

COURSE: MICROBIOLOGY OF FERMENTED MEDITERRANEAN FOODS

ACADEMIC YEAR: 2016-2017

TYPE OF EDUCATIONAL ACTIVITY: Characteristic

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Language: English

ECTS: 9 (8 lessons; 1 laboratory practice)	n. of hours: (lessons e tutorials/practice) 64 lessons 16 laboratory practice	Campus: Potenza School: SAFE Program: LM 70 EDAMUS	Semester: I
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#### EDUCATIONAL GOALS

Role of microorganisms in foods: main pathogen microorganisms, spoilage microorganism and agents of fermentative processes. Colonization, contamination and microbial metabolism. Factors that determine the presence, growth and survival of microorganisms in foods. Methods to measure microbial kinetics and growth in foods. During the course, it will be treated the microbial ecology of foods. Ecological factors (intrinsic, extrinsic, implicit and technological) that affect the presence, survival, growth and death of microorganisms in food. Control of microorganisms by acidification, aw lowering, low or high temperature, microwave, ionizing radiation, high pressure, pulsed electric currents, change of atmosphere and packaging, preservatives, fermentation. Fermented foods and starter cultures. Microbiology of dairy products, microbiology of meat products, microbiology of cereals and derivatives, microbiology of fermented beverages. Intestinal microbiota and probiotics.

The aim of the course is to provide knowledge of microorganisms (pro-technological, probiotic, pathogens and spoilage) associated with foods and their origin and role; Knowledge of the factors that determine the presence, growth and survival of microorganisms in food; knowledge of the main microbial groups involved in the production of fermented foods. Knowledge of the significance of starter culture. The knowledge required for the microbiological safety in food.

#### EXPECTED LEARNING OUTCOMES

At the end of the course, the students have acquired skills related to: the microbiological food control through appropriate and targeted applications of physical chemical and biological treatments; the use of basic microbiological methods for the evaluation of the microbial load in the different food matrices; the microbial monitoring of fermented foods; the use of selection scheme for starter cultures.

#### PRE-REQUIREMENTS

General microbiology

#### SYLLABUS

##### Lessons

Colonization, contamination and microbial metabolism. Knowledge of physicochemical factors influencing the presence and evolution of microorganisms in food. Primary and secondary microbial contamination sources.

Microbial ecology of the main foods. Main pathogen and spoilage microorganisms, pro-technological, probiotics, associated with foods and their origin and role. Methods to measure microbial kinetics and growth in food.

Microbial control in foods using physical, chemical and biological treatments or combinations thereof. Control of microorganisms in food by acidification, aw lowering, low or high temperatures, freezing. Control of microorganisms in foods by treatment with microwaves, ionizing radiation, through treatment with high pressure, pulsed electric currents. Microbial control in food control by chemical treatments. Preservatives and antimicrobial activity. Effect of treatments on different microbial groups through modification of the food atmosphere.

Microorganisms (bacteria, yeasts, molds) associated with foods. The role of microorganisms on the human health. Probiotic microorganisms. Microorganisms as indicators of quality and of food microbiological safety.

The fermentation. Main microbial groups involved in the production of fermented foods. Role of microorganisms as starter in the production of fermented foods and knowledge of their metabolism to the enhancement of the organoleptic and healthy quality of the products. Dairy microbiology: lactic acid bacteria, yeasts, molds.

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Microbiology of meat products. Evolution of different microorganisms during manufacture of salami. Lactic acid bacteria and positive characters. Microbiology of vegetable products. Microbiology of cereals and derived (bread): microbial species and role. Production of beer, yeast starter and formulation.

Microbiology of fermented beverages: microorganisms interest (lactic acid bacteria, yeasts, molds).

Alcoholic fermentation, malo-alcoholic and malolactic fermentations. Specific substrates for the isolation of the various microbial groups. Yeast starter and selective parameters: fermentative performance, antimicrobial resistance, killer character, production of secondary compounds.

#### **Practices**

- Food microbiological analysis, ie determination of the number and / or the presence of specific microbial populations
- Interpretation of analytical results: microbiological criteria and standards.
- In vitro test for the determination of the inhibition of the total microbial load as a function of chemical and physical changes in the culture media
- Isolation techniques and technological characterization of microorganisms to be used as starter cultures

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#### **TEACHING METHODS**

The course consists of 64 hours of theoretical lessons on all topics of the course and 16 hours of laboratory practices. During the practices, students will be directed to apply all the steps for the microbiological control of a food and for the monitoring of an inoculated fermentation. At the end of the course, the students will prepare a report of the laboratory work, reporting the results analysis.

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#### **EVALUATION METHODS**

The aim of the examination is to assess the level of theoretical knowledges and laboratory practices, and the achievement of the educational objectives.

The exam is divided into 2 parts:

- A written intermediate assay (mainly quiz at multiple answers) on the topics of the first part of the course, with the aim to evaluate the knowledge and understanding of the topics. To overcome the trial, the student must acquire the 18/30 vote. If the test is insufficient, the student will repeat the assay as oral examination at the end of the course.
- At the end of the course, an oral examination on the second part; to overcome the assay, the student must acquire the 18/30 vote

The final vote is the sum of the two trials.

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#### **TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

- Jay J.M, Loessner M.J, Golden D.A (2009) Modern Food Microbiology, Springer
- Ray B., Fundamental of food microbiology, London, CRC Press, (2004)
- Notes and teaching materials distributed during lessons, related to the course content not available in the textbooks.

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#### **INTERACTIONS WITH STUDENTS**

At the beginning of the course, objectives, program and methods of evaluation will be described. Furthermore, the list and data of students attending the course will be drafted. During the lessons, teaching materials (shared folders) will be provided. Office hours: Monday and Thursday from 15-16 in the teacher's study. In addition to the reception, the teacher will be available via e-mail.

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#### **EXAMINATION SESSIONS (FORECAST)<sup>1</sup>**

Examination at the end of the course and according to the students

#### **EVALUATION BOARD**

Patrizia Romano

Angela Capece

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SEMINARS BY EXTERNAL EXPERTS    YES X    NO

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#### **FURTHER INFORMATION**

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<sup>1</sup> Subject to possible changes: check the web site of the Teacher or the Department/School for updates.



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