

COURSE: Technologies of Preservation and Packaging of Food Products

ACADEMIC YEAR: 2019 / 2020

TYPE OF EDUCATIONAL ACTIVITY: Characteristic

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Language: Italian

ECTS: 9 (8 lessons + 1 tutorials/practice)	n. of hours: 80 (64 lessons and 16 tutorials/practice)	Campus: Potenza School: School of Agricultural, Forestry, Food and Environmental Sciences (SAFE) Program: MSc in Food Science and Technology	Semester: I
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#### EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course aims to provide the knowledge to manage a food preservation process, starting from the study of the causes of perishability of food products and then analyzing the available technologies for the preservation and packaging.

#### The main provided knowledges are:

Knowledge of the chemical, physical, enzymatic and microbial processes of food alteration and their impact on the nutritional characteristics, sensory quality and product safety. Knowledge and management of issues relating to food preservation by using established technologies as well as innovative technologies. Acquisition of skills required for the selection and use of packaging technologies most suitable for various foods, as well as for a proper evaluation and prediction perishable product shelf-life.

#### At the end of the course students will be able to:

- Evaluate the causes of deterioration of various types of food
- Assess the need / preference to apply food preservation technologies
- Know the application principles, the operating mode and the versatility of the preservation of traditional and innovative technologies as well as their impact on nutritional and sensory characteristics of foods
- Know and choose packaging materials more suitable
- Perform prediction studies of shelf-life
- Choose the technique of preservation / packaging / conditioning more suitable in function of the request shelf life
- Read up the arguments of study through bibliographic search
- Interact with the sector operators.

#### PRE-REQUIREMENTS

Base knowledge of Mathematic, Physic, General and Organic Chemistry, Microbiology and Unit operations.

#### SYLLABUS

The group is divided in 9 teaching blocks.

#### **Block 1** ( 8h, lectures):

Classification of treatments applied to food: history and technology. Orientation towards " minimally processed foods". Sustainability of preservation and packaging processes. Effects of technologies on the nutritional, structural and sensory properties of foods.

#### **Block 2** ( 8h, lectures):

Study of physico-chemical, enzymatic and microbiological deterioration of foods and their impact on nutritional characteristics, sensory and product safety as well as on food shelf-life. Preservation of food through the application and subtraction of heat. Proceedings based on reduction of water activity.

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**Block 3** ( 8h, lectures):

Innovative methods for food preservation (high pressures - pulsed electric fields - ultrasounds - ionizing radiations): illustration of the theoretical principles of the techniques and examples of applications reported in the literature for food preservation, with analysis of advantages and disadvantages compared to traditional methods of preservation.

**Block 4** ( 8h, lectures):

Innovative methods for food preservation (microwaves - radio waves - infrared - resistive treatment - electrolyzed water): illustration of the theoretical principles of the techniques and examples of applications reported in the literature for food preservation, with analysis of advantages and disadvantages compared to traditional methods of preservation.

**Block 5** ( 8h, lectures):

Fish products: processing of tuna, anchovies, clams in brine or sauce, surimi, smoked salmon. Meat products: preservation and derivatives.

**Block 6** (8h, lectures):

The main operations of the industry of canned vegetables. Processing tomato, pea, bean.

**Block 7** ( 8h, lectures):

Packaging for specific food groups. Functional packaging.

**Block 8** ( 8h, lectures):

Tests of accelerated shelf-life. Printing, labeling and coding.

**Block 9** ( 16h, practical activity):

Educational visits to food industries. Laboratory activities for the evaluation of the shelf-life of foods and the effect of preservation techniques on specific nutrients.

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**TEACHING METHODS**

The course is based on 9 teaching blocks and it includes 64 h lectures and 16 h practical tutorials, concerning the active participation in room activities, laboratory experiments related to food preservation and technical visits to food industries. There will be some in-depth seminars on specific topics taught by experts in the food field.

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**EVALUATION METHODS**

Learning will be assessed through periodical discussion of the theoretical concepts and with an oral examination at the end of the course. The oral exam consists of questions by which the student must demonstrate knowledge of the subjects and the ability to connect them, with particular focus on a subject on which the student will have performed a personal bibliographic study previously agreed with the teacher and reported in a Power Point presentation. To pass the test you must acquire at least 18 points out of 30 (max 12 points for Power Point presentations, max 7 point for each submitted question; honors will be awarded if the sum of the score is above 30).

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**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

The reference didactic material consists of reference texts and supplied to the students, integrated with teaching material produced by the teacher. All teaching material is provided even through a shared web folder.

The recommended textbooks, to further deepen the topics covered in the course, are the following:

- Cappelli P., Vannucchi V. Chimica degli alimenti. Conservazione e trasformazioni. Zanichelli.
  - Decareau R.V. Microwaves in the food processing industry. Academic Press, Inc.
  - Del Nobile M.A., Conte A. Packaging for food preservation. Springer.
  - Fellows P.J. Food processing technology. Principles and practice. CRC.
  - Jen J.J. Quality factors of fruits and vegetables. Chemistry and technology. ACS Symposium series 405. ACS.
  - Kyzlink V. Principles of food preservation. Elsevier.
  - Oliveira F.A.R., Oliveira J.C. Processing foods. Quality optimization and process assessment. CRC.
  - Piergiovanni L., Limbo S. Food packaging. Materiali, tecnologie e qualità degli alimenti. Springer -Verlag.
  - Pompei C. La trasformazione industriale di frutta ed ortaggi. Tecnologie per la produzione di conserve e
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semiconserve vegetali. Edagricole.

- Singh R.P., Heldman D.R. Principi di tecnologia alimentare. Casa Editrice Ambrosiana.
- Tiecco G. Tecnica conserviera. Edagricole.
- Lecturer's note of the course and PDF files, reprints, ect.

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#### INTERACTION WITH STUDENTS

At the beginning of the course, after describing the objectives, program and test procedures, teacher collects the list of students accompanied by telephone number, registration number and e-mail. The teacher receives generally on Monday and Thursday from 15.00 to 17.00 and on Wednesday from 10.30 to 13.30 (SAFE 2nd floor-3A218 room) and she is available at all times for a contact with the students, through its telephone or e-mail.

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#### EXAMINATION SESSIONS (PREDICTED)<sup>1</sup>

20/02/2020, 19/03/2020, 16/04/2020, 14/05/2020, 11/06/2020, 9/07/2020, 17/09/2020, 15/10/2020, 12/11/2020, 10/12/2020, 14/01/2021.

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#### EVALUATION COMMITTEE

Prof. Fernanda Galgano (President), Dr. Marisa C. Caruso (member), Dr. Nicola Condelli (member), Prof. Annamaria Ricciardi (replacement member)

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SEMINARS BY EXTERNAL EXPERTS    YES     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.