

General Information	
Academic subject	Technical physics for food industry
Degree course	Master Programme: Food science and technology
ECTS credits	6 ECTS
Compulsory attendance	No
Teaching language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Biagio Bianchi	biagio.bianchi@uniba.it	AGR/09

ECTS credits details	
Basic teaching activities	3.5 ECTS Lectures 2.5 ECTS Laboratory or field classes

Class schedule	
Period	I semester
Course year	First
Type of class	Lecture- workshops

Time management	
Hours	60
In-class study hours	35
Out-of-class study hours	25

Academic calendar	
Class begins	9 th October 2017
Class ends	26 th January 2018

Syllabus	
Prerequisites/requirements	Knowledge of: Physics, Calculus and Unit Operations.
Expected learning outcomes	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Mastery in the design, management and logistics of mass and energy exchanges in the food industry ○ Knowledge of the issues related to the environmental impact of mass and energy exchanges <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Ability to carry out basic design and application of the design solutions ○ Ability in defining layouts for mass and energy exchange in food processes, also based on the possibilities of energy recovery and the need to minimize the environmental impact <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> ○ Ability to correctly carry out the research for mechanical and plant solutions that are correct to change the characteristics and quality of foodstuffs ○ Ability to correctly guide the choice of suitable technical solutions to monitor mass and energy exchanges in food processes ○ Ability to evaluate technical and plant choices related to the environmental sustainability of primary productions <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Ability to establish a professional dialogue with other professionals and operators in the industry, concerning to the definition of mass and energy flows, the layouts definition, and the testing of the studied plants <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> ○ Ability to develop and update knowledge of mass and

	<p>energy exchanges in food processes</p> <p>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)</p>
Contents	<p>Heat exchanges in the food industry, deepening radiation transmission.</p> <p>Open thermodynamic systems.</p> <p>Indications of Fuels, notes on thermal and steam generators. Rankine Cycle, Absorption Refrigerator Loop. Empty systems.</p> <p>Mass and energy exchanges in concentration processes:</p> <ul style="list-style-type: none"> - Thermodynamics of discontinuous, continuous thermal film concentrators, with falling film and forced circulation; - Fluidodynamics of the membrane concentration. <p>Mass and energy exchanges in drying food:</p> <ul style="list-style-type: none"> - Hygrometry; - Balance of matter and energy in drying plants. <p>Mass and Energy Exchanges in Cooking Food:</p> <ul style="list-style-type: none"> - Thermodynamics of ovens used in the food industry.
Course program	
Reference books	<p><i>Support materials</i></p> <ul style="list-style-type: none"> ▪ 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, Chirotti Editori, Pinerolo, 1992. ▪ Lecture notes <p><i>Additional readings</i></p> <ul style="list-style-type: none"> • ASHRAE (2005), <i>Fundamentals 2005 Ashrae Handbook</i>, Amer Society of Heating.
Notes	<p>Supplementary Supplements (periodically updated) are enclosed with a bibliography in which specific publications and other texts are recalled to deepen each topic.</p>
Teaching methods	<p>Lectures will be presented through PC assisted tools (Powerpoint). Lecture notes and educational supplies will be provided by means of email or online platforms (i.e.: Edmodo)</p>
Evaluation methods	<p>The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in the laboratory/production plants, as reported in the Academic Regulations for the Master Degree in Food Science and Technology (article 9) and in the study plan (Annex A).</p> <p>Students attending at the lectures may have a middle-term preliminary exam, consisting of an oral test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for a year.</p> <p>The evaluation of the preparation of the student occurs on the</p>

	<p>basis of established criteria, as detailed in Annex A of the Academic Regulations for the Master Degree in Food Science and Technology.</p> <p>Non-Italian students may be examined in English language, according to the aforesaid procedures.</p>
<p>Evaluation criteria</p>	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Description of mass and energy exchanges in plants studied during the course; ○ Determination of operation, components, and working of the energy processes studied during the course; ○ Description of operation of thermodynamic systems studied during the course; ○ Description of layouts studied during the course. <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Making of mass and energy balances using the methods used in theoretical-practical lessons and exercises. ○ Definition of criteria for choice of thermodynamic systems and layouts according to examples presented as case studies. <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> ○ Proposals of changes in the thermodynamic systems based on the quantitative, qualitative and ecological requirements of the processes studied. <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Ability to develop relationships and professional collaborations. <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> ○ Ability to extend the acquired knowledge to untreated mass and heat exchanges food processes.
<p>Receiving times</p>	<p>From Monday to Friday by appointment only</p>