SCUOLA DI SCIENZE AGRARIE, FORESTALI, ALIMENTARI ED AMBIENTALI

ACADEMIC YEAR: **2019-2020**

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

TYPE OF EDUCATIONAL ACTIVITY: free choice

TEACHER: Giovanni Carlo Di Renzo

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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: MS Food Science and Technology	Semester: I

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

This is an advanced course in Machine and plant for food production with the aim to provide to the students the knowledge and tools to choice or to design a Mediterranean food processing plant on the basis of the efficacy and efficiency of the process in relation to final product quality. During the lectures both the processing and service plants are described. Moreover are studied the design criteria of the following industry: fruit, vegetable and ready to eat product packing house, winery, dairy industry, olive oil extraction, dry pasta and preserves product, juice and smoothies. In particular are emphasized the different machines, plant and layout solutions in relation to the processing operation in order to produce high quality products according with the Mediterranean tradition.

- **knowledge and understanding:** Knowledge and understanding of the relation between the machine/plant mode of operation and the final quality of the product processed, he energy and water requirement, the waste production; the knowledge of the correlation between the row 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.

PRE-REQUIREMENTS

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Base knowledge of Physic, 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: The packinghouse for fresh fuit and vegetable and ready to eat products (10h lecture + 4h laboratory)

Essentials on fruit and vegetable postharvest.

Plant and packing house layout.

Controlled temperature and atmosphere room design.

Test and inspection of the packing house

Unit 2: Winery (6h+ 2h)

Essentials on grape and grape harvest for quality wine production

Plant and winery layout.

Design criteria for the principal plants.

Unit 3: Dairy industry (6h+4h di laboratorio)

Essentials on milk and milking high quality milk

Plant and dairy industry layout

Design criteria for the principal plants.

Plant and cheese industry layout

Design criteria for the principal plants.

Waste recover and purification

Unit 4: Extra virgin olive oil industry (6h+2h)

Essentials on olive harvesting in relation to the quality of olive oil extracted.

Plant and extra virgin olive oil industry layout

Design criteria for the principal plants.

Waste recover and purification

Unit 5: Pasta manufacturing plant (6h+2h)

Essentials on semolina and other product in relation with the final quality of the pasta

Plant and pasta manufacturing plant layout

Design criteria for the principal plants.

Drying plant optimization in relation with the energy saving

Unit 6: Industry for preserves, juice and smoothie (6h+2h)

Plant for preserves in oil and vinegar

Plant for juice and smoothie

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]

11	set, 2019
9	ott, 2019
6	nov, 2019
11	dic, 2019
15	gen, 2020
5	feb, 2020
4	mar, 2020
8	apr, 2020
6	mag, 2020
10	giu, 2020
8	lug, 2020

EXAMINATION BOARD

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

SEMINARS BY EXTERNAL EXPERTS YES X NO □

FURTHER INFORMATION

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