ACADEMIC YEAR: 2018-2019

ACADEMIC COURSE: Agro-industries (section of an integrated course of Microbiology and Agro-industries)

FORMATIVE ACTIVITY: Characterizing

TEACHER: Grasso Gianni (becoming contract); members of the examining board: Galgano Fernanda, Caruso Maria

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Language: Italian

n. CFU: 6 (5 of lessons; 1 of numerical and computer exercitations)	n. hours: 40 of lessons + 16 of numerical exercitations and a conclusive numerical computer exercitation	place: Potenza School: SAFE	II semester

FORMATIVE TARGETS AND LEARNING RESULTS

Contents and knowledge

Knowledge about the basic phenomena concerning the Agro-industries in the context of the principles of the basic Sciences as Chemistry, Physics and Microbiology, finalized to present an unified, interconnected and comparative approach to the heterogeneous scenario of the agri-foods technological transformations. See the analytical description in the next "COURSE CONTENTS ".

Skills

Competence to:

1) perceive in a systematic way the frame of the agro-industries technical aspects correlating:

- objective obligations acting as virtual needs (both the chemical and physical *micro-* and *macro*-structural aspects of the raw-matters and the end-products obtained;

- tools and opportunities (the technological aspects of the processes);

- targets (end-products performances);

2) apply the general principles of the three basic Sciences as Chemistry, Physics and Microbiology to the course topics: a) technical parameters and variables of the transformation processes viewed in the context of unit-operations approach; b) *micro-* and *macro-* structures of both raw-matters and end-products, focusing attention on their colloidal aspects (structures as sol, gel, foams, emulsions, powders etc., properties as adsorption, isoelectric point and electric particles charges, particles stability etc.);

3) apply the general principles of the "Industrial Technique" and the "Management Systems" to link the materials transformation aspects to the technical-economical aspects based on plant lay-out analyses and "PDCA" criteria of Quality Assurance.

4) utilize quantitative computation methods applied to the solution of exercises related to real, practical "cases" of technical computations of some basic process-parameters. E.g. sedimentation times, oleo-pneumatic pressures, thermal flows etc. The employing of basic mathematics and dimensional analysis as well as computer calculations programs is required.

PREREQUISITES

Basic knowledge of General and Organic Chemistry, Physics and Microbiology principles; Basic algebra and mathematics knowledge, numerical data expression in exponential scientific standard form, measure-units conversion and dimension analysis; Computer-science basic knowledge (*Excel* program for draw simple graphics from a data table and make previsions, see after the final optional test); Basic knowledge of English language.

COURSE CONTENTS

The course is subdivided in 8 sections of 5 + 2 h (5 h of lessons and 2 h of exercitations).

Lessons

A General Part introduces the technical problematic of the Agro-industries in the context of the previous $\neq 1$ point of the expected skills. The Special Part consider, in this context, the typical four main agro-industries sectors. 5 + 2 h

GENERAL PART

System concept. System/Environment interaction. State variables; application to plant machines, physical products and biological organisms in the course of development. State variables. Physical, chemical and microbiological models. Dynamical models (transformation/evolution kinetics) and equilibrium models (statics configurations). Good Practice rules. Analyses, tests and evaluations. Conceptual scheme of how to obtain the technical macroscopic process-parameters from the principles of the several microscopic and macroscopic descriptions (processes equations). 5 + 2 h

SPECIAL PART

Olive oil production. The olive, component parts and characteristics. Ripening. Harvesting. Pressing, kneading, centrifugation. 5 + 2 h

Grinding. Pressure extraction. Oils characteristics. Quality changes and defects. Seeds oils. Solvents extraction. Sensory analysis. 5 + 2 h

Wine production. Grape, component parts and characteristics. Ripening. Grape harvest. Alcoholic fermentation, yeasts, enzymes. Parallel/side fermentations. Wine plant. Winemaking. Clarification and stabilization. 5 + 2 h

Centrifugation, filtration, pasteurization. Wine ageing. Wine characteristics. Sensory analysis. Quality changes and defects. Sparkling wine and alcoholic distillates. Distillation. 5 + 2 h

Dairy productions. Milk, component parts and characteristics. Microbial and colloidal aspects. Cow lactation. Collection. Pasteurization, sterilization. 5 + 2 h

Homogenization. Skimming. Churning. Cheese making. Coagulation (rennet and acid). Salting. Ripening. Quality changes and defects. 5 + 2 h

Flour milling industries. Wheat, component parts and characteristics. Milling. Flour. Bread-making. Leavening. Bread. Pasta. 5 + 2 h

Exercitations

Technical visits to four plants of the cited productions, reporting in a paper the observed technical data (plant lay-out, mass and energy inputs and outputs (IN/OUT) balance, Good Practice Regulations applied etc.). Numerical calculations of technical process-parameters from mathematical equations (see the previous $\neq$ 4 point of the expected skills).

Computer-science final test (optional), i.e. computation of a proportionality constant (= kinetic constant) of a linear physical, chemical or microbiological kinetic law from a series of numerical data.

TUTORIAL METHODS

Lessons are conducted by monitoring the students attention and understanding by means of the "maieutics" socratic technique, stimulating the students deductive capability concerning the "pull out" of the conclusions by means of directed interrogations and questions.

Students with a 50 % of frequency can take the optional computer-science final test (additional final score of maximum 2/30, that can be added to the score achieved in the written test).

CHECKING OF UNDERSTANDING

The final exam is composed of 2 parts:

- A written test on the course subjects (4 selected written topics and a numerical problems; minimum effective score 18/30).
- A final talk in order to check the real student competency toward the aspects of the test subjects (additional, maximum score of 2/30, added to the previous score of the written test).
- An additional score of maximum 2/30 coming from the optional computer-science final test

TEXTS AND DIDACTIC SUPPORTS

- specific lecture notes delivered by the teacher, concerning the transformed products, the apparatuses, the numerical examples, etc (on paper support). Recommended Texts:

Sciancalepore Vito, Industrie Agrarie, UTET 2006;

Dario Friso, Ingegneria dell'industria agroalimentare, CLEUP 2017

INTERACTIONS WITH THE STUDENTS

After any lesson are delivered the related lecture notes.

After any written-graphical test or essay is given the solution of the presented exercises.

Reception: Tuesday from 14:30 to 15:30 (room 218 stage II Agri-food building).

Teacher available via e-mail or, if necessary, by phone.

EXAMS FREQUENCIES

Almost monthly

EXPERTS SEMINARS NO □