

COURSE: MACHINES AND PLANTS FOR THE MEDITERRANEAN HIGH QUALITY AGRO-FOOD INDUSTRY PRODUCTIONS

ACADEMIC YEAR: 2017-2018

TYPE OF EDUCATIONAL ACTIVITY: Characterizing

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Language: English

ECTS: 6 (5 lessons; 1 laboratory practice)	n. of hours: (lessons e tutorials/practice) 40 lessons 16 laboratory practice	Campus: Potenza School: SAFE Program: EDAMUS - MSc Food Science and Technology	Semester: II
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EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

This is an advanced course in Machine and plant for food production. During the course the machines and plants used for the production, processing, and storage in the major Mediterranean agro-food industries are explained. The aim is to emphasize the results of their use on quality, safety and sensorial properties of the followings Mediterranean foods: olive oil, wine, mozzarella cheese and fresh and ready-to-eat fruits and vegetables, pasta. Furthermore are described the machines and plant layout techniques to improve the product quality and production management. Practical applications for the Mediterranean agro-food industry using laboratory instruments, pilot plants and technical visit in the major industries of Basilicata. Signs about the most common treatments for management and control of by-products related to the production process.

- **knowledge and understanding:** Knowledge and understanding of the relation between the machine/plant mode of operation and the final quality of the product processed, the energy and water requirement, the waste production; the knowledge of the correlation between the raw material and the plant used for processing; knowledge the design and layout criteria of production plant for the major Mediterranean quality agro-food industries with reference to the following industries: olive oil, wine, cheese and fresh fruits and vegetables, pasta production. the criteria used to choose the operating parameters (temperature, atmosphere composition, pressure, etc.) of the plant in order to control and preserve the quality;
- **applying knowledge and understanding:** apply the knowledge of the major components of a processing line for high quality products; knowledge of the plant layout for the major Mediterranean foods: olive oil, wine, mozzarella cheese and fresh and ready-to-eat fruits and vegetables, pasta; to suggest solutions for the practical application of the fundamental concepts of mass, heat, and momentum transfer in machines and plant for food processing; understand the principles of process control and instrumentation; suggest strategies to optimize the use of the plant to reduce wastes.
- **making judgements:** ability to identify the most effective design, technical solution, construction material, control system for food quality assurance in the development of new products and processes and in the improvement of existing ones; capacity to evaluate the design and layout criteria of production plant for the major Mediterranean quality agro-food industries; to evaluate and choose the optimal processing parameters (temperature, atmosphere composition, pressure, etc.) of the plant in order to control and preserve the quality;
- **communication skills:** Ability to communicate the effects of the impact of effective design, technical solution, construction material, control system on food quality assurance to both non-technical and technical audiences. Risk communication skills. Ability to interact and communicate with food business operators and representative of companies involved in the development and implementation of machine and plant for the food industry. Ability to communicate with representative of food safety agencies, official control agencies and quality certification agencies in all the steps needed for the registration and approval of a food production/distribution plant and during food quality and safety audits.
- **learning skill:** Ability to access sources of data, documentation and information sources on food engineering and machine and plant for food processing using technical and scientific literature.

EXPECTED LEARNING OUTCOMES

At the end of this course, the students have to be able to know:

- the design and layout criteria of production plant for the major Mediterranean quality agro-food industries with reference to the following industries: olive oil, wine, cheese and fresh fruits and vegetables, pasta production. the criteria used to choose the operating parameters (temperature, atmosphere composition, pressure, etc.) of the plant in order to control and preserve the quality;
- the mechanical treatment to process or prolong the product shelf-life and to preserve the original quality and organoleptic characteristics of Mediterranean food;
- the optimal plant layout;
- the most common treatments for the management and control food waste and by-products.

PRE-REQUIREMENTS

Base knowledge of Physics, Chemistry, Unit operations and Machines and Plant for food industry 1.

SYLLABUS

The course is organized in 6 teaching units. For each of the unit describing processing plant/line for specific product/food will be described.

Unit 1: Machine and plant for fruit and vegetables postharvest and ready to eat production (10h lecture + 4h laboratory)

Cleaning, sorting, grading and packing lines for fresh fruit.

Cold storage rooms. Temperature and atmosphere control.

Precooling plant.

Cleaning, sorting, grading and packing lines for ready to eat products.

Unit 2: Machine and plant for wine production (6h+ 2h)

White wine production lines.

Red wine production lines.

Unit 3: Machine and plant for cheese production (6h+4h di laboratorio)

Cooled tank.

Cheese making vats

curd drainage and maturation systems

Feeders and curd cutters

Stretching machines

Steam stretching machines

Salt dosage systems and water heaters

Moulding machines

Hardening and brining vats

Controlled temperature and humidity ripening rooms

Ricotta production plant

Unit 4: Machine and plant for extra virgin olive oil (6h+2h)

Olive harvesting in relation to the quality of olive oil extracted.

Washing and sorting lines.

Crusher and mill machines, machines for mechanical extraction e final cleaning of oil.

Olive oil storage.

Unit 5: Machine and plant for pasta production (6h+2h)

Mixing and kneading machines.

Extrusion systems.

Drying plant .

Machines for home made pasta

Production plant for long and short pasta

Unit 6: Machine and plant for recovering and improvement of food product

Plant for whey recover.

Plant for compost production

Plant for biogas production

TEACHING METHODS

Theoretical lessons (40 hours), Laboratory practices (16 hours). During the laboratory and technical tour students have the opportunity to learn in practice the specific operating conditions of each industry and to operate using the pilot plants present in the technological hall of the department.

EVALUATION METHODS

The final exam will verify the achievement of the expected learning outcomes. It will be based on 30 questions with multiple answers, 20 questions are about theory and plant identification, 10 questions are on process control and regulation. The available time for the test will be 40 min and the student can use text and photocopies distributed during the lectures. To pass the test the number of correct answer should be equal or more than 18. The oral exam is required if the student don't pass the test.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Notes and teaching materials distributed during lessons, related to the course content. The materials will be distributed using a Dropbox directory shared with all the follower students.

INTERACTION WITH STUDENTS

At the beginning of the course, objectives, program and methods of evaluation will be described; furthermore, it will be collected the list and data of students attending the course. During the lessons, teaching materials (shared folders) will be provided. Office hours: Monday 15.00 to 17.00 and Wednesday 9.30 to 11.30 at the teacher's study (SAFE, 3 floor, Building 2A, Viale dell'Ateno Lucano 10, Potenza). Furthermore, the teacher is available at all times for contact with students by e-mail.

EXAMINATION SESSIONS (FORECAST)¹

21/09/2016, 12/10/2016, 16/11/2016, 14/12/2016, 18/01/2017, 15/02/2017, 15/03/2017, 12/04/2017, 17/05/2017, 21/06/2017, 12/07/2017

EXAMINATION BOARD

Giovanni Carlo Di Renzo (President), Francesco Genovese (member), Giuseppe Altieri (substitute)

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

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