SCUOLA DI SCIENZE AGRARIE, FORESTALI, ALIMENTARI ED AMBIENTALI

ACADEMIC YEAR: 2019/2020			
COURSE: Engineering for food production/module of tutorial of machine and plant for food industries			
TYPE OF EDUCATIONAL ACTIVITY: Basic			
LECTURER: dr. Francesco Genovese			
e-mail: francesco.genovese@unibas.it		website:	
phone: +390971205256		mobile (optional): +393288467820	
Language: Italian			
ECTS: 1	n. hours: 16	Campus: Potenza Dept./School: School of agriculture, forestry, food and environmental sciences	Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The module, using practical and numerical examples, and on the basis of theoretical recalls, presents considerations in terms of dimensioning and design of all the machines and plants used in the food industry. The aim is to provide students with practical elements and knowledge on free tools and software, provided by companies that market plants, for the choice and sizing of machines and plants used for the execution of Unitary Operations. The module is completely integrated with the lectures of the 5 ECTS path, and develops knownoledge on machines and plants for the food industries.

- **knowledge and understanding**: students must be able to use the fundamental equations underlying the operation of the machines in order to develop and size the main machines used for in the food industry processes. Students are aware of design elements, layout, and maximum costs of the machines in order to allow them to carry out with autonomy adequate technical-economic considerations.
- **applying knowledge and understanding**: Students must be able to carry out practical exercises with the aim of obtaining a sizing of the main machines. Students develop skills in the use of the technical sheets of the plants, and in the use of some free software, freely downloadable from the Internet sites of some companies marketing machines, indicated by the lecturer.
- **making judgements:** Students must develop the ability to propose the appropriate reasoning to formulate hypotheses and to carry out calculations useful to the dimensioning of the machine or plant subject of discussion during the lecture, according to some project constraints proposed by the lecturer.
- **communication skills**: Students acquire and develop the ability to communicate to technicians and non-technicians the principles underlying the sizing and choice of a suitable type of plant in relation to the specific process conditions, taking into account technical and economic constraints.
- **learning skill**: Knowledge on technical databases downloadable online on specialized sites and on use of main reference texts and scientific bibliographical sources in order to acquire the data of the machines and plants, and the information related to performances under different operating conditions.

PRE-REQUIREMENTS

The knowledge of the following subjects is needed:
-Numerical processing techniques and dimensional analysis;
-Energy processes and energy conversion
-fundamental concepts of mechanics, fluid mechanics and thermodynamics.

SCUOLA DI SCIENZE AGRARIE, FORESTALI, ALIMENTARI ED AMBIENTALI

SYLLABUS

Electric engine and transmission systems (2 hours)
Recall of formulas and numerical application of calculation and dimensioning of electric engine
Numerical application on transmissions (performance, transmitted power, diameter of wheels and clutches)

Pumps, hydraulic systems, fans (3 hours)
Formulas for the dimensioning of pumps, numerical and dimensional considerations on the operating parameters of the pumps, tutorial on the laboratory operating cycle with real models of pumps
Exercises on design criteria and sizing of hydraulic circuits installed in food industry
Numerical exercise on fan design and sizing

Compressors, Heat exchangers (3 hours)
Sizing of compressors in relation to cooling capacity: theoretical recalls and exercises
Laboratory operating cycle exercise with real models of compressors
Sizing of heat exchangers: Theoretical recalls, formulas and exercises
Design criteria and sizing of refrigeration systems

Pasteurization and sterilization plants (2 hours)
Dimensioning, design and demonstration of the operating cycle of pasteurization system
Dimensioning, planning and operating cycle of sterilization plants

Filtration and centrifugation plants (4 hours)
Operating cycle, numerical exercises and examples on use of plates and cartons filtration systems, drum vacuum
Operating cycle, numerical exercises and examples on use of membrane filtration plants
Operating cycle, numerical exercises and examples on use of sedimentation and separation plants
Operating cycle, numerical exercises and examples on use of centrifugation plants (horizontal axis, vertical axis)

Concentration/Evaporation and drying plants (2 hours)
Operating cycle, numerical exercises and examples of use of evaporation/concentration plants
Operating cycle, numerical exercises and examples of use of drying plants

TEACHING METHODS
16 hours divided in guided experiences in the laboratory and calculation exercises in the classroom.

EVALUATION METHODS
The objective of the examination test is to verify the level of attainment of the previously indicated training objectives.
At the end of the course there will be a final (written) evaluation test.

SCUOLA DI SCIENZE AGRARIE, FORESTALI, ALIMENTARI ED AMBIENTALI

The test is based on N. 20 multiple-answer questions with three response options. During the test all the material provided by the lecturer can be used. The test is intended to be passed with the minimum score of 18/30. The final mark is given by the average of the marks obtained in the two modules of which the whole exam is composed.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

The reference material is made up of notes selected from reference texts and provided to students, supplemented with didactic material produced by the lecturer. The contents of the laboratory/numerical exercises are provided to students.

All the material is provided to students by sharing in a web folder (Dropbox or equivalent).

INTERACTION WITH STUDENTS

At the beginning of the course, after describing objectives, programme and verification methods, the list of students who wish to attend the course is collected in order to best organize the laboratory activities. The lecturer makes available to the students the material at the end of each lesson through shared folders to which the students have access.

Attending the course is strongly recommended, as content and insights are not present on any reference text.

In addition to the fixed dates of reception, the lecturer is available sending an-email.

Reception Date/hours: Monday from 15.00 to 17.00 and Wednesdays from 9.30 to 11.30 at office on the 4th floor ex Dip. DITEC and by appointment by mail or telephone (building 2A of the Campus of Macchia Romana)

EXAMINATION SESSIONS (FORECAST)[1]

The examination dates will be available on the ESSE3 Web Platform and on the lecturer webpage (http://docenti.unibas.it/site/home/docente.html?m=005052)

EVALUATION BOARD

F. Genovese (President), G.C. Di Renzo, (Member), G. Altieri (Member)

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.