Syllabus

Course Description

Course Title	Innovation and authenticity in food processing
Course Code	44760
Course Title Additional	
Scientific-Disciplinary Sector	
Language	English
Degree Course	Master in Food Sciences for Innovation and Authenticity
Other Degree Courses (Loaned)	
Lecturers	Prof. Sergio Angeli, Sergio.Angeli@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/27643 Prof. Giovanna Ferrentino, Giovanna.Ferrentino@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/36045 Dr. Juliane Elisabeth Kleiner, JulianeElisabeth.Kleiner@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/48865
Teaching Assistant	Dott. Abdessamie Kellil
Semester	First semester
Course Year/s	1st
CP	12
Teaching Hours	72
Lab Hours	48
Individual Study Hours	180
Planned Office Hours	36
Contents Summary	Insects as Novel Food: This course aims to provide an overview and concepts related to the topic of novel foods (food that was not consumed to a

	significant degree by humans in the EU prior to 15 May 1997), with particular emphasis on risk assessment and regulatory aspects in EU, insects and plants as novel foods, new substances, new techniques, new sources as novel foods, insect consumption around the world, actual and future trends of novel foods in Europe. At the end of the course, students should be able to: 1) understand the concept of novel foods; 2) insights on novel foods risk assessment; 3) explain health, economic and environment impacts of insect consumption as an alternative food source; 4) future trends in novel foods and possible impacts. Innovative Food Technologies: The course aims to provide knowledge and understanding of the basic principles, effects and main applications of the innovative technologies in the field of food industry. Moreover, the course will provide information on the qualitative aspects and stability of food products obtained using the innovative technologies. The followed approach is both descriptive and quantitative. The description of the physical, chemical and / or biological changes induced to the food during a treatment is intended to assess the impact that the process has on the quality of the final products. The quantitative approach provides the tools for choosing the innovative process that tends to minimize the deleterious effects on food. For some of the proposed innovative processes, laboratory activities are planned with the aim of showing the plants and the effects on the treated food.
Course Topics	Insects as Novel Food: The course will cover the following topics: 1. The concept of 'Novel Foods' in EU legislation. 2. Significance and importance of insects as novel foods. 3. Basic knowledge of entomology and edible insects 4. Insect species is authorised as novel foods: Acheta domesticus, Gryllodes sigillatus, Locusta migratoria, Schistocerca gregaria, Tenebrio molitor, Alphitobius diaperinus, Zophobas atratus, Galleria mellonella, Achroia grisella, Bombyx mori. 5. Potential new insect species under evaluations as novel foods. 6. Insects as a new source of bioactive compounds.

	7. Source and production of novel food, practical considerations. 8. Actual and future trend of insects as novel food in European countries. 9. Novel foods from animals, cell or tissue cultures. 10. Novel foods from plants microorganisms, fungi, algae. 11. Novel foods through new production processes. 12. Novel Foods through new or modified molecular structure. 13. EFSA responsibility for risk assessment. 14. Health and legislation aspects. 15. Lab activity: Introduction to insect morphology, physiology and classification. 16. Lab activity: Extraction, physicochemical characterization of nutrients and bioactive molecules in edible insects. Innovative Food Technologies: 1. Fundamentals Definitions and objectives of innovative technologies in food processing Application of mass and energy balances to food processes 2. Extraction and Recovery Innovative technologies for the extraction of food components 3. Stabilization and Preservation Innovative technologies for the pasteurization of food products 4. Drying and Dehydration Innovative technologies for the drying of food products
Keywords	Innovative technologies, Food Quality, Sustainable Processes, Edible Insects; Novel Foods; Food Safety and EU Legislation
Recommended Prerequisites	Knowledge on mathematic and physic.
Propaedeutic Courses	None
Teaching Format	The course combines lectures with laboratory sessions and possible didactic excursions. During the lectures, the Professor presents the theoretical aspects using PowerPoint slides, scientific publications, articles from the food sector, multimedia resources, case studies, discussions, exercises, and practical examples. These interactive activities are intended to reinforce students' understanding of the topics covered.

	The laboratory sessions and didactic excursions are supervised by the Professor and the Teaching Assistants. They provide students with hands-on experience and allow selected topics introduced during the lectures to be explored in greater depth through practical demonstrations, experiments, and field observations. Students may also be asked to prepare and deliver short presentations to the class on selected topics.
Mandatory Attendance	No
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding: Deep understanding of the technological, microbiological, biochemical, chemical, and physical principles underlying food transformation processes and responsible for food product degradation, ensuring their stability and prolonging their shelf life. These knowledge areas will be developed through an educational program that integrates theoretical teaching activities with practical activities, such as laboratory exercises, computer simulations, simulations of food processes using pilot plants, and company visits. Ability to apply knowledge and understanding: Ability to manage the technological, microbiological, biochemical, chemical, and physical processes that drive food transformation and the main issues related to the stability and shelf life of food products. Ability to plan and develop analytical techniques, innovative products, and processes using a multidisciplinary approach, with particular attention to local food productions. Making judgements: Independent judgement is developed through a training programme designed to stimulate critical analysis in students. This includes the use of case studies, simulations using spreadsheets and videos, the reading and critical discussion of scientific articles, as well as specialist seminars held by experts in the food sector. The assessment of the independent judgement acquired by students is entrusted to the individual teachers responsible for the training activities, who will assess it through oral and/or written reports on specific topics and/or through exams.

	Communication skills: Use of the English language, both written and spoken, at a B2 level, with a command of technical and scientific vocabulary related to food science. Structure and draft scientific and technical documentation describing project activities. Interact and collaborate in the design and development of products and processes with peers and industry experts. Learning skills: The degree course provides graduates with the cognitive skills, logical tools and familiarity with new information technologies necessary to ensure continuous updating of knowledge, both in their specific professional field and in the field of scientific research.
Specific Educational Objectives and Learning Outcomes (additional info.)	None.
Assessment	The overall mark of the course will be calculated as the average of the marks of the two modules. The assessment of the module Insects as Novel Food consists of two parts: Written exam with multiple-choice and review questions (if possible) (85%) Presentation on a given topic (15%) The assessment of the module Innovative Food Technologies consists of two parts: Written exam with open questions (70%) A project report developed during the laboratory and class activities (30%)
Evaluation Criteria	Assessment will be based on the following criteria: - Written exams: accuracy and clarity of answers; appropriate use of language; ability to summarize, connect different topics, and demonstrate critical and independent thinking. - Project work: accuracy of content, clarity of presentation, ability to summarize, and ability to establish connections with related topics.

	- Seminar presentations: accuracy of content, clarity of presentation, critical thinking, and ability to answer questions.
Required Readings	Power Point presentations and additional teaching materials will be made available in the Microsoft-Teams group of the course and/or in the course reserve collection database.
Supplementary Readings	For Insects as Novel Food: Grasso S and Bordiga M (*Eds*). 2023. *Edible insects processing for food and feed from startups to mass production*. CRC Press. Sogari G, Mora C, and Menozzi D (*Eds.*). 2019. *Edible insects in the food sector: methods, current applications and perspectives*. Springer. van Huis A and Tomberlin JK. 2017. *Insects as food and feed: from production to consumption*. Wageningen Academic Publishers. FAO. 2013. *Edible insects: future prospects for food and feed security.* Journal of Insects as Food and Feed Regulation (EU) 2015/2283 of the European Parliament and of the Council of 25 November 2015 on novel foods, amending Regulation (EU) No 1169/2011 of the European Parliament and of the Council and repealing Regulation (EC) No 258/97 of the European Parliament and of the Council and Commission Regulation (EC) No 1852/2001 Guidance on the preparation and presentation of an application for authorisation of anovel food in the context of Regulation (EU) 2015/2283. EFSA Journal 2016;14(11):4594, 24 pp.doi:10.2903/j.efsa.2016.4594 Ermolaos Ververis et. al. Novel foods in the European Union: Scientific requirements and challenges of the risk assessment process by the European Food Safety Authority. Food Research International 137, Nov. 2020, 109515 https://www.sciencedirect.com/science/article/pii/S0963996920305408 For Innovative Food Technologies: Emerging Technologies for Food Processing. Edited by:Da-Wen Sun Supercritical Fluid Extraction: Principles and Practice. Edited by: Mark A. McHugh, Val J. Krukonis

	Innovative Food Processing Technologies. Edited by: Kai Knoerzer and Kasiviswanathan Muthukumarappan.
Further Information	None.
Sustainable Development Goals (SDGs)	No poverty, Zero hunger, Good health and well-being, Life on land, Responsible consumption and production, Climate action, Industry, innovation and infrastructure

Course Module

Course Constituent Title	Insects as Novel Food
Course Code	44760A
Scientific-Disciplinary Sector	AGRI-05/A
Language	English
Lecturers	Prof. Sergio Angeli, Sergio.Angeli@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/27643 Dr. Juliane Elisabeth Kleiner, JulianeElisabeth.Kleiner@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/48865
Teaching Assistant	
Semester	First semester
CP	6
Responsible Lecturer	
Teaching Hours	36
Lab Hours	24
Individual Study Hours	90
Planned Office Hours	18
Contents Summary	This course aims to provide an overview and concepts related to the topic of novel foods (food that was not consumed to a significant degree by humans in the EU prior to 15 May 1997), with particular emphasis on risk assessment and regulatory aspects in EU, insects and plants as novel foods, new substances, new techniques, new sources as novel foods, insect consumption around the world, actual and future trends of novel foods in

	Europe. At the end of the course, students should be able to: 1) understand the concept of novel foods; 2) insights on novel foods risk assessment; 3) explain health, economic and environment impacts of insect consumption as an alternative food source; 4) future trends in novel foods and possible impacts.
Course Topics	The course will cover the following topics: 1. The concept of 'Novel Foods' in EU legislation. 2. Significance and importance of insects as novel foods. 3. Basic knowledge of entomology and edible insects 4. Insect species is authorised as novel foods: Acheta domesticus, Gryllodes sigillatus, Locusta migratoria, Schistocerca gregaria, Tenebrio molitor, Alphitobius diaperinus, Zophobas atratus, Galleria mellonella, Achroia grisella, Bombyx mori. 5. Potential new insect species under evaluations as novel foods. 6. Insects as a new source of bioactive compounds. 7. Source and production of novel food, practical considerations. 8. Actual and future trend of insects as novel food in European countries. 9. Novel foods from animals, cell or tissue cultures. 10. Novel foods from plants microorganisms, fungi, algae. 11. Novel foods through new production processes. 12. Novel Foods through new or modified molecular structure. 13. EFSA responsibility for risk assessment. 14. Health and legislation aspects. 15. Lab activity: Introduction to insect morphology, physiology and classification. 16. Lab activity: Extraction, physicochemical characterization of nutrients and bioactive molecules in edible insects.
Teaching Format	This is a lecture-lab course in which topics are presented by the professors and the teaching assistant. Practical parts, lab activities, and excursions are explained by the professors and the teaching assistant. Generally, Power Point presentations are available in the course reserve collection database of the Faculty one day after each single lecture. Additional material will be provided by the professors. Lecture attendance is strongly encouraged.

Required Readings	Teaching material in the course reserve collection and additional material provided by the professors, assigned scientific papers.
Supplementary Readings	Grasso S and Bordiga M. (*Eds*). 2023. *Edible insects processing for food and feed from startups to mass production*. CRC Press. Sogari G, Mora C, and Menozzi D (*Eds.*). 2019. *Edible insects in the food sector: methods, current applications and perspectives*. Springer. van Huis A and Tomberlin JK. 2017. *Insects as food and feed: from production to consumption*. Wageningen Academic Publishers. FAO. 2013. *Edible insects: future prospects for food and feed security.* Journal of Insects as Food and Feed Regulation (EU) 2015/2283 of the European Parliament and of the Council of 25 November 2015 on novel foods, amending Regulation (EU) No 1169/2011 of the European Parliament and of the Council and repealing Regulation (EC) No 258/97 of the European Parliament and of the Council and Commission Regulation (EC) No 1852/2001 Guidance on the preparation and presentation of an application for authorisation of anovel food in the context of Regulation (EU) 2015/2283. EFSA Journal 2016;14(11):4594, 24 pp.doi:10.2903/j.efsa.2016.4594 Ermolaos Ververis et. al. Novel foods in the European Union: Scientific requirements and challenges of the risk assessment process by the European Food Safety Authority. Food Research International 137, Nov. 2020, 109515 https://www.sciencedirect.com/science/article/pii/S0963996920305408

Course Module

Course Constituent Title	Innovative Food Technologies
Course Code	44760B
Scientific-Disciplinary Sector	AGRI-07/A
Language	English
Lecturers	Prof. Giovanna Ferrentino, Giovanna.Ferrentino@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/36045

Teaching Assistant	
Semester	First semester
CP	6
Responsible Lecturer	
Teaching Hours	36
Lab Hours	24
Individual Study Hours	90
Planned Office Hours	18
Contents Summary	The course aims to provide knowledge and understanding of the basic principles, effects and main applications of the innovative technologies in the field of food industry. Moreover, the course will provide information on the qualitative aspects and stability of food products obtained using the innovative technologies. The followed approach is both descriptive and quantitative. The description of the physical, chemical and / or biological changes induced to the food during a treatment is intended to assess the impact that the process has on the quality of the final products. The quantitative approach provides the tools for choosing the innovative process that tends to minimize the deleterious effects on food. For some of the proposed innovative processes, laboratory activities are planned with the aim of showing the plants and the effects on the treated food.
Course Topics	1. Fundamentals - Definitions and objectives of innovative technologies in food processing - Application of mass and energy balances to food processes 2. Extraction and Recovery - Innovative technologies for the extraction of food components 3. Stabilization and Preservation - Innovative technologies for the pasteurization of food products 4. Drying and Dehydration - Innovative technologies for the drying of food products
Teaching Format	The course combines frontal lectures with laboratory sessions. During lectures, theoretical aspects are presented and reinforced

	through exercises and practical examples. Teaching is supported by advanced methodologies, including case studies, and by the use of up-to-date tools such as PowerPoint slides, scientific publications, articles from the food sector, and multimedia resources (e.g., videos). Laboratory activities are designed to provide hands-on experience, allowing students to apply and consolidate the knowledge acquired during lectures through practical demonstrations and experiments.
Required Readings	• Slides, keynotes and scientific papers provided by the lecturers • Emerging Technologies for Food Processing. Edited by:Da-Wen Sun • Supercritical Fluid Extraction: Principles and Practice. Edited by: Mark A. McHugh, Val J. Krukonis • Innovative Food Processing Technologies. Edited by: Kai Knoerzer and Kasiviswanathan Muthukumarappan
Supplementary Readings	None.