UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

Consiglio di Interclasse L-26 e LM-70

General information		
Academic subject	Applications of machines and plants for food processing	
Degree course	Master Programme: Food science and technology (LM70)	
Academic Year	First	
European Credit Transfer and Accumulation System (ECTS)		6 ECTS
Language	*Italian*	
Academic calendar (starting and ending date)	*September 26, 2022 - January 20, 2023*	
Attendance	*No Compulsory*	

Professor/Lecturer	
Name and Surname	Biagio Bianchi
E-mail	biagio.bianchi@uniba.it
Telephone	0039805442940
Department and address	*DIP. DISAAT – University of Bari Aldo Moro*
Virtual headquarters	*Microsoft teams*
Tutoring (time and day)	Monday-Friday 9.00-14.00

Syllabus	
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 relating 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 of food technology.*
Contents	Recalls of heat exchange in the food industry, in-depth analysis of transmission by radiation. Notes on fuels, notes on thermal energy and steam generators. Rankine cycle, heat pump, absorption refrigeration cycle, refrigeration fluids with low environmental impact, cogeneration, trigeneration; applications in the food industry. Vacuum systems. Exchanges of mass and energy in the processes of concentration: - Thermodynamics of discontinuous, continuous, falling film and forced circulation thermal concentrators. - Fluid dynamics of the concentration on the membrane. Mass and energy exchanges in the drying of food products: - Hygrometry; - Thermohygrometric applications to the production of pasta, cheese and cured meat; - Mass and energy balances in drying plants.
Books and bibliography	*Support materials* • Notes from the lectures and didactic material distributed during the course. ▪ Yunus A., Çengel “Termodinamica e trasmissione del calore” Mc Graw-Hill; ▪ Friso D., "INGEGNERIA DELL’INDUSTRIA AGROALIMENTARE", Volume I – Teoria, applicazioni e dimensionamento delle macchine e impianti per le operazioni unitarie, CLEUP sc, Padova, 2017 (www.cleup.it); ▪ Peri C. "La Filtrazione nell’Industria Alimentare", Parte. 1, 2 e 3, CUSL, Milano, 1994; ▪ Autori vari “Lo scambio termico nell’industria alimentare” Chirotti Editore; ▪ P.J. Fellows, Food processing technology, principles and practice, CRC Press, Boca Raton Boston New York Washinton, DC, 2000;

	▪ Giovanni Quaglia, Scienza e Tecnologia degli Alimenti, Chiriotti Editori, Pinerolo, 1992. ▪ Lecture notes. *Additional readings* ASHRAE (2005), *Fundamentals 2005 Ashrae Handbook*, Amer Society of Heating.
Additional materials	*The lecture notes and slides integrate the contents of the reference texts*

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

Teaching strategy	
	The topics of the course will be treated with the help of Power Point presentations. The exercises will consist of practical applications and general projects. All the material used for the lessons will be made available to students on special web platforms.

Expected learning outcomes	
Knowledge and understanding on:	o Ability to carry out the general design and application of the plant solutions studied.
Applying knowledge and understanding on:	o Ability in defining the layout of mass and energy exchange in food processes, also based on the possibility of energy recovery and the need to minimize the environmental impact.
Soft skills	• *Autonomy of judgment* o Ability to correctly orient the search for mechanical and plant engineering solutions suitable for modifying the characteristics and quality of food products; o ability to correctly guide the choice of technical solutions suitable for monitoring mass and energy exchanges during food processes; o evaluate technical and plant engineering choices related to the environmental sustainability of primary productions.*Abilità comunicative* o 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 the layouts, the testing of the systems studied. • *Ability to learn independently* o Ability to deepen and update one's knowledge of mass and energy exchanges during food processes.
The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification).	

Assessment and feedback	
Methods of assessment	The exam consists of an oral test on the topics developed during the theoretical and theoretical-practical lesson hours in the classroom, in the laboratory and in the didactic visits, as reported in the Didactic Regulations of the Master's Degree Course in Food Science and Technology (art.9) and in the study plan (Annex A). For students enrolled in the course year in which the teaching is carried out, an exemption test is provided, which consists of an oral test on topics developed by

	the date of the exemption. The test will be evaluated out of thirty and in the event of a positive outcome, in the final oral test the interview will focus on the remaining part of the teaching contents. The outcome of the exemption test contributes to the evaluation of the final exam and is valid for one academic year. The assessment of the student's preparation takes place on the basis of pre-established criteria, while the grade is also in accordance with what is reported in Annex B of the Teaching Regulations of the Master's Degree Course. The exam for foreign students can be done in English in the manner described above.
Evaluation criteria	*Knowledge and understanding* o Describe the mass and energy exchanges in the plants studied during the course; o describe the function, components, functioning of the energy processes studied during the course. *Applied knowledge and understanding* o Carry out mass and energy balances using the methods and formulas used in the theoretical-practical lessons and exercises. *Autonomy of judgment* o Express criteria for choosing thermodynamic systems and for defining lay-outs according to the examples presented as case studies. *Communication skills* o Describe the functioning of the thermodynamic systems studied during the course; o describe the layouts studied during the course. *Ability to learn* o Hypothesize possible variants in the choices of thermodynamic systems based on the quantitative, qualitative and ecological needs of the processes studied.
Criteria for assessment and attribution of the final mark	The evaluation criteria that contribute to the attribution of the final mark will be: knowledge and understanding, the ability to apply knowledge, autonomy of judgment, i.e. the ability to criticize and formulate judgments, communication skills.
Additional information	