

Module Manual

Degree Program:

Food Safety

Appendix 2 to the Study Regulations

as published on March 30, 2015

Module No./Code	7LS-MAS01-LS
Module name	Mathematics and Statistics
Module contents	<p>Analysis/Linear algebra Calculating with real numbers, equations, functions of one or more variables, differential calculus, integral calculus, vectors, matrices</p> <p>Linear optimization Modeling and solution of linear optimization tasks</p> <p>Descriptive statistics Characteristics and scales, frequency distribution, mean values, measures of dispersion, correlation and regression analysis, time series</p> <p>Probability calculation Combinatorics, random events and probabilities, random variable and probability, expected value, variance</p> <p>Inductive statistics Point/confidence estimates, significance tests</p>
Semester / ECTS	Semester 1 / 6 ECTS

Module No./Code	7LS-NAW01-LS
Module name	Biological and Chemical Foundations
Module contents	<p>Botany and zoology</p> <p>General cell theory, tissue types, morphology and function of plants, plant systematics</p> <p>Histology, organ systems, ontogenesis, evolution and overview of the animal world</p> <p>Human biology</p> <p>Functional anatomy, basis/extracts of selected chapters (ontogenesis, human ecology, population genetics, human genetics, anthropology and immunobiology)</p> <p>General and inorganic chemistry</p> <p>Atomic theory, periodic table, chemical bond, equilibrium and mass action law, acids and bases, solutions, basics of chemical reaction, redox reactions, complex compounds, reaction kinetics, stoichiometric calculations</p>
Semester / ECTS	Semester 1 / 7 ECTS

Module No./Code	7LS-LES01-LS
Module name	Food Sensorics
Module contents	<p>Foundations of food sensorics Definition, importance and fields of application, sensory-physiological foundations - general, anatomical and practical foundations of sensory perception</p> <p>Installation of a sensorics laboratory Test room, test stations</p> <p>Design and function of a test panel</p> <p>Test methods Detection tests, threshold tests, difference tests, descriptive tests, hedonic tests</p> <p>Sensorics of different product groups</p> <p>Analytical methods for the investigation of sensory abnormalities</p> <p>Practical implementation of sensory analyses</p>
Semester / ECTS	Semester 1 / 5 ECTS

Module No./Code	7LS-WIW01-LS
Module name	Economic Foundations
Module contents	<p>General Business Administration Basic economic concepts and foundations of economic activity, economic systems, business and the environment, management and functional areas of corporate governance, value chain and business management indicators, legal forms, location issues, structural characteristics, business concept and business start-ups</p> <p>Marketing Foundations Behavioral foundations, need/demand, market and customer orientation, market information procurement and target group analysis, marketing policy instruments and marketing mix</p> <p>Macroeconomics Basic terms, foundations of micro and macroeconomics</p> <p>Study methodology Course of studies, learning techniques, introduction to academic writing</p>
Semester / ECTS	Semester 1 / 6 ECTS

Module No./Code	LS-PRA01-LS
Module name	Food Sensorics and Corporate Structure
Module contents	<p>Business purpose and corporate structure</p> <ul style="list-style-type: none"> • Business concept and business goals • Legal form of the company • Position of the company in the market • Corporate structure (organizational structure, organigram) <p>Food sensorics in the company</p> <ul style="list-style-type: none"> • Implementation of sensory activities in the context of product development or quality control • Representation of sensory profiles of produced / processed food • Development of potential applications of sensory analyses
Semester / ECTS	Semester 1 / 6 ECTS

Module No./Code	7LS-NAW02-LS
Module name	Physics, Process Engineering
Module contents	<p>Food physics Physical quantities of food, disperse systems, relationship between physical quantities and food quality</p> <p>Foundations of process engineering: Foundations of mechanical and thermal process engineering, foundations of rheology</p> <p>Basic processes of mechanical process engineering Cutting, grinding, mixing, agglomerating, extruding, foaming</p> <p>Basic processes of thermal process engineering: Heating and cooling, drying, crystallization, distillation and rectification</p>
Semester / ECTS	Semester 2 / 6 ECTS

Module No./Code	7LS-LCP01-LS
Module name	Food Chemistry and Food Chemistry Processes
Module contents	<p>Organic chemistry:</p> <ul style="list-style-type: none"> • Classification and nomenclature, isomerism, functional groups, classification of chemical reactions, hydrocarbons, alcohols, phenols, ethers, carbonyl compounds, carboxylic acids, thiols, amines, heterocycles, etc. <p>Chemical and physical properties and reactions of the following food ingredients:</p> <ul style="list-style-type: none"> • Water, amino acids, peptides, proteins, enzymes, lipids, carbohydrates, flavorings, vitamins, minerals, etc. <p>Changes, functionality (quality, shelf life, sensorics, processing, nutritional value) of the above mentioned ingredients</p> <p>Occurrence, extraction and effects of selected ingredients</p> <p>Composition of selected food groups:</p> <ul style="list-style-type: none"> • Milk and dairy products, eggs and egg products, meat, fish and fishery products, edible fats and oils, grains and grain products, fruit and vegetables, etc. <p>Processing operations using chemical reactions of selected product groups</p>
Semester / ECTS	Semester 2 / 7 ECTS

Module No./Code	7LS-MIK01-LS
Module name	Foundations of Microbiology
Module contents	<p>Microorganisms in food (systematics, morphology, cytology and metabolic physiology, verification possibilities):</p> <p>Bacteria, yeasts, fungi, viruses, etc.</p> <p>Microorganisms in foods of animal origin:</p> <p>Meat and meat products, fish and fish products, seafood, eggs and egg products, milk and dairy products</p> <p>Microorganisms in plant-based foods</p> <p>Grain and grain products, fruits and vegetables</p> <p>Production/modification of food using microorganisms:</p> <p>Starter and protective cultures, microbial metabolites in food, probiotics, prebiotics, bread, alcoholic beverages, raw sausage, raw cured products, dairy products, cheese, sour vegetables, coffee, Asian fermentation products</p> <p>Food spoilage:</p> <p>Types of microbial spoilage, influencing factors, detection of microbial spoilage</p> <p>Preservation of food:</p> <p>Temperature reduction, heat treatment, reduction of water activity, ionizing radiation, chemical preservation, modification of gas atmosphere, hurdle technology, novel technologies</p>
Semester / ECTS	Semester 2 / 5 ECTS

Module No./Code	7LS-WAS01-LS
Module name	Scientific Work and Social Competencies
Module contents	<p>Foundations of Science Theory</p> <p>Foundations of scientific work:</p> <p>Time management and study organization, basic concepts and theory of cognition, scientific research/reading/writing, problem solving and research methods, principles of data collection, data preparation and data evaluation, evaluation of results</p> <p>Communication and conversation techniques:</p> <p>Conversational situations, understanding of roles, employee appraisal, moderation, presentation, interactions, metacommunication</p> <p>Conflict management and negotiations:</p> <p>Strategies and concepts of action, negotiation styles, rhetoric of negotiation, difficult negotiation situations, conflict prevention, conflict signals, methods/models of conflict management, capacity for compromise and critical ability</p>
Semester / ECTS	Semester 2 / 6 ECTS

Module No./Code	LS-PRA02-LS
Module name	Process Technology and Food Chemical Processes
Module contents	<p>Food process engineering in the company</p> <ul style="list-style-type: none"> • Specific operations of the manufacturing process (basic working techniques) • Knowledge of conditions of mass transfer processes in the production/processing of food • Critical examination of technical conditions (processes) in the practice company and submission of proposals for optimization <p>Food chemical processes in the company</p> <ul style="list-style-type: none"> • Knowledge of quality-related ingredients of produced/processed food in the company and possible influencing factors • Critical examination of raw materials/goods selection • Critical examination of technological processes and their influence on food ingredients • Planning processes to ensure product quality, and prepare drafts for management and control
Semester / ECTS	Semester 2 / 6 ECTS

Module No./Code	7LS-LMI01-LS
Module name	Food Microbiology
Module contents	<p>Food poisoning (characteristics, occurrence, course of disease, preventive measures, detection):</p> <p>Enterobacteriaceae, vibrionaceae, listeria monocytogenes, staphylococcus aureus, campylobacter spp., bacterial spore-formers, microbial toxins, mycotoxin-forming fungi, viruses, bovine spongiform encephalopathy, parasites, etc.</p> <p>Infection protection law</p> <p>Theory and practical implementation of microbiological analyses and tests:</p> <p>Handling of biological substances, basic techniques of the microbial approach, microscopy, production of a bacterial dilution series, cast plate method, detection of bacterial metabolic performance, basic principles of quantitative and qualitative microbiological diagnostics, sample preparation, test standardization and test validation, rapid test systems</p>
Semester / ECTS	Semester 3 / 5 ECTS

Module No./Code	7LS-TWP01-LS
Module name	Technology and Product Knowledge of Plant-based Foods
Module contents	<p>Introduction and relevant definitions</p> <p>Grain foods</p> <p>Technological foundations and product information, grain flour products, including peeling and flaking processes, production of bread and bread rolls, fine bakery products, pasta, extraction and processing of starch</p> <p>Fruit and vegetable foods</p> <p>Technological foundations and product information, canned fruit and vegetables, juices, marmalade, jam, jelly</p> <p>Sugar, confectionery, honey and syrup</p> <p>Technological foundations and product information, extraction of sugar from sugar beet and sugar cane, production of selected confectionery products, production of syrup and honey</p> <p>Coffee, tea, cocoa</p> <p>Technological foundations and product information, production of coffee, tea and cocoa, including relevant products</p> <p>Beverage technology</p> <p>Technological foundations and product information, water as food, mineral water, lemonades, fizzy, fruit juice drinks, malt production, beer production, wine production, sparkling wine production, spirits</p>
Semester / ECTS	Semester 3 / 7 ECTS

Module No./Code	LS-EDV01-LS
Module name	Foundations of Business Informatics
Module contents	<p>Introduction and technological foundations</p> <p>Terms, nature and history, computer science, business informatics and IT, data, information, knowledge, coding, basic knowledge hardware, software, data communication and networks (Internet, cloud computing)</p> <p>Business information systems</p> <ul style="list-style-type: none"> • Typology, architecture and introduction of IS • ERP systems (basics, use in the food industry, case studies) • Overview of SCM systems (including e-business, EDI) and CRM systems (structure, function, objectives) • MIS & management support systems (Data Warehouse, OLAP, BI, KDD, Data Mining, Big Data) • Information security and data protection in the operational and social environment <p>Business process and data modelling, databases</p> <p>IS architecture, business process modeling, data view, data modeling (ERM), database models, relational algebra, SQL and data queries</p>
Semester / ECTS	Semester 3 / 5 ECTS

Module No./Code	LS-ENG01-LS
Module name	English
Module contents	<p>Topics:</p> <p>A career in management, sectors of economy/company organization, making contact in a business context, company presentations, product presentations</p> <p>Vocabulary of natural science and statistics, basic vocabulary of microbiology, food chemistry and food technology, foods, food safety, risk assessment, quality management, human biology</p> <p>Skills:</p> <p>Business communication, business correspondence, enquiries, quotations, orders, presenting</p> <p>Oral and written reports, reminders and complaints, describing graphs and statistics, discussions</p> <p>Grammar:</p> <p>Review of relevant grammar topics (tenses, passive, question tags, reported speech, conditional clauses, modal verbs, gerund and infinitive etc.)</p>
Semester / ECTS	Semester 3 und 4 / 7 ECTS

Module No./Code	LS-QLA01-LS
Module name	Quality Control and Food Analytics
Module contents	<p>Foundations of food analytics:</p> <p>Requirements, sampling and sample preparation, measurement and evaluation including error analysis, laboratory work (laboratory safety, etc.), methods in food analytics - theoretical principles and practical implementation, analytical principles, analytical technology - instrument design, functional principle and competent handling</p> <p>Analysis of ingredients of selected food groups:</p> <p>Chromatographic methods, electrophoretic methods, enzymatic methods, wet chemical methods (titrations, gravimetry, etc.), automated methods</p> <p>Practical execution of food analyses</p>
Semester / ECTS	Semester 3 und 4 / 7 ECTS

Module No./Code	LS-PRA03-LS
Module name	Technological and Microbiological Processes, Food Analytics
Module contents	<p>Technological processes in the company</p> <ul style="list-style-type: none"> • Classification of technological food production processes • Critical examination of the technical-technological processes in the practice company and submission of proposals for optimization <p>Microbiological processes in the company</p> <ul style="list-style-type: none"> • Classification of desired microorganisms in food production and spoilage organisms in the company • Optimization of manufacturing processes to minimize the growth of undesirable microorganisms • Examination of the germ content of the used raw materials and finished products in the individual processing stages <p>Analytical processes as part of quality control and product development</p> <ul style="list-style-type: none"> • Preparation and optimization of sampling plans • Sampling and preparation of samples • Evaluation of the selected analytical methods in the company • Interpretation of test results
Semester / ECTS	Semester 3 / 6 ECTS

Module No./Code	LS-TWT01-LS
Module name	Technology and Product Information of Foods of Animal Origin
Module contents	<p>Introduction and relevant definitions</p> <p>Production and processing of meat</p> <p>Technological foundations and product information, selected technological methods of meat production and processing; technological methods of scalded sausage production: production of cooked sausage; production of raw sausage; production of cured products and specialties; production of canned meat</p> <p>Extraction, handling and processing of fish and other marine animals</p> <p>Technological foundations and product information, fishing and fresh fish processing; the processing of fish, crabs and mussels</p> <p>Production, handling and processing of eggs</p> <p>Technological foundations and product information, production, packaging, storage and distribution of eggs and egg products</p>
Semester / ECTS	Semester 4 / 6 ECTS

Module No./Code	LS-PLH01-LS
Module name	Process and Food Hygiene
Module contents	<p>General requirements:</p> <p>EU regulations (basic regulation, hygiene package, labelling law, etc.), hygiene standards (Codex Alimentarius, DIN, ISO, CEN), standards (IFS, BRC, QS, KAT, GMP)</p> <p>Hygiene management:</p> <p>Requirements for buildings, rooms and technology, requirements for personnel, general requirements for self-checks, special requirements for process hygiene</p> <p>HACCP:</p> <p>Basic terminology and definitions, legal regulations, biological risks, chemical risks, physical risks, foreign matter management, risk management, risk analysis, risk assessment, control points and critical control points, process control, monitoring and HACCP review, special case studies</p> <p>Special hygiene using the example of kitchen hygiene:</p> <p>Special features of individual food items, general conditions, rules for industrial hygiene, rules for personal hygiene, rules for process hygiene, sources and chains of contamination</p>
Semester / ECTS	Semester 4 / 6 ECTS

Module No./Code	LS-BEG01-LS
Module name	Consumer commodities
Module contents	<p>Consumer commodities, incl. food commodities</p> <p>Terminology (definition, legal bases, systematics, product information, migration, hygienic design, hygiene-relevant properties), plastics, elastomers, rubber, coatings, paper, cardboard, paperboard, commodities made of metal, ceramics, glass, enamel commodities, textile commodities, furs and leather</p> <p>Risk evaluation of various selected ingredients of the described products, examples of the corresponding analysis</p> <p>General packaging principles</p> <p>Packaging methods</p> <p>active und smart packaging, value added packaging, vacuum packaging, modified atmosphere, aseptic packaging, nanotechnology</p>
Semester / ECTS	Semester 4 / 5 ECTS

Module No./Code	LS-PRA04-LS
Module name	Technological Processes, Hygiene, Food Analytics
Module contents	<p>Process and food hygiene in the company</p> <ul style="list-style-type: none"> • Knowledge of relevant food hygiene processes • Knowledge of relevant instruments of hygiene management in the company and participation in individual forms • Critical examination of the conditions in the practice company and submission of proposals for optimization • HACCP in the company • Planning of hygiene-related processes and preparing drafts for control and monitoring <p>Food analytics in the company</p> <ul style="list-style-type: none"> • Getting to know and carrying out analytical test methods in laboratories of the university or, if necessary, in external laboratories • Evaluation of test results and derivation of measures • Analysis of target values and threshold values and their implementation and consequences • Critical examination of the conditions in the practice company and submission of proposals for optimization <p>Technological processes in the company</p> <ul style="list-style-type: none"> • Classification of technological food production processes • Critical examination of the technical-technological processes in the practice company and submission of proposals for optimization
Semester / ECTS	Semester 4 / 6 ECTS

Module No./Code	LS-QMA01-LS
Module name	Quality Management
Module contents	<p>Foundations</p> <p>Quality, quality dimensions and requirements, quality management, Total Quality Management, Kaizen</p> <p>Methods</p> <p>Process management, process descriptions, problem analysis, complaint management, CIP, company suggestion scheme, PDCA, FMEA, error prevention, risk management, crisis management, benchmarking, quality officers, quality circles, audit, certification, other methods of quality improvement</p> <p>QM concepts in the food industry</p> <p>DIN EN ISO 9000 et seqq, ISO 22000, IFS (IFS Food, IFS Cash & Carry, IFS Logistics, IFS Broker), BRC, Six Sigma, hygiene concepts, HACCP, Eco Certificate, religious food laws (halal, kosher), GMP, Globalgap, criteria and standards in individual areas of the food industry, implementation and development of QM systems</p>
Semester / ECTS	Semester 5 / 7 ECTS

Module No./Code	LS-RLR01-LS
Module name	Law and Food Law
Module contents	<p>Food law systematics</p> <p>Overview of the legal system, Codex Alimentarius, sub-statutory regulations, structure of authorities and institutions in Germany and Europe, organization of consumer health protection, control regulation</p> <p>Requirements for the production and marketing of food and animal feed</p> <p>Definitions: Food, consumer goods, animal feed, cosmetics, pharmaceuticals, tobacco products, medical devices, consumer expectations, marketing; principles of food law: principle of misuse, marketing bans and marketability</p> <p>Administrative offences law</p> <p>Labelling law and special law</p> <p>e.g. Prepackage ordinance, calibration law, food information ordinance, health claims VO, eco and genetic engineering labelling, novel food, additive law, assessment principles of various product groups</p>
Semester / ECTS	Semester 5 / 7 ECTS

Module No./Code	LS-PMS01-LS
Module name	Project Management and Student Research Project
Module contents	<p>Foundations of Project management</p> <ul style="list-style-type: none"> • Project management tasks • Definition of project objectives • Project scheduling • Project teams and project manager • Qualitative and quantitative personnel planning • Project controlling <p>Project paper on a subject-relevant topic with an introduction to the respective topic by a specialist lecturer.</p> <p>Project presentation</p>
Semester / ECTS	Semester 5 und 6 / 6 ECTS

Module No./Code	LS-EW101-LS
Module name	Nutrition Science
Module contents	<p>Nutrition-physiological foundations Structure and characteristics of nutrients; digestion, absorption and intermediate metabolism of nutrients; function, need, deficiency and excessive intake of nutrients; energy requirements and energy metabolism</p> <p>Applied human nutrition Determination of nutritional status and nutrient intake; derivation of nutrient recommendations; requirements for a healthy diet; nutrition in different phases of life; nutrition of different population groups; alternative diets; importance and prevention of diet-related diseases</p> <p>Food-scientific aspects Nutrition-physiological significance of various food groups; functional food; food supplements</p> <p>Sustainability and nutrition</p>
Semester / ECTS	Semester 5 / 6 ECTS

Module No./Code	LS-TOX01-LS
Module name	Food Toxicology
Module contents	<p>Foundations of Toxicology Toxicokinetics (absorption, distribution, biotransformation, excretion), toxicodynamics, toxicity testing, determination of limit values, factors influencing toxicity, mechanism of carcinogenesis, principles of poisoning treatment</p> <p>Toxicologically relevant food ingredients, residues and contaminants (occurrence, structure, formation, metabolism, removal, etc.)</p> <p>Microbial toxins, algal toxins, prions, radionuclides, processing induced toxins, heavy metals, nitrate and nitrite, organic contaminants (PAH, dioxins, etc.), pesticides, veterinary drugs, performance enhancers and fattening aids, preservatives, dyes and sweeteners, antioxidants, ethanol, biogenic amines, vitamins, trace elements and minerals, etc.</p>
Semester / ECTS	Semester 5 / 6 ECTS

Module No./Code	LS-PRA05-LS
Module name	Quality Management and Food Law
Module contents	<p>QM in the company</p> <ul style="list-style-type: none"> • Knowledge of quality-related processes • Understanding quality development as a strategic success factor for companies • Knowledge of relevant QM instruments in the company and involvement in individual forms • Critical examination of the conditions in the practice company and submission of proposals for optimization • Selection of instruments for quality improvement and their application in a networked manner for the purpose of long-term, stable company development • Planning of quality-related processes and preparation of drafts for management and control <p>Law and food law</p> <ul style="list-style-type: none"> • Knowledge of food law requirements • Implementation of food law requirements • Food labelling and food information • Critical examination of the conditions in the practice company and submission of proposals for optimization
Semester / ECTS	Semester 5 / 6 ECTS

Module No./Code	LS-MAL01-LS
Module name	Management in the Food Industry
Module contents	<p>Foundations of innovation management for companies in the food industry</p> <p>Vision, mission and innovation strategy, product life cycle and portfolio models, innovation processes, open innovation</p> <p>Foundations of product development</p> <p>Importance of product development for companies in the food industry, company organization from the perspective of product development and relevant interfaces, important competencies of product developers, application of methods in the individual phases of product development, identifying and using internal and external sources of idea generation, idea collection and evaluation, technical product development (development of product formulations, functional analysis, root cause analysis, scale-up process etc.)</p> <p>Competition analysis</p> <p>Intellectual property management</p> <p>Current trends in the food industry</p>
Semester / ECTS	Semester 6 / 5 ECTS

Module No./Code	LS-NAM01-LS
Module name	Sustainability Management
Module contents	<p>Sustainability in the company Framework conditions, approaches, elements of a sustainability concept, sustainable product design, ecological assessment, sustainability indicators</p> <p>Sustainability in food companies Eco directives, sustainable packaging, cultivation associations, carbon/water footprint</p> <p>Environmental management</p> <p>Sustainable cleaning and disinfection</p> <ul style="list-style-type: none"> • Terminology (definition, legal bases, systematics) • Chemical and physical foundations of R&D in dependence on the specifics of the different areas of food processing • Chemistry of detergents and disinfectants, trends, selection criteria, lists of disinfectants, disinfection methods, microscopic-chemical identification of contamination and selection of the most efficient detergents • Foundations of cleaning management <p>Cleaning and disinfection practice Practicing various disinfection methods (spraying, foaming, atomizing, etc.) with germ carrier tests</p>
Semester / ECTS	Semester 6 / 6 ECTS

Module No./Code	LS-AUD01-LS
Module name	Auditing
Module contents	DIN EN ISO 19011 and relevant sections of DIN EN ISO/IEC 17021 Conducting an audit Planning, conducting, preparation of checklists, definition and implementation of corrective measures, reporting, communication
Semester / ECTS	Semester 6 / 5 ECTS

Module No./Code	LS-RKU01-LS
Module name	Comodity Science
Module contents	<p>Foundations of plant production Pedology, plant physiology, plant diseases, plant breeding, cultivation and harvest, yield and quality assurance</p> <p>Foundations of animal production The animal organism, animal breeding, animal nutrition, animal feeding, feed and feed evaluation, livestock farming and hygiene, raw milk production, production of beef, pork, poultry and lamb, production of other animal raw materials</p>
Semester / ECTS	Semester 6 / 5 ECTS

Module No./Code	LS-BAA01-LS
Module name	Bachelor Thesis
Module contents	<p>Writing of the thesis</p> <ul style="list-style-type: none"> • Development of a concept • Description of the structure • Literature review and analytical work • Independent compilation of the thesis <p>Defense of the thesis</p> <ul style="list-style-type: none"> • Presentation of results • Scientific and professional discussion
Semester / ECTS	Semester 6 / 12 ECTS