

## Syllabus

### Course description

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| <b>Course title</b>      | Starter and Functional Microbes for Innovation, Authenticity and Healthy Status |
| <b>Course code</b>       | 44706   |
| <b>Scientific sector</b> | AGR/16 Agriculture Microbiology   |
| <b>Degree</b>            | Master in Food Sciences for Innovation and Authenticity                         |
| <b>Semester</b>          | 2nd   |
| <b>Year</b>              | I   |
| <b>Academic year</b>     | 2024/25   |
| <b>Credits</b>           | 12  |
| <b>Modular</b>           | Yes   |

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| <b>Total lecturing hours</b> | 72             |
| <b>Total lab hours</b>       | 48             |
| <b>Attendance</b>            | Not compulsory |

#### Specific educational objectives

This course provides insights concerning the selection and the use of microbial starters in food fermentation processes for making traditional and novel foods and beverages (Module 1) and the role of microorganisms in human gut as driven by diverse dietary habits (Module 2). In particular, the course shows how microbes are selected and tailored for specific fermentations (Module 1) and how the human gut microbiome interacts and is involved in the healthy status (Module 2).

The course consists of two modules, each one of 60 hours of frontal lectures and laboratory.

After defining the main criteria for selection microbial starters, Module 1 will provide a number of examples of using lactic acid bacteria and yeast for making fermented milks, cheeses, sourdough baked goods, fermented fruits and vegetables, and functional foods. After defining the large variety of microorganisms that colonize the human gut, Module 2 provides a number of insights on how the microbiome responds to different types of dietary habits and nutrients modulating the functionalities. The course has the educational objective to address the students to manage with the industrial applied biotechnology on fermentation processes and with some innovative view on the management and role of the human gut microbiome to prevent and to interfere with human healthy.

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| <b>Module 1</b>                 | The Natural Microbial Starters for Innovation and Authenticity  |
| <b>Lecturer</b>                 | Raffaella Di Cagno – raffaella.dicagno@unibz.it   |
| <b>Scientific sector of the</b> | AGR/16 Agriculture Microbiology   |
| <b>Teaching language</b>        | English   |
| <b>Office hours</b>             | Monday to Thursday by appointment   |
| <b>List of topics covered</b>   | <p>The course will cover the following topics:</p> <ul style="list-style-type: none"> <li>- Criteria and tools for selecting microbial starters</li> <li>- Type of natural and commercial starters</li> <li>- Metabolic networking of microbial starters as tailored for specific food attributes</li> <li>- Examples of uses of microbial starters in cheeses, baked goods, fermented fruits/vegetables and functional foods</li> <li>- The new frontiers for managing the food microbiomes</li> </ul> |
| <b>Teaching format</b>          | The course consists of lectures where the topics are presented by the professor. Course topics are presented at the blackboard and using electronic slides. Teaching material and additional materials are provided by the Professor at the beginning of each lectures.   |

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| <b>Module 2</b>                          | The Food – Human Axis for Driving the Gut Microbiome  |
| <b>Lecturer</b>                          | Marco Gobetti – marco.gobetti@unibz.it  |
| <b>Scientific sector of the lecturer</b> | AGR/16 Agriculture Microbiology   |
| <b>Teaching language</b>                 | English   |
| <b>Office hours</b>                      | Monday to Thursday by appointment   |
| <b>List of topics covered</b>            | <p>The course will cover the following topics:</p> <ul style="list-style-type: none"> <li>- Meta-omics approaches to unravel the gut microbiome</li> <li>- Role of the gut microbiome</li> <li>- Effects of the diet in modulating the functionality of the gut microbiome</li> <li>- Examples of cases of study showing the management of the gut microbiome</li> <li>- Future perspective to drive and assembly the gut microbiome</li> </ul> |
| <b>Teaching format</b>                   | The course consists of lectures where the topics are presented by the professor. Course topics are presented using power-point presentations. Teaching material and additional materials are provided by the Professor at the beginning of each lecture.  |

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| <b>Learning outcomes</b> | <p>Through the study and the application of the topics presented during lectures, students have to achieve the:</p> <ol style="list-style-type: none"> <li>1. knowledge and understanding of the fundamentals of selecting, preparing and using microbial starters for food fermentations;</li> </ol> |
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|  | <p>2. knowledge and understanding of the fundamentals of human gut microbial ecology and functionality</p> <p>3. capacity to project, manage and to solve food related processing for innovation and authenticity, and to assess the effect of dietary habits and nutrients on the assembly of the gut microbiome;</p> <p>3. development of a concept into a process and products;</p> <p>4. management of microbes in food processing and human gut;</p> <p>5. capacity of showing concepts achieved in the course.</p>        |
| <b>Assessment</b>  | <p>The assessment of the student preparation is through an oral exam. The oral assessment includes questions to assess the knowledge and understanding of the course topics and questions designed to assess the ability to transfer these skills to case studies and practical applications.</p> <p>Questions on practical applications also assess the ability of the student to apply the knowledge and understanding of the course topics, the ability to make judgments and finally, the student communication skills.</p> |
| <b>Assessment language</b>                                 | English   |
| <b>Evaluation criteria and criteria for awarding marks</b> | <p>Students are asked to attend the oral exam.</p> <p>It is relevant for the oral exam to: master the specific language (also with respect to teaching language); prove the understanding of the topics and learning skills; evaluate and establish relationships between topics; grow specific skills in critical thinking.</p>  |
| <b>Required readings</b>                                   | <p>The professor will provide the specific materials (e.g., articles, specific chapters from books) for each subject of the course. Lecture notes are strongly recommended as a study material.</p>   |