Syllabus

Course Description

Course Title	Physics and Computer Science
Course Code	40453
Course Title Additional	
Scientific-Disciplinary Sector	
Language	German
Degree Course	Bachelor in Food and Enogastronomy Sciences
Other Degree Courses (Loaned)	
Lecturers	Prof. Dr. Anton Dignös, Anton.Dignoes@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/20695 Prof. Michele Larcher, Michele.Larcher@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/33885 Prof. Dr. Niko Stephan Münzenrieder, Niko.Muenzenrieder@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/42095
Teaching Assistant	
Semester	Second semester
Course Year/s	1st
CP	6
Teaching Hours	38
Lab Hours	22
Individual Study Hours	90
Planned Office Hours	18
Contents Summary	General physics and fluid physics for the Food industry (3 credits DE): Introduction to general physical concepts, unit systems and

	coordinate systems; Overview of classical mechanics focusing on kinematics and dynamics; Behaviour of fluids and gases including their density, viscosity, and flow; Applications of non-Newtonian fluid mechanics for the food industry. Applied computer science (3 credits DE): Computer fundamentals (information and data, information representation and processing, hardware, operating system, networking); Spreadsheets (basics, numerical and visual summaries, advanced functions) Programming (introduction, conditional statements, loops).
Course Topics	General physics and fluid physics for the Food industry: This is a basic course on the fundamental of physics. The course aims to give the attendants a basic scientific understanding on classical mechanics, and fluid dynamics. Applied computer science: The course aims at teaching the basics concepts of informatics and providing students with a scientific approach for problem solving. The course has the following objectives: (a) provide students with the basic notions of computers (software and hardware), application programs, networks and internet; (b) provide them with the necessary knowledge to manipulate and analyze data using spreadsheets; (c) provide them with a basic understanding of algorithmically thinking and programming.
Keywords	physics, fluid physics, computer science
Recommended Prerequisites	Basic knowledge of mathematics
Propaedeutic Courses	None
Teaching Format	Frontal lectures, exercises and tasks.
Mandatory Attendance	No
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding: Upon completion of their studies, graduates with a bachelor's degree in Food and Enogastronomy Sciences will have acquired a solid foundation of scientific knowledge in disciplines such as

	chemistry, physics, biology, mathematics, computer science, and law, specifically applied to the food and gastronomic sector. They will gain technological skills for managing production and transformation processes, along with an integrated view of the quality, safety, and sustainability of food supply chains and systems. In addition, graduates will understand the principles related to waste reduction, resource optimization, and the reconciliation of economics and ethics, which are central elements for addressing the modern challenges of the agri-food system. The knowledge and understanding skills mentioned above are acquired through participation in lectures, practical exercises, seminars, and through guided personal study and individual study as provided by the activated educational activities. The verification of the achievement of learning outcomes is mainly carried out through exams and any interim tests. The tests may be written and/or oral, and may also consist of reports and oral presentations of projects or seminars. Ability to apply knowledge and understanding: The educational activities are designed to strengthen the autonomy of judgment and the ability to make decisions in complex contexts, as well as to develop communication skills and the ability to work in multidisciplinary and international teams. At the end of the program, graduates will be able to independently apply their knowledge in professional contexts, promoting innovative and sustainable solutions for the challenges of the agri-food and gastronomic system. The achievement of the ability to apply knowledge is accomplished through critical reflection on the texts proposed for individual study, stimulated by classroom activities, the study of research and application cases presented by the professors, the performance of practical laboratory exercises, fieldwork, bibliographic research, the completion of individual and/or group projects included in the core and elective courses of the curriculum, as well as during internships and the preparation of the final exam. The assessments, carried out through written and/or oral exams, reports, and exercises, involve the completion of specific tasks in which the student demonstrates mastery of tools, methodologies, and critical autonomy. During internships, the assessment is

	conducted through the presentation of a report by the student to the supervising professor. Making judgements: Express independent judgments regarding innovative techniques for the transformation and enhancement of food and gastronomic productions, evaluating the risks and opportunities associated with the introduction of new technologies or business models, both locally and internationally. Communication skills: Communicate effectively and appropriately with both technical and non-technical interlocutors, including professionals in the food and gastronomic sector, public and private institutions, and the general public. This includes the ability to adapt the communication style based on the audience, using the specific technical language of the food and gastronomic sector when necessary. Present and discuss the results of their analyses and research in both written and oral form, using technological and multimedia tools. Graduates will be able to draft technical reports, research papers, and scientific documents, as well as present their results clearly and structured, for example during conferences, seminars, or business meetings. Actively participate in discussions and group work in multidisciplinary and international contexts, demonstrating active listening, negotiation, and collaboration skills. Practical experiences and internships will provide students with the abilities to work effectively in teams and contribute to solving complex problems in the sector. Use the three languages of instruction of the course (Italian, German, and English) fluently and confidently, both for written and oral communication. Thanks to the trilingual approach of the Free University of Bozen-Bolzano, graduates will be able to face international work contexts, participate in global networks, and contribute to the development of international cooperation projects to address the challenges of the food and gastronomic sector. Learning skills: At the end of the degree program, graduates will have developed strong learning skills, essential for successfully continuing academic

	studies and entering the workforce. In particular, they will be able to: Learn autonomously and continuously, keeping up to date with scientific and technological advancements in the food and gastronomic sector. Graduates will have acquired study methods and research tools that will allow them to independently update their skills, critically interpreting new knowledge. Effectively manage the learning of complex concepts by integrating the various scientific and technical disciplines covered in the degree program, such as chemistry, biology, food technologies, economics, and law. They will be able to identify the most relevant sources, understand and apply new methodologies, and adapt to sector developments. Develop collaborative learning strategies, thanks to the experience gained through group work, internships, and laboratory activities. Graduates will be able to share their knowledge and learn from others, demonstrating adaptability and teamwork skills. Continue their studies independently in Master's degree programs (such as the LM-70 class, Food Science and Technology, currently offered at the same university) or in other related fields, using the skills and methods acquired during the bachelor's degree to tackle new learning challenges, even in high-level academic and professional contexts.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	General physics and fluid physics for the Food industry: Formative assessment: In-class exercises as part of course-accompanying exercises (ILOs assessed 1-5) Summative assessment: Written exam of 2 hours (ILOs assessed 1-5) Applied computer science: The assessment is based on a written final exam and assignments performed in teams. The final grade is the average of the grades obtained in the two modules.
Evaluation Criteria	General physics and fluid physics for the Food industry:

	The written exam consists in two parts: a first part with a series of qualitative questions based on the understanding of the covered topics, as well as a second part consisting of several numerical problems to be solved, which cover aspects of the various topics covered. Judged will be: • the correctness of the approach and the mathematical steps of the solution, the calculation of numerical results and the correct use of physical quantities and units; • the correctness of the provided answers, as well as the terminology used. Every problem has an individual score. The final score is the sum of the scores associated by each exercise. To pass the exam the final score must be greater than or equal to 18. If the final score is greater than 30, a "with honors" is awarded. The student can have access to the exam with a pen, pencil, dictionary, and a non-programmable calculator. Constants are provided to the students along with the text of the exam. All students are also allowed to bring a single A4 sheet with handwritten notes to the exam. Applied computer science: The assessment is based on • Assignments (30%) • Written final exam (70%) To pass the course, both parts are mandatory with a combined pass grade, and the written exam has to be passed. In the assignments students have to solve exercises that are assessed according to correctness and clarity. In the written final exam students have to answer questions on topics taught in the course. The written final exam is assessed according to correctness of answers.
Required Readings	General physics and fluid physics for the Food industry: Blackboard / lecture slides Applied computer science: Lecture notes
Supplementary Readings	General physics and fluid physics for the Food industry: • Physik, Douglas C. Giancoli, Pearson Studium, Pearson

	Deutschland GmbH, 3. Auflage, 2010 (basierend auf 3. Auflage “Physics for scientists and engineers with modern physics”, 2000). Applied computer science: • Heinz Peter Gumm und Manfred Sommer: „Einführung in die Informatik” . 10. vollständig überarb. Aufl. 2012. De Gruyter Studium. • Dirk Ertner: „Spread Cheat : Praktische Anwendungsfälle und Tipps zur Tabellenkalkulation “. 1. Aufl. 2018. Springer Berlin Heidelberg.
Further Information	
Sustainable Development Goals (SDGs)	Quality education

Course Module

Course Constituent Title	General Physics and Fluid Physics for the Food Industry
Course Code	40453A
Scientific-Disciplinary Sector	PHYS-03/A
Language	German
Lecturers	Prof. Michele Larcher, Michele.Larcher@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/33885 Prof. Dr. Niko Stephan Münzenrieder, Niko.Muenzenrieder@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/42095
Teaching Assistant	
Semester	Second semester
CP	3
Responsible Lecturer	
Teaching Hours	20
Lab Hours	10
Individual Study Hours	45

Planned Office Hours	9
Contents Summary	Introduction to general physical concepts, unit systems and coordinate systems; Overview of classical mechanics focusing on kinematics and dynamics; Behaviour of fluids and gases including their density, viscosity, and flow; Applications of non-Newtonian fluid mechanics for the food industry.
Course Topics	
Teaching Format	Frontal lectures, exercises and tasks.
Required Readings	Blackboard / lecture slides Physik, Douglas C. Giancoli, Pearson Studium, Pearson Deutschland GmbH, 3. Auflage, 2010 (based on 3rd edition "Physics for scientists and engineers with modern physics", 2000).
Supplementary Readings	

Course Module

Course Constituent Title	Applied Computer Science
Course Code	40453B
Scientific-Disciplinary Sector	INFO-01/A
Language	German
Lecturers	Prof. Dr. Anton Dignös, Anton.Dignoes@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/20695
Teaching Assistant	
Semester	Second semester
CP	3
Responsible Lecturer	
Teaching Hours	18
Lab Hours	12
Individual Study Hours	45
Planned Office Hours	9

Contents Summary	Computer fundamentals (information and data, information representation and processing, hardware, operating system, networking); Spreadsheets (basics, numerical and visual summaries, advanced functions) Programming (introduction, conditional statements, loops).
Course Topics	The course aims at teaching the basics concepts of informatics and providing students with a scientific approach for problem solving. The course has the following objectives: (a) provide students with the basic notions of computers (software and hardware), application programs, networks and internet; (b) provide them with the necessary knowledge to manipulate and analyze data using spreadsheets; (c) provide them with a basic understanding of algorithmically thinking and programming.
Teaching Format	Frontal lectures, exercises and tasks.
Required Readings	Lecture notes
Supplementary Readings	• Heinz Peter Gumm und Manfred Sommer: „Einführung in die Informatik" . 10. vollständig überarb. Aufl. 2012. De Gruyter Studium. • Dirk Ertner: „Spread Cheat : Praktische Anwendungsfälle und Tipps zur Tabellenkalkulation ". 1. Aufl. 2018. Springer Berlin Heidelberg.