COURSE OF STUDY *Master degree: Food science and technology (LM70)*
ACADEMIC YEAR *2023/2024*
ACADEMIC SUBJECT *Machines and plants for food processing*

General information	
Year of the course	*First*
Academic calendar (starting and ending date)	*I Semester (16.10.2023/26.01.2024)*
Credits (CFU/ETCS):	6 ETCS
SSD	*AGR/09 – Agricultulal Mechanics*
Language	*Italian*
Mode of attendance	*Not compulsory*

Professor/ Lecturer	
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Department and address	*DISSPA – University of Bari "Aldo Moro"*
Virtual room	*On digital TEAMS platform.TEAMS Course code will be provided at the beginning of the Course.*
Office Hours (and modalities: e.g., by appointment, on line, etc.)	Every day (except Holidays and University closures) from h. 9.30 till h. 15.30, by e-mail appointment, even on digital TEAMS platform.

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
150	*32*	*28*	*90*
CFU/ETCS			
6	*4*	*2*	

Learning Objectives	*The course aims to provide mastery in the design, management and logistics of mass and energy exchanges in the food industry, as well as practical knowledge of the issues related to the environmental impact of the studied mass and energy exchanges, through applications of the studied methodologies.*
Course prerequisites	*The exam includes knowledge of physics, mathematical analysis and unit operations.*

Teaching strategie	*Lectures will be presented through PC assisted tools (Powerpoint).* *Lecture notes and educational supplies will be provided by means of email or online platforms.*
Expected learning outcomes in terms of	
Knowledge and understanding on:	○ Ability to carry out the preliminary design and the application of the studied system solutions.
Applying knowledge and understanding on:	○ Ability to define mass and energy exchange layouts in food processes, also based on the possibilities of energy recovery and the need to minimize the environmental impact

Soft skills	• *Making informed judgments and choices* ○ Ability to correctly direct the search for mechanical and plant solutions suitable for modifying the characteristics and quality of food products; ○ ability to correctly guide the choice of technical solutions suitable for monitoring mass and energy exchanges during food processes; ○ evaluate technical and plant choices related to the environmental sustainability of primary productions. • *Communicating knowledge and understanding* ○ Ability to establish a professional dialogue with other professionals and operators in the sector, with particular reference to the definition of mass and energy flows, the definition of layouts, the testing of the systems studied. • *Capacities to continue learning* ○ Ability to deepen and update their knowledge of mass and energy exchanges during food processes..
Syllabus	
Content knowledge	*- References to heat exchange in the food industry, study of transmission by radiation.* *- Notes on fuels. Thermal energy and steam generators.* *- Rankine cycle and its practical applications (cogeneration, trigeneration, energy recovery in food industries).* *- Heat exchangers and sizing.* *- Vacuum systems (vacuum pumps; ejectors).* *- Exchanges of mass and energy in thermal concentration and membrane processes.* *- Exchanges of mass and energy in the drying of food products with applications of the psychrometric diagram.* *- Definition of a layout of a food company with conceptual design.*
Texts and readings	*- Friso D., "Engineering of the food industry. food engineering unit operations. Machines and plants", CLEUP.* *- Yunus A., Çengel "Thermodynamics and heat transfer" Mc Graw-Hill;* *- Peri C. and Zanoni B., "Manual of Food Technologies I", Part. 1, 2 and 3, CUSL, Milan, 1994.* *- Peri C. "Filtration in the Food Industry", Part. 1, 2 and 3, CUSL, Milan, 1994.* *- Lecture notes and supplementary handouts.*
Notes, additional materials	*- Giovanni Quaglia, Food Science and Technology, Chiriotti Editori, Pinerolo, 1992.* *- Various authors "Thermal exchange in the food industry" Chirotti Editore.* *- P.J. Fellows, Food processing technology, principles and practice, CRC Press, Boca Raton Boston New York Washinton, DC, 2000.*
Repository	*The teaching material will be available in the TEAMS Class whose code will be provided at the beginning of the Course.*

Assessment	
Assessment methods	*The exam consists of an oral test on the topics developed during the hours of theoretical and theoretical-practical lessons in the classroom, in the laboratory and in the educational visits, as reported in the Educational Regulations of the Master's Degree Course in Food Science and Technology (art. 9) and in the study plan (attachment A).* *The evaluation of the student's preparation takes place on the basis of pre-established criteria, while the vote is also in accordance with what is reported in Annex B of the Teaching Regulations of the Master's Degree Course.* *The profit exam for foreign students can be carried out in English according to*

	the methods described above. *The possibility for students to take an ongoing test, the so-called of Exoneration which will take place in oral form and will focus on the part of the program agreed with the trainees and actually carried out up to the period of temporary suspension of the ad hoc teaching activity envisaged (as per the proposal of the Interclass Council and subsequent approval of the relevant Department Council to the Interclass). The evaluation of the Exoneration test is expressed as foreseen by the evaluation taxonomy proposed in the grid of the ESSE 3 system.* *There are no different verification methods for attending and non-attending students.*
Assessment criteria	• *Knowledge and understanding* ○ Students have to describe mass and energy exchanges in the plants studied during the course; ○ Students have to describe the function, the components, the functioning of the energy processes studied during the course. • *Applying knowledge and understanding* ○ Students have to carry out mass and energy balances using the methods and formulas used during the theoretical-practical lessons and exercises. • *Autonomy of judgment* ○ Students have to express criteria for choosing thermodynamic systems and defining layouts according to the examples presented as case studies. • *Communicating knowledge and understanding* ○ Students have to escribe the functioning of the thermodynamic systems studied during the course; ○ Students have to describe the layouts studied during the course.. • *Communication skills* ○ Students have to show their capabilities to focus themes and problems, enlighten them and apply balanced solutions to developing problems. • *Capacities to continue learning* ○ Students have to hypothesize possible variants in the choices of thermodynamic systems based on the quantitative, qualitative and ecological requirements of the studied processes.
Final exam and grading criteria	
Further information	
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