

Module Descriptions – Degree Program Industrial Engineering - Studienakademie Bautzen

Module code	Module name	Short description	Semester	ECTS
Pflichtmodule				
WW-MA-10	Mathematics I	The module includes the topics of complex numbers, linear algebra, differential and integral calculus for functions of an independent variable.	1	5
WW-TPHYS-10	Technical Physics	The module explains the functionality of vibrational systems. Furthermore, it covers the changes of state of thermodynamic systems and their applications in heat engines, refrigerating machines and heat exchangers. In addition, the module includes basic electrical and electronic knowledge and possible practical applications.	1	7
WW-ING-10	Materials and Design Fundamentals	Students understand technical drawings of simple components and assemblies and are familiar with their standardized representation. They know the functions, operating principles, and application areas of selected design elements in industrial practice and learn how to use technical drawing elements. The module further addresses the most important material-related correlations and their influence on the design properties of technical systems.	1	6
WW-ING-10	Information Technology	Students gain basic knowledge of selected topics in information technology with the aim of being able to create algorithms and processes. They are familiarized with the different working levels of parametric CAD systems and their special strategies. This includes knowledge of the basic functions of 3D modelling as well as their application in the design development process.	2	6
WW-MA-20	Mathematics II	The module includes topics of function series, differential calculus for functions of several variables, ordinary differential equations as well as probability theory and statistics. Students expand their understanding of basic mathematical principles, grasp the interrelationship between different parts of mathematics and their subject-specific applications, and become familiar with the fundamentals of statistics.	2	5

WW-BWGL-20	Foundations of Business Administration and Law	Students gain an overview of the foundations of business administration. They know the basic categories of modern management theory. Furthermore, students acquire basic legal knowledge, which enables them to analyze and assess legal questions.	2	7
WW-ME-20	Design of Machine Elements	The module addresses topics of the design of construction elements. Students acquire knowledge of the use of connecting elements and their design. They learn how to test metallic materials in order to determine the necessary material parameters for the optimal design of the systems.	2	6
WW-TM-20	Engineering Mechanics	The module imparts basic knowledge of the effect that forces and moments have on solid-state bodies and deals with the correlations between external load, support reaction and the internal forces on a supporting structure. Furthermore, students are familiarized with the different forms of motion as well as the relevant physical quantities and procedures for the characterization and calculation of motion processes.	2	6
WW-FES-30	Dimensioning and Manufacturing of Machine Elements	The module addresses topics of the calculation and design of shafts and bearings as well as the cutting with geometrically definite and indefinite cutting edge, the joining of components and the design of construction elements.	3	7
WW-FES-30	Strength of Materials	Students can describe and explain the basic methods for stress and deformation calculation. They understand the component parameters required for a strength calculation and their application limits. They know the correlation between stresses and deformations and the interrelation to the procedures of structural durability. They understand the essential aspects of stresses and their application in stress hypotheses.	3	6
WW-FWRW-30	Financial Management/Accounting	The module conveys the instruments of internal and external accounting. In particular, students understand the importance of data collection in financial accounting for the purposes of cost and activity accounting and management accounting. They know and understand the structure of balances and profit and loss accounts as well as the system of double-entry accounting and the significance of value added tax for a company. Building on the knowledge gained in the module on accounting, students grasp the connection between investment and financing processes.	3	7

WW-ENGB-30	English Basic	Students expand their foreign language skills in the communicative and intercultural field. In particular, they complement their foreign language skills by acquiring general business terminology and subject-specific terminology (industrial engineering).	3	4
WW-BFMB-40	Dimensioning and Manufacturing of Machine Components	The module covers topics related to the design of machine components and production engineering with a focus on forming and casting. Students are able to dimension the machine components to be developed with a focus on production-technological aspects and to determine the parameters for an optimal production strategy.	4	8
WW-PWI-40	Production Management	The module imparts knowledge of the REFA (German Association for Work Design, Business Organization and Business Development) work system and methods for systematic procedures in the design of work systems and processes. These can be evaluated and designed with regard to their suitability for concrete forms of production and for simulated improvements. Students understand the methods of material planning and control as well as the analysis, planning and evaluation of the production flow and the optimization of material flow and storage capacities.	4	8
WW-FMT-40	Production Metrology/ Quality Assurance	The module imparts knowledge of data collection and the calculation of statistical indicators. Causes and effects are determined in a functional context, and the results are interpreted in terms of quality and applicability.	4	5
WW-PDM-50	Process Data Management for Production Systems	The module imparts comprehensive and detailed knowledge of the identification, application and use of work-related data. Students are able to assess, time and link production systems of all types to important parameters. They possess methodological competence for both the analysis of production systems and their redesign and are able to transform the results to changing operational conditions.	5	5
WW-MM-50	Management Methods	The module conveys the principles of quality management in a corporate context and the situational application of these models in corporate management. Students are enabled to act as team leaders, moderators, and conflict mediators. They can apply previously acquired knowledge of modelling methods, process models and process organization to a concrete practical activity on the computer by using current software.	5	5

WW-PLM-60	Product Life Cycle Management	Students acquire basic knowledge of processes in the product life cycle using ERP and PLM systems. The connection between technical and economic decisions is consolidated in exercises and linked to current developments.	6	9
WW-PWCUF-60	Selected Topics of Corporate Governance	The module familiarizes students with the essential success factors for companies and the connection to effective leadership. Particular importance is placed on the aspects of integrated management systems for quality, environmental, energy, health and safety management.	6	9
WW-ENGA-60	English Advanced	Students know the linguistic devices to describe their position, their company and the individual functional areas as required by the situation. They are able to provide target-oriented information and obtain necessary information. In addition, students deepen their knowledge of how to conduct discussions on basic economic issues and how to present basic economic and technical matters.	5 u.6	4

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Compulsory elective modules				
Field of specialization: Production Engineering				
WW-CAX-40	CAX Technologies	Students gain an overview of CAD/CAM methods and are familiar with the basic elements and concepts of modeling and CNC processing. They understand the basic principles of simulation in the calculation of components and assemblies and directly apply them in exercises.	4	5
WW-AT-50	Automation Engineering	This module conveys knowledge of automation systems in process and production engineering. Students recognize possible applications and different options for implementation. They understand the basics of signal capture and electronic signal processing and are given an overview of safety standards and equipment.	5	5

WW-PI-50	Product and Innovation	Students become acquainted with the possibilities of virtual commissioning and are able to develop models and link their mechanical components with virtual controls. They know the methods of concept development and apply them to concrete problems.	5	5
WW-PS-60	Production Systems	The module deals with the elements of automated production and possible ways of using the operation equipment. Simulations that include CAD/CAM software are used to monitor the processes and visually identify their interrelationships. By means of a complex example of the use of robotics in production, students understand and consolidate the connections between the engineering requirements and the demands of economic activity.	6	6
Field of specialization: Technical Sales and Distribution				
WW-MAWI-40	Materials Management	Students are familiar with various analyses, calculation processes and algorithms in business organization and assign them to the different functional areas of the companies. They understand tasks as part of the operational environment and deepen their knowledge of the procedures in the company processes.	4	5
WW-MARM-50	Marketing Management	The module deals with the basics of marketing as a market-oriented corporate function. Students become acquainted with the prerequisites and conditions necessary for a successful marketing strategy involving the development of strategic business areas and customer management. By means of numerous practical examples, they understand the different effects of various marketing methods and their impact on the company.	5	5
WW-IGM-50	Marketing of Industrial Goods	Students gain knowledge of how to market industrial goods. They understand the interrelationships between industrial goods, efficiency and user demands and recognize the requirements for service offers in the context of technical regulations. In workshops they develop a marketing campaign for a selected industrial good.	5	5

WW-VM-60	Sales Management	Students understand the sales process within the internal organization and in external communication with customers. They know the most important measures and activities for achieving the set sales targets, with special emphasis on the management of the sales team. In role-plays, students understand that, particularly in sales, cooperation between the individual company divisions represents an important success factor.	6	6
Field of specialization: Plastics Engineering				
WW-KST-40	Plastics-Polymers Materials	The module deals with the fundamentals of the structural design of plastics. Students are enabled to understand the principles of plastics production and the relationship between structure and properties. They become acquainted with methods of testing and analysis techniques, apply them in laboratories and understand their fields of application.	4	5
WW-KVGL-50	Foundations of Polymer Processing	Students understand the relationships between rheological, thermodynamic, and fluid mechanical parameters and the properties that arise in the polymer melt. They know the processes in processing machines for the melting, conveying and solidification of polymers and their necessary processing-relevant characteristics and realization. At the same time, students understand the effect of fillers and reinforcing materials.	5	5
WW-KVPS-50	Polymer Processing Production Systems	The module focuses on basic processing methods for plastics and the associated machine technology, their production processes, boundary conditions, relationships between material properties, product properties and processes (structure-process-property relationships). Students understand the interrelationships in tool design and are familiar with essential calculation methods.	5	5
WW-KKS-60	Material- and Processing-Compatible Construction Systems	The module enhances knowledge of the relationships between further processing and the properties that arise in the component. Students apply the principles of process selection in dependence of the material or component properties and use them for plastic-compatible component construction, design, and simulation applications. A project on the " Introduction of a plastic product" in production puts this knowledge into practice.	6	6

Field of specialization: Foundry Engineering				
WW-GWST-40	Cast Materials	The module deals with the fundamentals of common iron, steel and malleable cast iron materials and their classification in terms of their microstructure and properties as well as their castability and further processing on the component. Furthermore, students gain basic knowledge of the technical framework conditions set by standards and laws.	4	5
WW-GGK-50	Casting-Compatible Design and Construction	The module deals with the basic principles of casting-compatible design according to the requirements of the production of a cast part. By modelling a specific cast part and selecting the appropriate materials, students gain knowledge of the feasibility of lightweight constructions.	5	5
WW-FSFT-50	Molding Materials and Molding Technology	Students become acquainted with the different molding tools, master models, the systematics of molding principles and the molding and core material binding systems. They are able to distinguish between different molding materials in terms of their further usability and understand the relationships between molding materials, models and cores with regard to their use in the corresponding context.	5	5
WW-GPG-60	Foundry Process Engineering	Students gain knowledge of the optimal design of the foundry process in accordance with the requirements of the industry. They understand the composition and properties of the used materials and casting defects. Students deal with a complex example to put the theoretical principles into practice.	6	6

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Practical modules				
WW-PM-10	Practice Company in a Global Environment	In this module, students get to know the company, its organizational structure, and its corporate objectives. Students work out the characteristics of the performance profile as well as future development trends and acquire knowledge of elementary, operational processes. They complete simple professional tasks of the company and are involved in production. Thereby, students acquire fundamental knowledge of value creation in the company and the resources used in this context.	1	6
	Application of Work and Problem-Solving Strategies	Students learn to apply special problem-solving techniques by transferring and consolidating knowledge acquired in the theoretical phases. They are involved in the day-to-day business of the company and solve simple corporate tasks. Students document these solutions in a first project paper.	2	6
WW-PM-20	Development of Action, Methodological and Social Competence	In this module, students consolidate the specialist knowledge acquired in the theoretical phases by applying it to concrete practical solutions. They are integrated in selected functional areas, including the associated IT, e.g. in merchandise management, materials management, accounting, and production management. Students may also be involved in the areas of development and production. Thereby they become acquainted with the marketing objectives and instruments of the practice company.	3	6
	Engineering Work	Depending on the chosen compulsory elective module, students are employed in the areas such as product development and testing, metrology/quality management, materials management/logistics, controlling, production preparation, sales, etc. Students complete their second project paper thus consolidating their skills in scientific work and linking these skills to practical work in the main areas of production or economy.	4	6

WW-PM-30	Autonomous Working	<p>Students increase their independence. They broaden their professional knowledge, the ability to think analytically, critically, and constructively, the ability to analyze and assess specific technical contexts and processes, and the ability to put theoretical knowledge into practice and vice versa. They select and apply problem solving and project management techniques.</p> <p>Students solve practical problems in an independent and responsible manner. This may include the representation of the practice partner at trade fairs and other public events, the independent implementation of sub-projects or becoming acquainted with the tasks of project management. In their third project work, students scientifically prepare and present the results of these activities.</p>	5	6
WW-BAWW-60	Bachelor-Thesis	<p>With their final thesis, students show that they are able to independently solve a specialized problem. This may include an introduction to and familiarization with future work tasks. Students participate in consultations that deal with the content-based approach of their thesis. They prepare their thesis in accordance with the guidelines for scientific work.</p> <p>Students present and discuss their conclusions in a subsequent defense.</p>	6	12