

| General Information   |  |
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| Academic subject      | Advanced Microbiological Methods (I.C. Biotechnologies for Food Quality) |
| Degree course         | Master programme: Food Science and Technology                            |
| ECTS credits          | 3  |
| Compulsory attendance | No   |
| Teaching language     | Italiano   |

| Subject teacher | Name Surname         | Mail address   | SSD    |
|-----------------|----------------------|--|--------|
|                 | <b>Maria Calasso</b> | <a href="mailto:maria.calasso@uniba.it">maria.calasso@uniba.it</a> | AGR/16 |

| ECTS credits details      |                 |                                  |
|---------------------------|-----------------|----------------------------------|
| Basic teaching activities | 2 ECTS Lectures | 1 ECTS Laboratory or field class |

| Class schedule |                    |
|----------------|--------------------|
| Period         | I semester         |
| Course year    | Second             |
| Type of class  | Lecture- workshops |

| Time management          |    |
|--------------------------|----|
| Hours                    | 75 |
| In-class study hours     | 30 |
| Out-of-class study hours | 45 |

| Academic calendar |                                   |
|-------------------|-----------------------------------|
| Class begins      | September 30 <sup>th</sup> , 2019 |
| Class ends        | January 17 <sup>th</sup> , 2020   |

| Syllabus                   |  |
|----------------------------|--|
| Prerequisites/requirements | Principles of biochemistry, food microbiology and genetics   |
| Expected learning outcomes | <p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Knowledge of the main advanced methods applied to monitor the main microbial groups involved in food production</li> </ul> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Knowledge of the main microbiological methods for identification, typing and in situ/ ex situ monitoring of starter, spoilage, and pathogen microorganisms in the food, to guarantee quality and safety during processes of transformation and conservation.</li> <li>○ Skill for management and control of traceability operations of food industries</li> </ul> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> <li>○ Correctly advising solutions to assess microbiological properties and quality of foods</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describing advanced microbiological methods and applications to monitor food quality</li> </ul> <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> <li>○ Updating the knowledge of advanced microbiological methods applied to monitor microbiological food quality</li> </ul> <p>The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification)</p> |
| Contents                   | <ul style="list-style-type: none"> <li>• Microbial starters for main food fermentations; spoilage and</li> </ul>   |

|                       |   |
|-----------------------|---|
|                       | <p>pathogen microorganisms</p> <ul style="list-style-type: none"> <li>• Culture-dependent techniques</li> <li>• Microbial identification by phenotypic methods</li> <li>• Microbial identification by genotypic methods</li> <li>• Nucleic Acid Extraction and Purification</li> <li>• Polymerase chain reaction</li> <li>• Electrophoresis</li> <li>• Genic amplification</li> <li>• Species Specific Identification</li> <li>• Sequencing of 16S rRNA Gene</li> <li>• Amplified Ribosomal DNA Restriction Analysis</li> <li>• PCR Restriction Analysis</li> <li>• Southern Blot</li> <li>• Fluorescent In Situ Hybridization</li> <li>• Microbial Typing</li> <li>• PFGE (Pulsed Field Gel Electrophoresis)</li> <li>• RAPD (Random Amplified Polymorphic DNA)</li> <li>• repPCR (Repetitive Element Sequence Based PCR)</li> <li>• Polyphasic Approach</li> <li>• Culture-independent techniques</li> <li>• Microbial community dynamics</li> <li>• PCR-DGGE (Polymerase Chain Reaction-Denaturing Gradient Gel Electrophoresis)</li> <li>• Real time PCR</li> <li>• Next generation sequencing</li> <li>• Metagenomics</li> <li>• Case studies</li> </ul> |
| <b>Course program</b> |   |
| Reference books       | <ul style="list-style-type: none"> <li>• Lecture notes and educational supplies provided during the course</li> <li>• Lecture notes and educational supplies will be provided by means of online platforms (i.e.: Edmodo)</li> <li>• Scientific reviews.</li> <li>• Gobbetti M. e Corsetti A. Biotecnologie dei prodotti lievitati da forno. Casa Editrice Ambrosiana (2010).</li> <li>• Introduction to Bioinformatics in Microbiology; Editors: Christensen, Henrik, 2018, Springer</li> <li>• Brock; Madigan; Martinko. Brock Biologia dei Microrganismi 1, 2. Casa Editrice Ambrosiana (2007).</li> <li>• Farris, Gobbetti, Neviani, Vincenzini. Microbiologia dei prodotti alimentari. Casa Editrice Ambrosiana (2012).</li> <li>• Simonetti, Simonetti e D'Auria. Elementi di Tecniche Microbiologiche, Edizioni Mediche Scientifiche Internazionali (2001).</li> </ul>   |
| Notes                 |   |
| Teaching methods      | <p>Lectures will be presented through PC assisted tools (PowerPoint, video). Field and laboratory classes, reading of regulations, case studies will be experienced.</p> <p>Lecture notes and educational supplies will be provided by means of online platforms (i.e.: Edmodo, Google Drive etc.)</p>  |
| Evaluation methods    | <p>The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in the laboratory/production plants, as reported in the Academic Regulations for the Master Degree in Food Science and Technology (article 9) and in the study plan (Annex A).</p> <p>Students attending at the lectures may have a middle-term</p>   |

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|                            | <p>preliminary exam, consisting of a written test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for a year.</p> <p>The evaluation of the preparation of the student occurs on the basis of established criteria, as detailed in Annex B of the Academic Regulations for the Master Degree in Food Science and Technology.</p> <p>Non-Italian students may be examined in English language, according to the aforesaid procedures.</p>   |
| <p>Evaluation criteria</p> | <p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describing the main advanced methods applied to monitor the main microbial groups involved in food production</li> </ul> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describing the main microbiological methods for identification, typing and in situ/ ex situ monitoring of starter, spoilage, and pathogen microorganisms in the food, to guarantee quality and safety during processes of transformation and conservation.</li> <li>○ Describing the management and control of traceability operations of food industries</li> </ul> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> <li>○ Expressing reasonable hypotheses about solutions to assess microbiological properties and quality of foods</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describing advanced microbiological methods and applications to monitor food quality</li> </ul> <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> <li>○ Expressing reasonable hypotheses about the application of advanced microbiological methods to monitor microbiological food quality</li> </ul> |
| <p>Receiving times</p>     | <p>Visiting hours: from Monday to Thursday 9.00 a.m. – 17.30 p.m. by appointment only</p>  |