Curriculum LE&M

BACHELOR
LOGISTICS ENGINEERING AND MANAGEMENT
Courses are taught in German unless it is specifically stated that the language of instruction is English.

Table of Contents

1. Compulsory Modules in the 1st Semester ........................................................................................................ 2
2. Compulsory Modules in the 2nd Semester ........................................................................................................ 8
3. Compulsory Modules in the 3rd Semester .........................................................................................................15
4. Compulsory Modules in the 4th Semester .......................................................................................................22
5. Compulsory Modules in the 5th Semester .........................................................................................................28
6. Compulsory Modules in the 6th Semester .........................................................................................................32
7. Compulsory Modules in the 7th Semester .........................................................................................................38
8. Compulsory Elective Modules .........................................................................................................................42
1. Compulsory Modules in the 1st Semester

Mathematics I

Learning objectives / competencies:

The overall objective of the course is for students to acquire important skills in scientific computing in technical and economic disciplines.

By the end of the course students will:

- Be confident in using the most basic mathematical functions graphically.
- Have an understanding of curves in Cartesian and polar coordinates.
- Have mastered differential calculus for the above mentioned functions and function types.
- Know how to approximate functions using polynomials and be able to solve simple extreme value problems.
- Have an understanding of functions that depend on several variables.
- Be able to partially differentiate and know how to transfer the derivatives of functions of one variable to functions of several variables.
- Know the basic primitives and have mastered the most important principles and techniques of integral calculus.
- Have mastered arithmetic with vectors and understood the geometric ideas behind various mathematical operations.
- Have a clear idea of scalar and vector fields and have mastered differential calculus in relation to these.

In particular, students will learn about the typical applications of the topics mentioned above.

Course content:

- Functions and curves
- Differential calculus for functions of one variable
- Taylor expansion
- Differential calculus for functions of several variables
- Integral calculus
- Vector algebra and vector analysis
Engineering Mechanics

Learning objectives / competencies:

By the end of the course students will:

- Be aware of the forces and moments in simple solid-state systems.
- Know how to determine forces and moments in mounting points and the impact of forces on substructures.
- Understand friction situations in technology.
- Be able to calculate the barycentre of bodies.
- Be able to determine the internal forces of subsystems (stresses) and their impact (strains).
- Understand the variables that influence static and dynamic component strength.
- Be able to demonstrate the strength of components in linear and simple compounded strain cases.

Course content:

- Summary of forces to resultants
- Bearing of bodies and application of the cutting principle
- Systems in balance
- Coulomb static and dynamic friction
- Relationship between stress and strain on material law
- Effects of traction/strain, bending, shear and torsion
- Practical application of the strength of material: static and dynamic strength analysis of components
Chemistry and Materials

Learning objectives / competencies:

Technical Chemistry

By the end of the course students will:

- Know the atomic structure of substances.
- Understand stoichiometric relationships and be able to perform simple calculations.
- Understand equilibrium reactions and electrochemical processes and their influence.
- Know the basic organic substances and reaction types.
- Understand the basics of thermodynamics.

Introduction to Materials Science

By the end of the course students will:

- Understand the importance of and working areas in materials technology.
- Know the main material groups and be able to cite examples of them.
- Understand the preparation, properties and applications of ceramic and polymeric materials.

Course content:

- Technical chemistry
- Atomic structure and periodic system
- Chemical bonds
- Chemical equilibrium
- Electrochemistry
- Basics of organic chemistry
- Introduction to materials Science
- Technical ceramics
- Polymeric materials
Technical Drawing

Learning objectives / competencies:

By the end of the course students will:

- Be familiar with the technical norms for drawings.
- Be able to represent the body in three-dimensional views.
- Understand the principles behind toleration of component measures, shape and position tolerances and the ISO fitting system.
- Understand the relationship between required quality and costs.
- Be able to create simple technical drawings independently and manually for the manufacturing and assembly of products, mainly in mechanical engineering.
- Be able to create simple BOMs.
- Be able to identify the function of illustrated devices, groups of machines and machines in general in assembly drawings.

Course content:

- Basis norms for technical drawings
- The three panel projection
- Measurement registrations and principles of toleration
- The ISO fitting system and data of surface qualities
- Representation of standardized components
Business Administration

Learning objectives / competencies:

By the end of the course students will:

- Be familiar with the economic aspects of specific topics in the current business press.
- Have learnt about the relevant relationships between businesses and the environment in terms of making corporate management decisions.
- Understand the key business processes and operational functions of service provision and utilization.
- Understand the functions of operational cooperation within a company and cross-functional management.

Course content:

- Constitutive decisions (choice of legal form of the company and site, cooperation and concentration forms).
- Corporate activities and business indicators (productivity, efficiency, profitability, liquidity).
- Business processes and basic functions of operational service provision and utilization.
- Management and cooperation of value added processes in the circulation of macroeconomic goods and money.
- Defining market and corporate developments.
Basics of Computer Science

Learning objectives / competencies:

By the end of the course students will:

- Have learnt the methods used in engineering-based problem solving.
- Be able to solve simple technical and economic problems using algorithms.
- Know how to program using basic imperative programming language.

Course content:

- Solving engineering-based problems in technology and economics by programming in a modern programming language or in a programming-related way.
- Basics of data processing to establish a comparable level of knowledge regarding the current state of development in computer science and information technology.
- VBA programming with Microsoft Office as an introduction to programming and the VB programming development environment.
- Declaring variables and constants.
- Basic and structured data types in Visual Basic.
- Basic in/output and print output programming.
- Elementary arithmetic using Visual Basic.
- Testing and failure analysis, the VB debugger, documentation.
- Basic principles of structured programming, creation of simple structure charts.
- Programming of control structures in Visual Basic.
- Programming subroutines in Visual Basic.
- Introduction to object-oriented programming with Visual Basic by creating a simple graphical user interface.
- File handling in VB.
- Introduction to number systems and coding, the binary system, hexadecimal representation and basic computer arithmetic.
- The application of VB in specific subject areas in technology and economics.
2. Compulsory Modules in the 2nd Semester

Mathematics II

Learning objectives / competencies:

By the end of the course students will:

- Be able to solve linear equations systematically and have mastered the basic techniques of arithmetic with matrices.
- Be able to use complex numbers in the different display options confidently and understand the difference between real and complex functions.
- Know how to interpret a double or a triple integral, solve them computationally in Cartesian and polar coordinates and be able to describe integration areas in the above mentioned coordinate systems.
- Be familiar with the tools used to visualize the solution behaviour of ordinary differential equations, know how to assign them to their respective class and be able to solve them using the relevant procedures.
- Understand the principle of integral transformation and know how to use the Laplace and Fourier transformations in appropriate application areas.

In particular, students will learn about the typical applications of the topics mentioned above.

Course content:

- Matrices and linear systems of equations
- Complex numbers and functions
- Integral calculus for functions of several variables
- Differential equations
- Laplace transformation
- Fourier transformation
Physics with Practical Training

Learning objectives / competencies:
By the end of the course students will:

- Understand the importance of physics as the scientific basis for the work of engineers.
- Know the basic laws of physics and have the ability to proof technical applications in terms of physical laws.
- Have an understanding of physical-technical issues, such as problem identification, problem formulation by applying the basic laws of physics, translation into mathematical language.
- Be able to perform simple laboratory tests, record and evaluate measurement data, present their results and interpretations in a written report that has to meet the stylistic demands of a scientific publication.

Course content:

- Mechanics: kinematics and dynamics of particles and rigid bodies
- Thermodynamics: state quantities and changes of state of ideal and real gases
Material Engineering

Learning objectives / competencies:

By the end of the course students will:

- Understand the structure of metallic materials and the significance of errors in their structure.
- Understand the mechanisms of elastic and plastic deformation and recognize the importance of the influence of deformation properties on metals.
- Understand the mechanisms that lead to the equalization of concentration differences and understand the changes of state when adding alloying elements.
- Know the basics of manufacturing metallic materials in construction.
- Understand the properties of iron-based materials, light metals and copper-based materials and know about their essential applications.
- Be able to influence the properties of materials by applying suitable and thermal treatments.
- Be familiar with the most important selection criteria for materials.

Course content:

- Lattice structure and lattice defects
- Deformation behaviour
- Diffusion
- Recovery and recrystallization
- Iron-based materials
- Light metals
- Copper and its alloys
Electrical Engineering

Learning objectives / competencies:

By the end of the course students will:

- Understand the principles behind electro technology in the fields of direct current, electrostatics, electromagnetism and alternating current.
- Be familiar with the significant technological applications of basic electrical engineering.
- Have learnt the basics of analog signal processing (amplification, filtering, mathematical processing, modulation).
- Understand the basics of digital technology in terms of information representation and processing and its technical realization (AD/DA transformation, compression).
- Have learnt how to deal with industrial simulation methods.

Course content:

- Direct current: simple electric circuits, network analysis, equivalent voltage sources.
- Electrostatics and electromagnetism: physical principles, capacitance and inductance, Faraday’s law, motors and generators, transformers.
- Alternating current: calculation methodology, applications (modulation, spectral analysis).
- Semiconductor technology and signal processing: transistors, operational amplifiers, filtering.
- Digital technology: digitalization, digital signal processing.
- Internship with industry standard software.
Learning objectives / competencies:

By the end of the course students will:

- Understand the advantages and disadvantages of various joining techniques.
- Know the structural constraints of different joining techniques.
- Be able to identify the basic operation of parts or assemblies from technical drawings and be able to infer the mechanical model from them.
- Be able to calculate and interpret different compounds and machine elements using simple formulas.
- Be familiar with different shaft-hub connectors, their properties and design principles.

Course content:

- Features of detachable connections such as screws, pins, rivets
- Features of non-releasable connections such as welding, soldering, gluing
- Calculation methods for different joining techniques
- Shaft – hub connections
Financial Accounting

Learning objectives / competencies:

By the end of the course students will:

- Understand the basic principles and procedures of accounting.
- Be able to record business transactions for an industrial company.
- Be able to assess how the balance changes according to entrepreneurial activity.
- Know how to record balance sheet assets and liabilities in accordance with German and the international law.
- Be able to calculate the number of the balance sheet items in accordance with German and the international law.
- Be able to compile the profit and loss statement.

Course content:

- Basics of accounting
- Accounting according to German law
- Accounting according to international law
Economics

Learning objectives / competencies:

By the end of the course students will:

- Have acquired the necessary knowledge to understand macroeconomic contexts.
- Understand the link between the political economy and business administration in order to comprehend the economic consequences of corporate activities.
- Appreciate the operational consequences of macroeconomic developments and economic policy decisions.

Course content:

- Performance of the market: how do markets work and why are they effective?
- Pricing in different markets: how to develop optimal business strategies.
- Competition and competition barriers: economy policy methods to ensure competition.
- Growth and employment: theoretical considerations, current trends and economic policies.
- International economics: theory of foreign trade, presentation and analysis of external economic interlacing.
3. Compulsory Modules in the 3rd Semester

### Process and Data Modelling

**Learning objectives / competencies:**

By the end of the course students will:

- Be familiar with the methods of process and data modelling.
- Understand the technical and commercial importance of process and data modelling in order to design and develop information systems.
- Be familiar with the procedure of business reengineering and business process improvement projects.
- Be able to create data models and use them in projects.
- Know how to develop process models and use process modelling tools.

**Course content:**

- Theory behind the modelling (representation) of material and information flows and their optimization.
- Basic data, process and business modelling techniques (UML, ERM, EPK, BPM, etc.).
- Data modelling in theory and practice with entity-relationship modelling (ERM)
- Normal forms – theory and practice.
- Case study on the integration of data models in companies.
- Methods for optimizing processes and procedures in both theory and practice.
- Practising data and process modelling with ARIS (Architecture of Integrated Information Systems).
Feedback Control Systems

Learning objectives / competencies:

By the end of the course students will:

- Know the objectives, approaches and applications of control engineering.
- Be familiar with the configuration and applications of stable control loop topologies.
- Have learnt about alternative implementations of control algorithms

Course content:

- Basics of systems engineering
  - Block diagrams and signal flow diagrams
  - Mathematical description methods
- Components of the control loop
  - Typical route types
  - Available control features
- Loop synthesis
  - Loop structures
  - Stability and dynamics (locus, Bode diagrams)
- Empirical control algorithms (fuzzy and neuro-networks)
- Examples from technology and logistics, such as the destructive testing of materials
Manufacturing Technology with Practical Training

Learning objectives / competencies:

By the end of the course students will:

- Be familiar with the applications of important industrial production procedures for the production of parts for metalworking.
- Be familiar with the typical machines and tools used for selected manufacturing processes.
- Know how to assess the effect of manufacturing parameters on quality and costs and thereby be able to recommend adequate manufacturing procedures.
- Have learnt the methods for calculating the most important manufacturing processes.
- Be able to assess the potential for rationalization to improve productivity and flexibility.
- Be able to create simple CNC programs.

Course content:

- Machining
- Forming
- Machining tools
- CNC programming
Cost Accounting

Learning objectives / competencies:

By the end of the course students will:

- Be able to transfer expenditures from bookkeeping into costs.
- Be able to perform internal cost allocations with the correct procedures.
- Have learnt how to calculate the cost of a product with the correct calculation method depending on the type of production.
- Know how profit can change according to specific decisions.
- Recognize the shortcomings of traditional cost accounting and be able to remedy them.

Course content:

- Cost type accounting
- Cost centre accounting
- Cost unit accounting
- Marginal costing
- Activity accounting
- Planned cost calculation
Private Commercial Law

Learning objectives / competencies:

By the end of the course students will:

- Have learnt the basics of business private law (civil law, commercial law and company law) and be able to apply the most important of these laws (Civil Code, Commercial Code and Limited Liability Companies Act).
- Recognize the interfaces between economics and justice and be able to incorporate this knowledge into their decisions and problem-solving tasks.
- Understand the methods used in judicial case preparation.

Course content:

- Civil law that is generally applicable in private matters
- Law of obligations which is essential to the Civil Code
- Commercial law as a special civil right of merchants
- Corporate law as a special civil right of entrepreneurs
- Principles of property law, intellectual property law and insolvency law
Statistics

Learning objectives / competencies:

During the course students will deepen their understanding of the following areas:

- Analysis of single and multidimensional data
- Demand forecasting
- Error analysis
- Evaluating process stability (Cp, Cpk charts)
- Identification of critical paths and cycle times in network planning
- XYZ analysis (through correlation and scattering of demand values as a function of time)

Course content:

- Analysis of frequency distributions
- Analysis and forecasting of time series
- Statistical intervals and significance tests
- Application of statistical methods in logistics
Material Handling

Learning objectives / competencies:

By the end of the course students will:

- Be familiar with the main equipment and facilities for internal transportation, its technical function and the most important factors for its commercial use.
- Understand the critical parameters of and most important methods for controlling transport systems.
- Be familiar with the current funding tools for in-house, national and international transport.
- Understand the usual structures of cross-company logistics networks.
- Know the main transport carriers in national and international traffic.
- Know how to select required transportation systems.
- Be able to dimension material handling systems using analytical methods.
- Be able to assess alternative materials handling systems according to economic, technical and social criteria.

Course content:

- Introduction
- Floor-free conveyer systems
- Floor-bounded conveyer systems
- Applications
- Profitability
- Methods for designing and dimensioning
- Control of conveyer systems
- Conveyer auxiliaries and packaging
- Distribution processes
- Transportation methods in national, continental and intercontinental traffic
- Technology of transport and logistics
4. Compulsory Modules in the 4th Semester

Financial and Investment Management

Learning objectives / competencies:

By the end of the course students will:

- Understand the basics of investing and finance.
- Have learnt about the tools used in financial and investment controlling.
- Be familiar with funding instruments.
- Recognize the influence of investment and finance on business success.
- Be able to show the context of and background to financial decisions with practical examples.

Course content:

- Basics of finance and investment management
- Companies as bundles of cash flows
- Financial mathematic applications
- Analysis of annual reports and corporate figures
- Investment calculation methods
- Instruments to raise capital
- Financial and risk policies
Business Language: English I

Learning objectives / competencies:

By the end of the course students will:

- Have developed comprehensive language communication skills.
- Expanded their knowledge of technical terminology and be familiar with the most important professional activities.
- Have acquired knowledge and expertise in the field of Business English.

Course content:

- Business communication and basics
Production Management and Logistics I

Learning objectives / competencies:

By the end of the course students will:

- Understand the basics of technical operational management such as work plans, bills of materials, time plans, etc.
- Understand the importance of how to estimate numbers of demand in order to draft a flexible production plan.
- Be familiar with the types of organization and performance of production.
- Be aware of the different forms of production control.

Course content:

- Methods of time management
- Content and structure of work plans
- Content and structure of bills of materials (BOM)
- Pay systems in production
- The importance of collective agreements
- Establishment of shift schedules
- Organizational and performance types
- Procedure in the layout plan
- Optimization of material flow
- The importance of demand forecasting
- Capacity planning process within the company
- Stock disposition
- Introduction to production management methods (push versus pull)
Storage Systems

Learning objectives / competencies:

By the end of the course students will:

• Understand the logistic processes that warehouses require.
• Know which elements belong to a storage system.
• Understand the important properties of storage systems.
• Be familiar with the procedures for setting up a warehouse.
• Have applied their knowledge in actual planning tasks.

Course content:

• Function of warehouses and puffers in a company
• Key objectives and parameters in the construction of warehouses
• Operational processes in the warehouse
• Storage organization and rules
• Storage structures
• Picking principles and techniques
• Technical storage systems
• Material flow in the warehouse
• Design of storage places based on case studies
Automation

Learning objectives / competencies:

By the end of the course students will:

- Understand the automation of measurement and process flows.
- Be familiar with the pneumatic, hydraulic and electrical components of control technology.
- Know how to assess dependencies and interactions of automation components.

Course content:

- Basics of control and regulation technology
  - Structures
  - Process interface
  - Path and schedule control
  - Follow and fixed value control
  - Two-point control
- Sensors and actuators
  - Process instrumentation
  - Handling
- PLC and process computers
  - Systems and components
  - Basics of programming
- Information technology
  - System hierarchies
  - Bus systems
  - Process visualization
Logistical Software Systems I

Learning objectives / competencies:

By the end of the course students will:

- Be able to assess the current most important software-supported processes within various logistics activities, describe their basic functions and evaluate how useful they are.
- Be familiar with the most important functions of current software systems such as the theoretical concepts used by logistics companies.
- Be able to name the typical applications of software systems and explain their advantages.
- Be able to name the basic information technologies and describe their purpose and uses.
- Know how to establish selection criteria for software systems.

Course content:

- Overview of current software systems in logistics
- Logistic functions in ERP systems:
  - ERP suites (e.g. SAP)
  - Best-of-breed solutions
- Theoretical foundations of logistic functions and processes:
  - Planning (projections, forecasting, etc.)
  - Simulation
  - Optimization (route optimization, etc.)
  - Control theory (queues, etc.)
  - Telematic services (detection, navigation, etc.)
- Information technology foundations of software systems at a glance.
- A more detailed analysis of example selected logistic systems such as:
  - Warehouse management systems (warehouse management and order picking systems)
  - Trace and Tracking systems
  - Picking systems
  - Material flow control
  - Supply chain management systems
  - Layout planning systems
  - Development of basic evaluation criteria for the selection of software systems in logistics
5. Compulsory Modules in the 5th Semester

**Project Planning and Quality Management**

Learning objectives / competencies:

By the end of the course students will:

- Understand the basic relationships in project management.
- Be familiar with the essential concepts, approaches and methods used in project development: preparing, planning, procurement, monitoring and controlling.
- Understand the relationship between project management and other functional areas.
- Recognize the influence of cross-cultural management and behavioural factors on project success.
- Be able to analyse typical project situations and know how to act and how to find appropriate solutions.
- Be familiar with the standards and requirements of quality management systems.
- Understand how quality management systems are introduced and implemented in a company according to ISO 9000:2000 and be familiar with industry-specific requirements for quality management systems.
- Know how to choose and apply quality methods in the development process in manufacturing and product application.
- Be able to assess quality in products using sampling systems.
- Understand the statistical process of planning and know how to create and assess quality control charts.
- Be able to prepare and carry out machine and process capability studies and know how to obtain measurements from these values.
- Know where quality-related costs arise and what knowledge the collection of these costs can provide.

Course content:

- Basic relationships in project management
- Objectives and project assignment
- Process models in project management
- Project structure
- Methodology for scheduling and cost planning
• Project controlling
• Project organisation and project team leadership
• Development of quality management
• Quality management systems
• Quality jobs within the company
• Quality methods in the lifecycle of projects and products
• Quality assurance in production
• Quality costs and indicators
Production Planning with Practical Training

Learning objectives / competencies:

By the end of the course students will:

- Have deepened their understanding of production planning.
- Have learnt about the practical applications of what they studied in Production Management and Logistics I
- Be able to use relevant software.
- Be able to practise an independent approach.

Course content:

- Development and implementation of an example PPS system
- Creating the necessary work documents for company operations
- Modelling orders and capacity in an ERP system
- Implementation of the scheduling of production orders
- Processing of sales inquiries in the context of an existing capacity situation
- Consideration of distributed capacity in-house and external production
- Measures to take in critical situations
- Comparison of results of different control algorithms, such as MRP I, MRP II and simulation
Industrial Placement
(20 weeks)

Learning objectives / competencies:
By the end of the course students will:

- Have gained work experience at the interface between technology and business management in addition to the theory they have already learnt at university.

Course content:

- Testing and deepening of the theory that students have already learned.
- Students will cope with the harsh conditions of working life at the interface between technology and business management.

Study and exam performance:

- Students have to take an oral exam consisting of a presentation about their experience (5 min) and an interview to find out about the work done at the interface between technology and business administration (5 min).
- Internship report
- Essay of approximately 10 pages on lessons learned
6. Compulsory Modules in the 6th Semester

**Business Language: English II**

Learning objectives / competencies:

By the end of the course students will:

- Have developed comprehensive language communication skills.
- Expanded their knowledge of technical terminology and be familiar with the most important professional activities.
- Have acquired knowledge and expertise in the field of Business English.

Course content:

- Globally important economic regions
- Social, economic and cultural characteristics
- Subject-specific terminology
- Writing reports and presentations
- Current specialized topics
Sourcing and Distribution

Learning objectives / competencies:

By the end of the course students will:

- Have learnt about the development of procurement strategies and their evaluation as a part of corporate strategy.
- Understand how to choose situation-appropriate suppliers.
- Recognize the cost savings resulting from purchasing and procurement optimization and competitive advantages, especially to achieve the right price and quality.
- Understand the design of the logistical interface between suppliers and customers.
- Be familiar with models of procurement and distribution logistics.

Course content:

- Purchasing (global sourcing)
- Procurement strategies
- Inco terms
- Customs themes
- Strategy sourcing and supplier management
- Distribution (one-level/multi-level)
- Objectives and influences of procurement and distribution logistics
- Models of procurement and distribution logistics
- Site plan
Production Management and Logistics II

Learning objectives / competencies:

By the end of the course students will:

- Have deepened their knowledge of short-to-long term capacity planning.
- Understand the optimization approaches of and methods used in production management.
- Be familiar with the methods used in (inventory) disposition, scheduling and production control.

Course content:

- Logistical operational characteristics
- Approaches to cost accounting in production planning
- Value stream mapping
- Kaizen
- Methods to increase versatility in the production
- Production control procedures (methods, algorithms, advantages and disadvantages, applications)
- Comparison of different algorithms for determining order quantity (EOQ, Wagner-Within, etc.)
Interdisciplinary Projects

Learning objectives / competencies:

During the course students will:

- Learn about the structured approach to implementing project activities and their documentation in enterprises: solving a problem related to “humans in logistic processes”.
- Prepare to write their Bachelor’s thesis

Course content:

- Implementation of project work on practical tasks in cooperation with companies
- Project management (application of standard tools)
- Library and Internet research
- Selection and application of appropriate data collection and simulation methods
- Scientific evaluation and analysis
- Documentation and presentation in front of an audience
Logistical Software Systems II

Learning objectives / competencies:

By then end of the course students will:

- Be able to analyse the economic, technical and procedural aspects of certain software systems in logistics.
- Be able to describe their uses and evaluate their usefulness.

Course content:

- Deepening of the theoretical foundations of logistics functions and processes:
  - Planning (projections/forecasting)
  - Simulation methods
  - Optimization (route optimization, etc.)
  - Control theory (queues, etc.)
  - Telematic services (detection, navigation, etc.)
- Compilation of business process requirements in logistics, which are important for analysing and selecting software systems.
- Development of a detailed assessment checklist for selecting software systems in logistics.
- Detailed functional, technical and procedural analysis of one or two examples taken from logistics systems:
  - Trace and tracking systems
  - Material flow control
  - Supply chain management systems
  - Scheduling and distribution systems
  - Layout planning systems

Carried out in the form of an evaluation project during the course.

- Detailed analysis of the logistic capabilities of mySAP in comparison with alternative ERP system functions.
- Presentation of results and critical discussion.
Learning objectives / competencies:

By the end of the course students will:

- Be able to describe ERP systems, how they can be used successfully in companies and how their IT architecture is designed.
- Be able to differentiate between suite and best-of-breed solutions and justify their respective areas of application.
- Be able to critically highlight the problems of introducing ERP systems and explain best practices for ERP implementation.
- Know how to use the mySAP ERP system in materials management and logistic functions.
- Be familiar with the operation and the basic functions of at least one alternative best-of-breed ERP system (alternative to SAP) and be able to evaluate its use in SMEs.
- Be able to specify criteria for the selection of ERP systems.

Course content:

- What is an ERP system? Product approach, functions, benefits, processes at a glance.
- What are the functions of an ERP system and what can it not do currently?
- Technical system architecture of ERP systems – advantages and difficulties in the use of basic technologies.
- ERP logistic functions at a glance – Which logistics processes are supported by ERP systems and how exactly do they work?
- Problems of ERP for SMEs – The benefits and problems with using ERP systems in small and medium enterprises (SMEs).
- Implementation problems of ERP Systems – How can we learn from the implementation of previous ERP systems? What do we need to know and what can we expect?
- The use of ERP logistic functions – logistic functions in mySAP ERP in practice (practical exercises on a PC).
- Analysis of ERP suites versus ERP best-of-breed solutions from the point of view of an SME.
- Establishing and discussing evaluation criteria for selecting suitable ERP systems.
- Practical exercises on the computer system.
7. Compulsory Modules in the 7th Semester

**People and Organisational Management**

**Learning objectives / competencies:**

By the end of the course students will:

- Understand the importance of leadership and organization in a company.
- Understand the difference between a process-oriented organization and conventional organization forms.
- Be familiar with the main settings and conditions that a manager ought to have in order to cope with tasks in functional management responsibility, personal responsibility and coaching.
- Know the basics of change management.
- Be familiar with the methods of communication for staff selection, feedback and discussion on conflict management.

**Course content:**

- Current psychological and sociological concepts of personnel management and its practical application
- Teamwork and group dynamics
- Employee motivation and performance optimization
- Social skills and creativity as a core requirement of executives
- Methods of employee selection
- Staff appraisal and performance feedback as the basis for development and promotion
- The target setting process
- Delegation and time management
Supply Chain Management

Learning objectives / competencies:

By the end of the course students will:

- Understand the necessity of building partnerships between suppliers and customers.
- Be able to evaluate the design of different supply chains.
- Understand the relevance of process-oriented designs of material, information and financial flows.
- Be able to implement SCM in an organization.
- Have learnt the methods used in SCM.
- Have gained experience from practical examples.

Course content:

- Basics of SCM
- Economic assessment procedures
- Balanced Scorecard as a target system
- Process management
- Cooperation with partner companies
- Support of SCM by using IT
Handling Technology

Learning objectives / competencies:

During the course students will learn about:

- The variety of handling processes in a company, particularly in the different varieties of assembly.
- Technical handling equipment
- The importance and function of packaging and transport containers.
- The procedure for selecting the optimum handling technology in each individual case.

Course content:

- Description of handling processes and applications
- Organization methods of assembly
- Importance of ergonomics/job design and physiology
- Ergonomic design rules
- Technical handling equipment (semi/fully automatic) to vary the amount or the location/orientation
- Handling equipment to form units, select or separate
- Packaging, packaging materials and transportation containers for internal and external transport
- Technical assistance packaging
- Investment appraisal (including the disposal of packaging waste)
- Application of the gained knowledge in case studies
- Automatic picking and sorting
Bachelor Thesis
(In German or English)

Learning objectives / competencies:
Students must be able to show that they can solve a specific problem in the field of industrial engineering in a systematic, independent and practice-oriented way (see § 10 SPO).

Course content:
Students will have the opportunity to choose a topic and work on it in cooperation with a professor. They can also decide to work on a topic that a professor has proposed. Students usually choose topics in cooperation with companies.

Study and exam performance:
Written elaboration of the topic: students have to submit a bound copy of their written thesis and a CD of their completed work to the secretary office. This copy will remain with the company or at the university – wherever the student got their topic from. Students have to discuss the structure, nature and scope of the written thesis with their supervising professor.
8. Compulsory Elective Modules

Aerodynamic Principles for Automotive Design

(Taught in English)

Learning objectives / competencies:

By the end of the course students will:

- Calculate or simulate a laminar flow field for a simple shape (e.g. blunt body, cone, ball or block) at low speeds.
- Describe and perform a simple experiment (designed by the students in teams), e.g. to be provided
- Write about it!

Course content:

Part 1 – Basics of low-speed fluid dynamics:

- Do some experiments
- Figure out what’s going on
- Describe what’s going on mathematically
- Describe what is happening verbally
- Present your experiment

Part 2 – Automotive Design:

- Be able to discuss the ins-and-outs of a two-stroke or a four-stroke internal combustion engine.
- Heating/cooling units
- Exterior Design with various shapes

Tour of a Car Manufacturer with an engineer as the tour guide – (could be either BMW or Audi)
Learning objectives / competencies:

By the end of the course students will:

- Have developed comprehensive foreign language communication skills.
- Expanded their knowledge of technical terminology for the most important professional activities.
- Have acquired basic skills in the economic, cultural and social language characteristics of French-speaking countries.

Course content:

Module 1

- Business communication
- Corporate and commercial basics

Module 2

- Globally important economic areas and their social, commercial and cultural characteristics
- Subject-specific terminology

Module 3

- Aspects of business founding
- Writing reports and presentations
- Current specialized topics
Entrepreneurship

Learning objectives / competencies:

- Develop an understanding for an holistic approach to entrepreneurship
- Acquire theoretical and practical knowledge concerning the phases of the innovation process
- Are able to work with methods and frameworks like creativity methods, business models and marketing instruments
- Know about the necessary steps (e.g. Business Plan, financing) to found a new venture

Course content:

- The entrepreneurial perspective
- From the problem to the opportunity
- From the business idea to the business plan
- From planning to founding a company
- The life cycle and growth of new ventures
Change Management

(Taught in English)

Learning objectives / competencies:

Students will be introduced to the process steps associated with “change” and their pitfalls through case study work (individually and/or in small groups) together with group discussion. Our aim is for students to be able to understand the mechanisms of human behaviour that accompany change and how these can be optimally managed to make the process smoother.

Course content:

Each lecture series will be accompanied by case study of work which will build on the lectures and provide practical illustrative examples. There will be time for internet research and to discuss outcomes. Students are expected to supplement their “in course” work with additional research and reading, particularly for the assignment.
Wie viel grün ist drin?

(no description)
## Sustainable Development Simulation Game

### Learning objectives / competencies:

By the end of the course students will:

- Have deepened their knowledge of the policy areas of the European Union.
- Be familiar with the dimensions of sustainability and sustainable development.
- Understand the complexity of EU policy (including EU policies and institutions).
- Understand the complexity of sustainability.
- Have developed and strengthened their social skills through group work.

### Course content:

- Introduction to the issues of sustainability, sustainable development and corporate social responsibility (CSR)
- Introduction to the European Union, guidance awarding and institutions
- Energy Policy
- Renewable Energy
Management Decision Making Supported by Data Analysis

(Taught in English)

Learning objectives / competencies:

By the end of the course students will:

- Understand the contribution data analysis can make to management decisions.
- Be able to identify decision-relevant data, analyse it from different angles and use this information to support decision making.
- Be able to present data analysis persuasively in English.
- Know how to lead discussion groups competently in English.

Course content:

- Case studies from various corporate functions such as:
  - Cooperate governance
  - Marketing
  - Production
- Extraction and measurement of appropriate parameters from data sets that come from various fields of activities of engineers and business managers.
- Creation of informative charts showing the stylistic demands of disclosure requirements.
- Practising English to guide and orient discussions.
Negotiation and Moderating

Learning objectives / competencies:

During the course students will learn about:

- Self-presentation
- Application techniques
- Negotiation
- Conflict management

Course content:

- Negotiating objectives
- Basics of communication
- Negotiation styles
- Preparation of negotiations
- Intercultural communication
- Staff and communication
- Effective communication in a team
- Discussions and argumentations
- Conflict Management
- Personality tests
- Exercises
Product Ergonomics

Learning objectives / competencies:

Students will learn about the tactile, visual, acoustic and informal interfaces between humans and their environment with regard to their biomechanical, receptor and informational conditions and their dependencies (age, sex, power conversion, etc.).

Course content:

Regularities of the interaction between humans and the environment or humans and machines:

- Informational: tactile, visual, acoustic
- Energy: biomechanical, thermoregulatory product design
- Actuator and control panels
- Hand-held tools
- Displays and input devices, console design
- Software ergonomics and assistance systems
- Seating and reclining systems
- Lighting
- Noise and vibration protection
- Climate and clothing (protective clothing, work clothes and sportswear)
Resource Efficiency and Resource Management

(Taught in German and possibly in English)

Learning objectives / competencies:

- The aim of the course is for students to gain the necessary knowledge and skills to work independently on scientific problems in resource efficiency and to learn how to present their findings.
- The module provides students with the necessary multidisciplinary skills and practical experience of project operations to work in interdisciplinary project teams.
- Students will:
  - Work intensively on questions of resource efficiency.
  - Learn about the procedures and methods used to manage projects.
  - Be able to analyse, structure and solve problems independently and in small groups.
  - Independently develop their knowledge, abilities and skills for working in an interdisciplinary team.
  - Be able to present what they have learnt in front of others.

Course content:

- Resource efficiency using the example of the university: students have to consider energy, building and plant engineering, equipment, waste disposal, user behaviour, communication and best practice.
- Work on projects with technical and business tasks, including project management:
  - Definition of project objectives and definition of requirements
  - Structuring of project content and preparation of a project plan
  - Setting up working packages and dividing responsibilities among team members
  - Obtaining and evaluating information
  - Preparation, evaluation and selection of solutions
  - Creating documentation and a presentation
**Marketing Project**

**Learning objectives / competencies:**

By the end of the course students will:

- Have gained practical experience in marketing issues from a case study in cooperation with a company.
- Be able to apply the knowledge they acquired in the marketing lectures in case studies and projects.

**Course content:**

- Work on a case study/project that deals with current issues in marketing
- Creating documentation and working papers
- Individual and group presentations for the overall project