzepte objektorientierter Programmierung, Poetzsch-Heffter, Springer, 2009 ▪ UML 2, Kecher, Galileo Press, 2009 ▪ Java als erste Programmiersprache, Heinisch; Goll; Müller-Hofmann, Teubner, 2007
11	**Contribution of the Module to the Educational Aims of the Degree Program** • Analysis and planning of business processes • Methods and tools for process optimization • Use of information systems and information technology in the enterprise • Use of industrial and enterprise standard software • Product life cycle management
12	**Date of last Modifications** 24.09.2019

Module 625 Internship

1	**Module Code** 625	**Degree Program / Target Group(s)** WNB	**Semester** 4	**Starts in the** ☒Winter Term ☒ Summer T.	**Duration** 1 Semester	**Module Type** Mandatory	**Workload (h)** 150	**ECTS Credits** 5
2	**Courses** a)		**Type of Instruction / Form of Learning** Internship		**Language of Instruction**	**Contact Time (h) weekly | total**	**Self Study (h)** 750	**ECTS Credits** 25

3	**Table of Qualifications**	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☒	☒	☒

4 Learning Outcomes and Competences

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

-

Applying Knowledge and Understanding (Skills)

- The students provide a written report.

Making Judgements and Analyzing (Competences)

- During their internship studies apply scientific methods and instruments in a business environment. They gain business experience and will be prepared for their professional life in an growing global labor market. They gain information for their career choice.

Creating and Extending Knowledge (Competences)

-

5 Syllabus/Contents

- The students work in a corporate or similar environment. At least they spent 100 days of physical presence in the place and provide a written report on the internship.
- They apply their theoretical knowledge from the university and combine it with real business problem solving.

6 Prerequisites

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- none

7 Type of Assessment (Examinations) and Requirements for Credits

written report

8 Module can be used in the following Degree Programs

WNB

9 Module Director and other Lecturers involved

Prof. Dr. Simone Zeuchner / Dr. Doerte Laing

10 Recommended Reading

11 Contribution of the Module to the Educational Aims of the Degree Program

12 Date of last Modifications

11.11.2014

Module 661 Soft Skills 2

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	661	WNB	5	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total		Self Study (h)	ECTS Credits
	a) Conflict management and communication	Lecture	German	2	30	60	3
	b) Scientific work	Lecture	German	2	30	30	2

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☐	☒	☒

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- name and explain basic models of communication theory
- describe common methods of conflict management
- name essential elements of scientific artefacts
- describe and select scientific methods

Applying Knowledge and Understanding (Skills)

- identify problems concerning communication, interpret conflict situations
- describe and interpret conflict situations
- choose and apply different methods with regard to specific conflicts
- structure scientific documents
- apply methods of scientific research

Making Judgements and Analyzing (Competences)

- analyze selected communication or conflict situations and work out appropriate solutions
- assess the quality of scientific documents

Creating and Extending Knowledge (Competences)

- estimate and possibly improve their own communication skills and conflict behavior
- plan the student's own bachelor thesis as project and structure it as a document

5 **Syllabus/Contents**

a) Methods for the description and analysis of situations concerning conflict management and communication
   a. Konflikttreiber, Konflikteskalationsstufen
   b. Types of conflicts/needs/conflict behaviour
   c. Kommunikationsquadrat, Zwischenmenschliche Kreisläufe, Inneres Team, Werte- und Entwicklungsquadrat
   d. Transactional Analysis

b) The students create a short scientific document, according to the instructions of the tutor. Both the process of creation and the structure of the document show all the essential aspects of bachelor thesis.

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- internship completed, bachelor thesis imminent

7 **Type of Assessment (Examinations) and Requirements for Credits**

Project work with final presentation for both sub-modules

Module 661 Soft Skills 2

8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Module Director: Prof. Dr. Badreddin Abolmaali Lecturers: Prof. Dr. Badreddin Abolmaali, Prof. Dr. Simone Zeuchner
10	**Recommended Reading** a) • Schulz von Thun, Friedemann; Miteinander reden 1: Störungen und Klärungen. Allgemeine Psychologie der Kommunikation; rororo 2010 • Schulz von Thun, Friedemann; Miteinander reden 2: Stile, Werte und Persönlichkeitsentwicklung. Differenzielle Psychologie der Kommunikation; rororo 2010 • Schulz von Thun, Friedemann; Miteinander reden 3: Das „innere Team“ und situationsgerechte Kommunikation; rororo 2013 • Glasl, Friedrich; Selbsthilfe in Konflikten: Konzepte – Übungen – Praktische Methoden; Freies Geistesleben 2007 • Stewart, Joines; Die Transaktionsanalyse; Herder Verlag 2015 b) • Lecture notes of seminar • Balzert, Helmut, Marion Schröder und Christian Schaefer (2011). Wissenschaftliches Arbeiten: Ethik, Inhalt & Form wiss. Arbeiten, Handwerkszeug, Quellen, Projektmanagement, Präsentation. 2. Auflage. Herdecke: W3L-Verl., XIV, 450 S. isbn: 978-3-86834-034-1. url: http://d-nb.info/101535386X/04
11	**Contribution of the Module to the Educational Aims of the Degree Program** The sub-module “scientific work” introduces students into the creation of the bachelor thesis. The sub-module “Conflict management and communication” prepares students for social aspects of situations of professional everyday life.
12	**Date of last Modifications** 30.09.2019

Module 662 Production and Quality Management

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	662	WNB	5	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Production and Quality Management	Lecture	English	4 60	60	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- Influence of product development on production, technology management
- Analyses of different manufacturing structures, necessary steps to plan production lines, sizing of production lines, metrics for process measurement and planning, variant management
- Quality assurance and -management methods

Applying Knowledge and Understanding (Skills)

- Apply various methods of product development, classify customer requirements that affect product and production
- Use methods for production line planning and evaluation
- Use of various methods of quality assurance

Making Judgements and Analyzing (Competences)

- Potential for improvement in production systems, calculating and analyzing key figures, including Overall Equipment Effective Factor

Creating and Extending Knowledge (Competences)

-

5 **Syllabus/Contents**

It is a basic event in which an overview of the planning problems in production and the methods for solving them are worked out. Students are introduced to different levels of planning (strategic, tactical, operational) and the planning problems in production.

- Relationship between product development and production management
- Analysis of production structures, such as single production, job shop production, mass production
- Production line planning: Life cycle, forecasting, plant dimensioning, variant management, automation level, layout planning
- Quality management and –assurance

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- Logistics 1

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam 90 minutes

8 **Module can be used in the following Degree Programs**

Module 662 Production and Quality Management

9	**Module Director and other Lecturers involved** Prof. Frederik Reichert
10	**Recommended Reading** • Günther, Hans-Otto und Tempelmeier, Horst: Produktion und Logistik, 8. Aufl., Berlin et al., Springer 2009. • Günther, Hans-Otto und Tempelmeier, Horst: Übungsbuch Produktion und Logistik, 7. Aufl., Berlin et al., Springer 2010. • Rother, Mike: Learning to See: Value-Stream Mapping to Create Value and Eliminate Muda : Version 1.3 June 2003.
11	**Contribution of the Module to the Educational Aims of the Degree Program** Basics of understanding of organization and planning in a manufacturing company
12	**Date of last Modifications** 17.10.2019

Module 641 Electronics

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	641	WNB	4	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total		Self Study (h)	ECTS Credits
	a) Electronics	Lecture	English	4	60	60	4
	b) Electronics Laboratory	Laboratory	English	1	15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☐	☐	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- distinguish and use appropriately the variations of devices and sub-circuits.
- check constructive designs in terms of behavior and determine characteristic values.
- understand the selection and arrangement of devices in sub-circuits in terms of electrical behavior and characteristic values.

Applying Knowledge and Understanding (Skills)

- do the design calculations of selected sub-circuits.
- modify situational selected sub-circuits.
- practically dimension, use and determine characteristic values of selected sub-circuits.

Making Judgements and Analyzing (Competences)

- none

Creating and Extending Knowledge (Competences)

- none

5 **Syllabus/Contents**

- Devices: bipolar, MOS, IGBT
- Amplifier: OPAMP-circuits, differential amplifier
- Power Electronic: buck and boost converters, bridges, servomotors
- Digital Circuits
- Buses: Ethernet, CAN, LIN, RS232, SPI, I2C
- Sensors: strain gauges, optical, magnetic, temperature, distance
- Experiments: sensors, operational amplifier, voltage supply, motor

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- 614 Electrical Engineering

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) and b) Exam of 90 minutes
To b) Attestation

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr.-Ing. Stephan Thiel

Module 641 Electronics

10	**Recommended Reading** • Schmidt, Sensorschaltungstechnik, Vogel-Verlag 2007 • Siegl; Schaltungstechnik, Springer-Verlag
11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 22.10.2019

Module 620 Automation Systems

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	620	WNB	4	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total		Self Study (h)	ECTS Credits
	a) Automation systems	Lecture	English	4	60	60	4
	b) Automation systems laboratory	Laboratory	English	1	15	15	1

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- know and understand the importance of automation technology in mechatronics.
- explain the basic concepts and standards of automation technology
- describe the methods for the systematic representation of control tasks
- understand the structure and operation of Programmable Logic Controllers (PLCs)
- understand the programming languages "ladder diagram (LAD)", "function block diagram (FBD)" and instruction list (STL) "according to IEC 61131
- deal with PLC development environments

Applying Knowledge and Understanding (Skills)

- Systematically plan the control task from a device-specific description with various methods
- Transfer systematically represented control tasks to a program in "LAD", "FBD" and "STL" according to IEC 61131 and test the program systematically

Making Judgements and Analyzing (Competences)

- Capture complex control tasks and, following a systematic description, create a control program that has a modular structure that takes into account the reusability aspects of software modules
- Critically questioning and evaluating the implementation of a task in a team. The factual discussion even with controversial opinions is promoted

Creating and Extending Knowledge (Competences)

- none

5 **Syllabus/Contents**

a) Lecture:

- Introduction to terms and standards, classification of controls according to DIN 19226, modularization and control hierarchy
- Systematic representation of control tasks: Function diagrams according to IEC 60848, function diagram, sequential flow chart, state graph
- Basic circuits of contact controls
- Hardware configuration of programmable logic controllers (PLC)
- Cyclic operation of programmable logic controllers
- Programming in ladder diagram, function diagram and instruction list according to IEC 61131

b) Laboratory:

- Handling programming systems for programmable logic controllers using the example of the TIA Portal.
- Systematic representation and implementation of a sequencer

Implementation of reusable software components

Module 620 Automation Systems

6	**Prerequisites** According to the Examination Regulations (Studien- und Prüfungsordnung): • Recommended: • 612 Information Technology 1
7	**Type of Assessment (Examinations) and Requirements for Credits** a) and b) Exam of 90 minutes b) Attestation
8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Module director: Prof. Dr.-Ing. Wolf-Dieter Lehner Lecturer: Johannes Zolynski
10	**Recommended Reading** • Berger, H.: Automating with STEP 7 in STL and SCL, Publicis Corporate Publishing, 2006 • Berger, H.: Automating with STEP 7 in LAD and FBD, Publicis Corporate Publishing, 2005
11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 24.10.2019

Module 621 Marketing and Sales

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	621	WNB	4	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Marketing and Sales	Lecture	English	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☒	☒	☒

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- To know and understand the strategies, instruments and functions in marketing and sales

Applying Knowledge and Understanding (Skills)
- To apply correctly the marketing and sales tool box

Making Judgements and Analyzing (Competences)
- To analyze and judge situations on the basis of market research, product programme structure analysis and customer analysis

Creating and Extending Knowledge (Competences)
- To derive recommendations for managerial actions by combination of different instruments.
- To internalize market oriented thinking and acting as the core of entrepreneurial orientation.

5 **Syllabus/Contents**

- Fundamental analysis and strategy instruments in marketing and sales
- Marketing-Mix (product-, pricing-, communication- und sales policy)
- Market research
- Positioning and segmentation of brands and marketgs
- International aspects of marketing and sales, e.g. culture, global trade
- Sales processes and organization
- Sales management
- Sales controlling

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 634 Business Administration and Economics

7 **Type of Assessment (Examinations) and Requirements for Credits**

Exam of 90 minutes
Midterm (25% of credits, facult.)

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr. Rainer Elste

Module 621 Marketing and Sales

10	**Recommended Reading** • Kotabe, Helsen, Global Marketing Management, 5th edition, Wiley 2010 • Kotler, Armstrong, Principles of Marketing, 15th edition, Pearson 2012 • Homburg, Schäfer, Schneider, Sales Excellence, Springer 2012
11	**Contribution of the Module to the Educational Aims of the Degree Program** Understand the relevance of marketing and sales in all function (interface in engineering management), apply instruments
12	**Date of last Modifications** 30.09.2019

Module 663 Business Processes

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	663	WNB	5	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total		Self Study (h)	ECTS Credits
	a) Business Processes	Project Work	English	2	30	60	3
	b) ERP Laboratory	Laboratory	English	2	30	30	2

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☒	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Understand characteristics and elements of a business process
- Understand business process categories
- Understand importance of ERP systems and the underlying technical characteristics

Applying Knowledge and Understanding (Skills)
- Model business processes using business process notations
- Select suitable organizational form
- Apply knowledge of ERP systems to actual problems

Making Judgements and Analyzing (Competences)
- Analyze and assess existing business processes

Creating and Extending Knowledge (Competences)
- Optimize existing business processes
- Develop new business processes
- Develop controlling system for business processes

5 **Syllabus/Contents**

Business Processes
- Introduction to business processes
- Business process modelling: Event-driven Process Chain (EPC), Business Process Model and Notation (BPMN)
- Business process management: organizational implications
- Business process controlling: controlling cycle, balanced process scorecard
- Business process performance improvement: radical business process re-engineering vs. evolutionary change

ERP Laboratory
- ERP systems
- Use case examples

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- None

Recommended:
- 656 Einführung Wirtschaftswissenschaften, 0612 Informatik 1, 0618 Informatik 2, 0672 Logistik 1, 625 Praktisches Studiensemester

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) and b) Project work

Module 663 Business Processes

8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Module director: Prof. Dr. Fabian Diefenbach Lecturers: Matthias Wolf; Prof. Dr. Rolf Gersbacher
10	**Recommended Reading** Rosing, H., Scheel, H., Scheer, A.W. (2014): The Complete Business Process Handbook: Body of Knowledge from Process Modeling to BPM
11	**Contribution of the Module to the Educational Aims of the Degree Program** Methods and tool for business process analysis and optimization
12	**Date of last Modifications** 18.10.2019

Module 664 Project Management

1	**Module Code** 664	**Degree Program / Target Group(s)** WNB	**Semester** 5	**Starts in the** ☒Winter Term ☒ Summer T.	**Duration** 1 Semester	**Module Type** Mandatory	**Workload (h)** 150	**ECTS Credits** 5
2	**Courses** a) Project management		**Type of Instruction / Form of Learning** Lecture		**Language of Instruction** English	**Contact Time (h) weekly | total** 4 60	**Self Study (h)** 90	**ECTS Credits** 5

3	**Table of Qualifications**	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☐	☒	☐
	Creating & Extending Knowledge	☒	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- Understand the terms and concepts of project management as well as their essential relevance for business companies in different branches.
- Discriminate between different approaches of project management (GPM / IPMA, PMI, Scrum, Prince2) with regard to their special fields of application within different contexts.
- See a company as well as a project as an integrated, target-oriented system.
- Recognize that project management is a strategic and competitive factor for business companies.

Applying Knowledge and Understanding (Skills)

- Understand the method of a skill-based project management according to GPM / IPMA. Perform the consecutive steps in the planning process of project management. Recognize and choose the most adequate methods and techniques for each step.
- Build, verify, reason and present a complete basic project planning including all essential elements with close regard to the environment and concrete special settings in the respectively worked out project.
- Refresh and deepen the acquired skills independently.

Analyzing and Making Judgements (Competences)

- Check and improve own worked out project plannings regarding completeness and correctness and consistency over the entire planning range.
- Deliberate, discuss and – if required – revise the own views and perceptions systematically.

Creating and Extending Knowledge (Competences)

- Define, structure and plan projects using specific and appropriate tools.
- Take an active part in a project-team. Create and discuss ideas and solutions with regard to an overall plan.
- Interact with the team members in a fair and target-oriented way. Assign tasks and take the responsibilities for the achieved results collectively.

5 **Syllabus/Contents**

- Project management – objectives and concepts
- Impact of project management on both, daily business in companies and macroeconomic and social progress
- Overview of methods according to GPM / IPMA (key), (less PMI, Scrum, Prince2)
- Deep skill-based project management according to GPM / IPMA baseline 3.0 and 4.0
- Creation of a basic, complete project planning in team work including all essential steps of the regarding process

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- none

Module 664 Project Management

7	**Type of Assessment (Examinations) and Requirements for Credits** Project work / complete project planning and final presentation
8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Module Director: Prof. Dr. Badreddin Abolmaali Lecturer: Matthias Pietzner
10	**Recommended Reading** • http://www.projektmanagementhandbuch.de/cms/projektrealisierung/ • R. Wagner, N. Grau (Hrsg.): Basiswissen Projektmanagement – Grundlagen der Projektarbeit, 1. Auflage 2013 • H. Schelle, R. Ottmann, A. Pfeifer: Projekt Manager, GPM 2018 • S. Rietiker, R. Wagner (Eds.): Theory Meets Practice in Projects, 2nd Edition 2017 • ICB – IPMA Competence Baseline, version 3.0, Nijkerk 2006 (new version in 2016) • ICB – IPMA Individual Competence Baseline, version 4.0, 1. Edition 2017 • Kerzner, Harold: Projektmanagement, ein systemorientierter Ansatz zur Planung und Steuerung, 2. Auflage, Bonn 2008 • Walter Jakoby: Intensivtraining Projektmanagement : Ein praxisnahes Übungsbuch für den gezielten Kompetenzaufbau, Springer Verlag, Wiesbaden 2015 • D. Dörner.: Die Logik des Misslingens, Reinbek 1989 - 2011 (also available as eBook)
11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 21.10.2019

Module 665 Sustainability 2

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	665	WNB	6	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Sustainability and Efficiency in Production Processes	Lecture	German	2 30	60	3
	b) Renewable Energies	Lecture	German	2 30	30	2

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

a) Sustainability and Efficiency in Production Processes
- Sustainability as an effort to integrate the social, ecological and economic goals
- Goals, tasks, processes and methods of Resource Efficiency
- Methodological basics of life cycle analysis

b) Renewable Energies
- Understand and estimate the energy demand for daily heating/mobility/electricity/etc.
- Know and quantitatively understand the physical basics of wind/sun/waves/tides/etc.

Applying Knowledge and Understanding (Skills)
- a) Applying of the method Life Cycle Assessment
- Estimating the potential of a technology and estimating the demand by a calculation.

Making Judgements and Analyzing (Competences)
- a) Analysis and evaluation of measures for resource efficiency in production processes
- b) Perform analysis of previously unknown concepts

Creating and Extending Knowledge (Competences)
- none

5 **Syllabus/Contents**

a) Sustainability and Efficiency in Production Processes
- Topics of sustainability and especially the focus on resource efficiency in production
- Understand and apply the method of Life Cycle Assessment
- Sustainability in selected production technologies, for example, the solar cell production

b) Renewable Energies
- Analyze and understand the energy demand of Germany
- Analyze and understand the potential of all renewable energy sources
- Getting a feeling for the magnitudes

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- Completed practical semester

7 **Type of Assessment (Examinations) and Requirements for Credits**

a & b) Exam of 90 minutes

Module 665 Sustainability 2

8	**Module can be used in the following Degree Programs** WNB, Nachhaltigkeit 2
9	**Module Director and other Lecturers involved** Prof. Dr. sc. (ETH Zürich) Frederik Reichert
10	**Recommended Reading** Fresner, Johannes and Bürki, Thomas and Sittel, Henning H., Ressourceneffizienz in der Produktion: Kosten senken durch Cleaner Production, Düsseldorf, 2009, Symposion Publishing, ISBN 978-3-939707-48-6 Holler, Gaukel, Erneuerbare Energien – ohne heiße Luft, UIT Cambridge MacKay, Sustainable Energy – without the hot air, UIT Cambridge
11	**Contribution of the Module to the Educational Aims of the Degree Program** Students develop strategies for solving conflicting goals. Students can apply engineering thinking and apply methods of technical problem solving.
12	**Date of last Modifications** 04.11.2019

Module 666 Logistics 2

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	627	WNB	6	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Logistics 2	Lecture	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☐	☐
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☐	☐	☐

4 Learning Outcomes and Competences

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Goals, tasks, processes and methods of intralogistics
- Goals, tasks, processes and methods of supply chain management

Applying Knowledge and Understanding (Skills)
- Develop solutions for complex logistic tasks

Making Judgements and Analyzing (Competences)
- Analyze, categorize and compare different approaches in the fields of intralogistics and supply chain management

Creating and Extending Knowledge (Competences)
-

5 Syllabus/Contents

a) Intralogistics
- Processes in intralogistics (handling, warehousing, picking, sorting, packing etc.)
- Technology and tools for handling, warehousing, picking, sorting, packing
- Warehouse Management Software
- Lean Management (Value Stream Mapping, Poka Yoke)
- Project work, case studies, company visits in the area of intralogistics

b) Supply Chain Management
- Supply Chain Design, Planning, Control, Execution, Monitoring and Event Management
- Organization und Cooperation in networks
- International standards (Legal, IT, technology, SCOR-model)
- Data exchange and SCM-software, data formats and data capturing
- Project work, case studies, company visits in the area of intralogistics

6 Prerequisites

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 672 Logistics 1, 662 Production and Quality Management

7 Type of Assessment (Examinations) and Requirements for Credits

Written exam, 90 minutes

8 Module can be used in the following Degree Programs

WNB

9 Module Director and other Lecturers involved

Prof. Dr.-Ing. Hannes Winkler

Module 666 Logistics 2

10	**Recommended Reading** • Rohrhofer/Graf: Weissbuch der Intralogistik und Logistiktechnologie, 2013. • Ten Hompel/Schmidt: Warehouse Management: Organisation und Steuerung von Lager- und Kommissioniersystemen, 2010. • Chopra/Meindl: Supply Chain Management, 2014. • Werner: Supply Chain Management, 2013
11	**Contribution of the Module to the Educational Aims of the Degree Program** Broad knowledge of logistics technology and processes and its influence on the organization. View on material and information flows beyond the own enterprise.
12	**Date of last Modifications** 15.10.2019

Module 667 Business Law and Corporate Organization

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	667	WNB	1	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total		Self Study (h)	ECTS Credits
	a) Business Law	Lecture	German	2	30	60	3
	b) Corporate Organization and Human Ressources Management	Lecture	German	2	30	30	2

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☒	☒	☒

4 Learning Outcomes and Competences

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- The students have a basic understanding of corporate related areas of business and labor law: civil law, commercial law, corporate law, competition law and labor law
- The students know the prevailing methods of organizational management

Applying Knowledge and Understanding (Skills)

- The students rare able to analyze and assess related law problems autonomously
- Thea are able to apply basic concepts and instruments of corporate organizations and human resources management business

Making Judgements and Analyzing (Competences)

-

Creating and Extending Knowledge (Competences)

- They are able to derive recommendations for actions through combination of different instruments.

5 Syllabus/Contents

a) civil law, commercial law, corporate law, competition law and labor law
b) corporate organization, human relations management

6 Prerequisites

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- 656 Business Administration and Economics

7 Type of Assessment (Examinations) and Requirements for Credits

Exam of 90 minutes

8 Module can be used in the following Degree Programs

WNB

9 Module Director and other Lecturers involved

Prof. Dr. Simone Zeuchner

10 Recommended Reading

- BGB, HGB, UWG, AktG, GmbHG
- Organisation; Vahs; Schäffer-Poeschel
- Grundlagen und Probleme der Betriebswirtschaft; Schmalen, Pechtl, Schäffer-Poeschel, Stuttgart
- Organisation; Schreyögg, Gabler, Wiesbaden

Module 667 Business Law and Corporate Organization

11	**Contribution of the Module to the Educational Aims of the Degree Program**
12	**Date of last Modifications** 18.10.2019

Module 668 Management and Controlling

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	668	WNB	6	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Management and Controlling	Lecture	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☐
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- understand and explain the importance of the management and management accounting with regard to a sustainable development of companies
- list and describe fields of activity and assignments of the management
- express and explain functions and instruments of the strategic and operational management accounting
- remember, correlate and describe important performance indicators of different operational dimensions (finance, customer/market, processes, potential)

Applying Knowledge and Understanding (Skills)

- develop strategies, define measure catalogs, perform budgeting
- perform plan/target/actual comparisons, adapt measure catalogs and take operational decisions
- choose and apply methods of decision accounting
- evaluate the meaning and usefulness of specified performance indicators
- compile and calculate performance indicators of different operational dimensions with regard to selected questions
- perform risk analyses for selected case studies

Making Judgements and Analyzing (Competences)

- estimate the status and development of companies on the basis of their financial statements
- interpret reportings and define further measures
- analyze decisions and performance indicators of former periods and develop corresponding strategies and measure catalogs

Creating and Extending Knowledge (Competences)

- none

5 **Syllabus/Contents**

- Functions and fields of action of the management
- Strategy and strategy development
- Sustainability
- Functions and instruments of strategic and operational management accounting
- The Process of management accounting
- Key performance indicators
- Risk management
- Selected areas of management accounting

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- 637 Financial Reporting, 639 Cost Accounting

Module 668 Management and Controlling

7	**Type of Assessment (Examinations) and Requirements for Credits** Oral exam of 15 minutes
8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Prof. Dr. rer. nat. Badreddin Abolmaali
10	**Recommended Reading** • Steinmann, Horst; Schreyögg, Georg; Koch, Jochen; Management: Grundlagen der Unternehmensführung; Konzepte – Funktionen – Fallstudien; Springer Gabler, 2013; Wiesbaden • Becker, Fred G.; Grundlagen der Unternehmensführung: Einführung in die Managementlehre; Schmidt, 2013; Berlin • Horváth, Péter; Controlling; Vahlen, 2011; München • Fischer, Dirk; Controlling: Balanced Scorecard, Kennzahlen, Prozess- und Risikomanagement; Vahlen, 2009; München • Reichmann, Thomas; Controlling mit Kennzahlen; Vahlen, 2011; München • Krause, Hans-Ulrich; Arora, Dayanand; Controlling-Kennzahlen - Key Performance Indicators; Oldenbourg, 2010; München
11	**Contribution of the Module to the Educational Aims of the Degree Program** The module „management and management accounting“ completes the business part of the degree program “Industrial Engineering” The modules “Financial Reportng” and “Cost Accounting” primarily aim on the monetary documentation of business transactions. In contrast, the lecture “Management” provides a future-oriented and broader view on the whole company and its departments. Main aspects are ‘vision’, ‘mission statement’ and the development of a business strategy. The lecture “Management Accounting” refers to the interface between accounting and management. Its essential aspect is the cycle of plan, examination and regulation of corporate policy, regarding a sustainable development of strategic and operational business objectives.
12	**Date of last Modifications** 29.09.2019

Module 669 Interdisciplinary Project

1	**Module Code** 669	**Degree Program / Target Group(s)** WNB	**Semester** 6	**Starts in the** ☒Winter Term ☒ Summer T.	**Duration** 1 Semester	**Module Type** Mandatory	**Workload (h)** 150	**ECTS Credits** 3
2	**Courses**		**Type of Instruction / Form of Learning**		**Language of Instruction**	**Contact Time (h) weekly | total**	**Self Study (h)**	**ECTS Credits**
	a) Interdisziplinary Project		Project Work		German	3 45	105	5

3	**Table of Qualifications**	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☐	☒	☒
	Applying Knowl. & Understanding	☐	☒	☒
	Making Judgements & Analyzing	☐	☒	☒
	Creating & Extending Knowledge	☐	☒	☒

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- name methods and terms of project management

Applying Knowledge and Understanding (Skills)
- apply project management methods in real world situations

Making Judgements and Analyzing (Competences)
- solve project management problems, using technical and business as well as project management methods

Creating and Extending Knowledge (Competences)
- dispatch work in the team and control projects

5 **Syllabus/Contents**

In small groups students run projects in a business or societal context, in many cases in cooperation with a company or another entity in the region. They apply their technical and business knowledge under real world conditions.

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 664 Project Management

7 **Type of Assessment (Examinations) and Requirements for Credits**

Project work with final presentation

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr.-Ing. Ulrich Nepustil

10 **Recommended Reading**

For reading on project management see module 624 “Quality and Project Management”; specific reading for the project scenarios is researched by the students

11 **Contribution of the Module to the Educational Aims of the Degree Program**

Work in projects and management of projects, both from a business and a technical aspect, are essential tasks of engineers.

12 **Date of last Modifications**

01.10.2014

Module 670 Scientific Project

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	670	WNB	7	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	300	10

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Scientific Project	Project Work	German or English	20	280	10

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☐	☐	☐
	Applying Knowl. & Understanding	☐	☐	☒
	Making Judgements & Analyzing	☒	☐	☐
	Creating & Extending Knowledge	☒	☒	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
Applying Knowledge and Understanding (Skills)

- The students may solve economic and technical tasks with respect to business related, ecological, safety related and ethical aspects.
- They may plan the appropriate timetable and resources.
- They may choose the appropriate methods for the task.
- They may perform research on literature, internet sources and if necessary in interviews with experts.
- They may work in a structured way, science-based and keep records

Making Judgements and Analyzing (Competences)

- The students are able to analyze and evaluate business respectively technical tasks and there solutions.
- They may classify their subject in the scientific discourse.
- They have noticed to the relevant literature in a critical way.

Creating and Extending Knowledge (Competences)

- The students are able to create and perform new solutions based on their knowledge.

5 **Syllabus/Contents**

The students work on a task within a given term using science-based methods. They may work in a team when the personal contribution is recorded. A final written report is requested.

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- 625 Internship

Recommended:

- All modules from 1st to 6th semester

7 **Type of Assessment (Examinations) and Requirements for Credits**

Written report

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr.-Ing. Ulrich Nepustil

Module 670 Scientific Project

10	**Recommended Reading** • Theisen, Manuel René: Wissenschaftliches Arbeiten, 16. Auflage München 2013, Vahlen • Stickel-Wolf, C.; Wolf, J.: Wissenschaftliches Arbeiten und Lerntechniken, 7. Auflage Wiesbaden 2013, Gabler • Balzert, H.; Schröder, M.; Schäfer, C.: Wissenschaftliches Arbeiten, 2. Auflage Herdecke 2012, W3L • Kornmeier, M.: Wissenschaftlich schreiben leicht gemacht für Bachelor, Master und Dissertationen, 6. Auflage, Bern 2013 • Stary, Joachim: Die Technik wissenschaftlichen Arbeitens. Eine praktische Anleitung, Band724 von Uni-Taschenbücher, 2013
11	**Contribution of the Module to the Educational Aims of the Degree Program** The students get interdisciplinary knowledge for scientific approaches. They learn to structure their tasks, to organize themselves and to question critically. The students are able to value the quality of their own work .
12	**Date of last Modifications** 17.02.2015

Module 632 Bachelor Thesis

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	632	WNB	7	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	450	15

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Bachelor Thesis	Project Work	German or English	40	320	12
	b) Colloquium	Presentation	German or English	2	88	3

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☐	☐	☐
	Applying Knowl. & Understanding	☐	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☒	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
Applying Knowledge and Understanding (Skills)

- The students are able to work on a problem within a given term using scientific methods.
- They may choose the appropriate methods for the task.
- They may work in a structured way, science-based, keep records and argue in a plenum.

Making Judgements and Analyzing (Competences)

- The students are able to analyze and evaluate business respectively technical tasks and there solutions.
- They may classify their subject in the scientific discourse.
- They have noticed to the relevant literature in a critical way.

Creating and Extending Knowledge (Competences)

- The students may solve economic and technical tasks with respect to business related, ecological, safety related and ethical aspects.

5 **Syllabus/Contents**

a) The students work on a task within a given term using science-based methods. They may work in a team when the personal contribution is recorded. A final written report is requested.
b) The colloquium consists of a presentation of the work and outcome of the bachelor thesis project and their argumentation in a plenum

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- Module 625 Internship

Recommended:

- All modules from 1st to 6th semester

7 **Type of Assessment (Examinations) and Requirements for Credits**

a.) Written report
b.) Presentation

The Bachelor Thesis is marked by two examiners. The mark is calculated from the arithmetical average of boths marks.

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr. Ulrich Nepustil

Module 632 Bachelor Thesis

10	**Recommended Reading** • Stickl-Wolf, C.; Wolf, J.: Wissenschaftliches Arbeiten und Lerntechniken, 7. Auflage, Wiesbaden 2013: Gabler Verlag • Theisen, M. R.: Wissenschaftliches Arbeiten, 15. Auflage, München 2011: Vahlen Verlag • Weber, D.: Die erfolgreiche Abschlussarbeit für Dummies, 2010, Wiley-VCH Verlag • Stock, S u.a. (Hrsg.): Erfolg bei Studienarbeiten, Referaten und Prüfungen, Heidelberg 2009: Springer Verlag • Disterer, G.: Studienarbeiten schreiben, 6. Auflage, Berlin u.a. 2011: Springer Verlag • Burchert, H; Sohr, S.: Praxis des wissenschaftlichen Arbeitens, 2. Auflage, München 2008: Oldenbourg Wissenschaftsverlag • Wytzens H. K. u.a.: Wissenschaftliches Arbeiten, 3. Auflage, Wien 2012: facultas.wuv • Balzert, H. u.a.: Wissenschaftliches Arbeiten, 2. Auflage, Herdecke 2011: W3L GmbH
11	**Contribution of the Module to the Educational Aims of the Degree Program** The students get interdisciplinary knowledge for scientific approaches. They learn to structure their tasks, to organize themselves and to question critically. The students are able to value the quality of their own work .
12	**Date of last Modifications** 17.02.2015

Module 627/671 Entrepreneurship

1	**Module Code** 627/671	**Degree Program / Target Group(s)** WNB	**Semester** 6	**Starts in the** ☒Winter Term ☒ Summer T.	**Duration** 1 Semester	**Module Type** Mandatory Elective	**Workload (h)** 150	**ECTS Credits** 5
2	**Courses**		**Type of Instruction / Form of Learning**		**Language of Instruction**	**Contact Time (h) weekly | total**	**Self Study (h)**	**ECTS Credits**
	a) Entrepreneurship		Project Work		German	4 60	90	5

3	**Table of Qualifications**	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☒	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Understand what entrepreneurship is, what a start-up is and in which environment it acts
- Understand typical challenges of start-ups
- Understand process to test a business idea
- Know the regional start-up ecosystem

Applying Knowledge and Understanding (Skills)
- Create a business idea based on an understanding of customer needs
- Test a business idea with real customers
- Develop a financial model representing the business idea
- Present your business idea professionally

Making Judgements and Analyzing (Competences)
- Analyze and assess your own and other business ideas

Creating and Extending Knowledge (Competences)
- Optimize business idea to fit market conditions

5 **Syllabus/Contents**

- Introduction to Entrepreneurship and Start-ups
- Design Thinking Workshop
- Validation of business idea
- Business plan / Requirements by banks to provide financing
- Presentation of business idea
- Varies per semester: visits to experience the Stuttgart / Göppingen entrepreneurship ecosystem

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- None

Recommended:
- 0656 Einführung Wirtschaftswissenschaften, 0603 Internes Rechnungswesen, 0621 Marketing and Sales, 0625 Praktisches Studiensemester

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) Project work

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr. Fabian Diefenbach

Module 627/671 Entrepreneurship

10	**Recommended Reading** • Flynn (2016): Will it Fly? SPI Publications, San Diego • Grichnik, Brettel, Koropp, Mauer (2017): Entrepreneurship, Schäffer-Pöschel Verlag, Stuttgart • Ries (2011): The Lean Startup, Crown Publishing Group, New York
11	**Contribution of the Module to the Educational Aims of the Degree Program** Methods and tools to identify and test own business idea
12	**Date of last Modifications** 13.09.2019

Module 627/671 Operations Research

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	627/671	WNB	6	☒Winter Term ☒ Summer T.	1 Semester	Elective	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Operations Research	Lecture and Excercises	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☐	☐
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- understand the goals, tasks, frameworks, processes and methods of Operations Research

Applying Knowledge and Understanding (Skills)
- develop solutions for tasks in the field of operations research and business decision-making
- recognize which methods are useful to give answers to predefined problems

Making Judgements and Analyzing (Competences)
- analysis, categorization and comparison of different approaches and procedures in the area of Operations Research

Creating and Extending Knowledge (Competences)
- none

5 **Syllabus/Contents**

- Optimizing processes for logistics and production
- Simplex algorithm
- Transportation problems
- Dynamic optimization problems
- queuing theory
- Simulation methods in MATLAB

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 657 Mathematics 1
- 617 Statistics

7 **Type of Assessment (Examinations) and Requirements for Credits**

Written exam, 90 minutes

8 **Module can be used in the following Degree Programs**

WNB

9 **Module Director and other Lecturers involved**

Prof. Dr. Gabriele Gühring

Module 627/671 Operations Research

10	**Recommended Reading** • Domschke et al.: Einführung in Operations Research (Springer-Gabler), 9. Auflage, 2014 • Hilier & Liebermann: Introduction to Operations Research (McGraw Hill), 2010 • Thonemann: Operations Management - Konzepte, Methoden und Anwendungen (Pearson Studium - Economic BWL), 2010.
11	**Contribution of the Module to the Educational Aims of the Degree Program** Students learn to evaluate methods of decision making in a buisness context based on quantitative methods. They are able to optimize processes and actions and in particular, apply them to logistics issues.
12	**Date of last Modifications** 28.10.2019

Module 627/671 Mathematical Modelling

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	627/671	WNB	6	☒Winter Term ☒ Summer T.	1 Semester	Elective	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Mathematical Modelling	Lecture and Excercises	German	4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☐
	Creating & Extending Knowledge	☒	☐	☐

4 Learning Outcomes and Competences

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Typical preceedings for mathematical modelling in practial exampels

Applying Knowledge and Understanding (Skills)
- Combining mathematical elements to complex models

Making Judgements and Analyzing (Competences)
- Testing solutions for validity check
- Comparison of different models for problem solutions. Check of benefit, complexity and coherence.

Creating and Extending Knowledge (Competences)
- none

5 Syllabus/Contents

- Calculation of sunset and sunrise times of Göppingen
- Astronomical fundamentals like determination of distances
- Analysis of the Rubiks Magic Cube
- Analysis of brachistochrone curve
- Milling of two solids of revolutions with non-parallel rotation axis

6 Prerequisites

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 657 Mathematics 1 and 611 Mathematic 2

7 Type of Assessment (Examinations) and Requirements for Credits

Oral test of 25 minutes

8 Module can be used in the following Degree Programs

WNB

9 Module Director and other Lecturers involved

Prof. Dr. Joachim Gaukel

10 Recommended Reading

none

11 Contribution of the Module to the Educational Aims of the Degree Program

Module 627/671 Mathematical Modelling

12	**Date of last Modifications** 30.10.2019

Module 627/671 Leadership Skills – Business Coaching

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	627/671	WNB	3-7	☒Winter Term ☒ Summer T.	1 Semester	Mandatory	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Business Coaching	Seminar		4 60	90	5

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☒
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☐	☒	☒

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)

- The students know the benefit and possible applications of coaching
- They are able to distinguish coaching from other kinds of consulting
- They understand how general psychologic effects are used in coaching
- They know two different variations of the coaching process

Applying Knowledge and Understanding (Skills)

- The students are able to carry out a coaching process on their own
- They can lead their coachee through the consecutive steps of the process
- Within the coaching process the students are responsive to their clients. They know how to alter the process in pace and intensity.

Making Judgements and Analyzing (Competences)

- The students are able to compare and evaluate different coaching concepts
- They can choose and apply the best coaching method regarding to its benefit within the respective situation
- During the coaching process, they can reflect and adjust their own behaviour

Creating and Extending Knowledge (Competences)

- The students are able to adapt an combine various coaching methods with regard to specific situations
- They can develop new coaching methods and, as required, integrate them into the coaching process
- The students are able to apply the new insights on their own problems, particularly in terms of a self-coaching

5 **Syllabus/Contents**

- Coaching Basics
- Basic principles of negotiation
- Intervention methods
- Coaching-Conferences
- Online-Coaching fundamentals

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):

- none

Recommended:

- Konfliktmanagement und Kommunikation

7 **Type of Assessment (Examinations) and Requirements for Credits**

Proof of attendance: report

Module 627/671 Leadership Skills – Business Coaching

8	**Module can be used in the following Degree Programs** WNB
9	**Module Director and other Lecturers involved** Prof. Dr. Badreddin Abolmaali
10	**Recommended Reading** ▪ Orientierung im Coaching | Elke Berninger-Schäfer; Richard Boorberg Verlag; 2011 ▪ Interventionsmethoden im Coaching | Elke Berninger-Schäfer (Hrsg.); Richard Boorberg Verlag; 2017 ▪ Die Kollegiale Coaching Konferenz | Thomas E. Berg, Elke Berninger-Schäfer; Richard Boorberg Verlag; 2010 ▪ Die Transaktionsanalyse – Eine Einführung | Ian Stewart, Vann Joines; Herder Verlag; 2015 ▪ Transaktionsanalyse im Coaching | Ulrich Dehner, Renate Dehner; managerSeminare Verlags GmbH; 2018
11	**Contribution of the Module to the Educational Aims of the Degree Program** Increased competence in problem solving regarding the contact to colleagues an staff members
12	**Date of last Modifications** 05.11.2019

Module 627/671 Smart Systems and Energy Management

1	Module Code	Degree Program / Target Group(s)	Semester	Starts in the	Duration	Module Type	Workload (h)	ECTS Credits
	627/671	WNB	5-7	☒Winter Term ☐ Summer T.	1 Semester	Mandatory Elective	150	5

2	Courses	Type of Instruction / Form of Learning	Language of Instruction	Contact Time (h) weekly | total	Self Study (h)	ECTS Credits
	a) Smart systems and energy management	Lecture	German	2 30	30	2
	b) Laboratory smart systems and energy management	Laboratory	German	2 30	60	3

3	Table of Qualifications	Expertise	Methodological Skills	Personal & Social Skills
	Knowledge & Understanding	☒	☒	☐
	Applying Knowl. & Understanding	☒	☒	☒
	Making Judgements & Analyzing	☒	☒	☒
	Creating & Extending Knowledge	☐	☐	☐

4 **Learning Outcomes and Competences**

On completion of the module the students are expected to be able to:

Knowledge and Understanding (Knowledge)
- Handling of Linux and Raspberry-PI
- Programming in C, net work programming of Client-Server
- Aims, tasks, boundary conditions, processes and methods of energy management

Applying Knowledge and Understanding (Skills)
- Handling of Raspberry-PI
- Assembly of electrical circuits as periphery
- Methodical approach to energy management

Making Judgements and Analyzing (Competences)
- Function of smart home and smart grid applications
- Analysis and assessment of energy efficiency measures

Creating and Extending Knowledge (Competences)
-

5 **Syllabus/Contents**

- Handling of Linux, programing in C
- Raspberry-PI plus periphery
- Client-Server-programing
- Energy demand (balances, indicators)
- Energy management (VDI 4602, ISO 50001)
- Energy efficiency (technological aspects, financial Instruments, regulatory Instruments etc.)

6 **Prerequisites**

According to the Examination Regulations (Studien- und Prüfungsordnung):
- none

Recommended:
- 612 Informatics 1
- 660 Sustainablity 1

7 **Type of Assessment (Examinations) and Requirements for Credits**

a) and b) Written exam of 90 minutes

8 **Module can be used in the following Degree Programs**

Module 627/671 Smart Systems and Energy Management

9	**Module Director and other Lecturers involved** Prof. Dr.-Ing. Ulrich Nepustil
10	**Recommended Reading** • Kerningham Ritchie: The C Programming Language • Handbuch Raspberry-PI • DIN EN ISO 50001: DIN EN ISO 50001 - Energiemanagementsysteme – Anforderungen mit Anleitung zur Anwendung. (2018) • Deutsche Energie-Agentur, Handbuch für betriebliches Energiemanagement: systematisch Kosten senken, Berlin, 2014, ISBN 978-3-9812787-7-4 • Pehnt, M. (Herausgeber). Energieeffizienz Ein Lehr- und Handbuch. Springer (2010). doi:10.1007/978-3-642-14251-2
11	**Contribution of the Module to the Educational Aims of the Degree Program** WNB
12	**Date of last Modifications** 17.11.2019