

Unit operation for the food industries (IInd Year of study, IIIrd Semester)

Credit value (ECTS) 5

Course category

Domain (Imposed)

Course holder:

Assoc. Prof. Dr. Eng. Petru Marian CÂRLESCU

Discipline objectives (course and practical works)

The aim of the course is to have students acquire knowledge about the unitary operations and the working processes specific to the appliances used in the food industry. Also of particular importance is the identification of various types of unit operations and appliances in the field of food engineering and the evaluation of technical and functional parameters.

Practical works seek to familiarize students with the unitary operations and the appliances in the technology and operation lines of the agro-food products processing, the recognition of the main sub-assemblies of a device and its operation. Special emphasis is placed on designing and interpreting a flowsheet specific to a production process.

Contents (syllabus)

Course (chapters/subchapters)
General considerations and general principles of unit operations in the food industry.
Principles for balances design: material and energy balances.
Unit operations for the transport of products: transport of liquid products, transport of solid products.
Unit operations for separation by gravity field sedimentation: separation of gas-solid heterogeneous systems, separation of liquid-solid heterogeneous systems, separation of liquid-liquid heterogeneous systems.
Unit operations for separation by centrifugal field-sedimentation: centrifuges, cyclones.
Unit operations for separation by filtration: hydrostatic filters, high-pressure filters, depression filters.
Unit operations for separation by centrifugal field-filtration: filter centrifuges.
Unit operations for separating solid-solid heterogeneous mixtures: oscillating planar sieves, vibratory sieves, color separators.
Unit operations for grinding products from the food industry: grinding by cutting, grinding, disintegration.

Practical works
General training for NTN and PSI; substantiating, identifying and customizing unit operations in the food industry.
Unit operations for the liquid transport.
Unit operations for the gas transport.
Unit operations for the solid transport.
Unit operations for liquid mixing separation by gravity field sedimentation.

Unit operations for the separation of heterogeneous gaseous mixtures by sedimentation.
Unit operations for the separation of heterogeneous liquid mixtures by filtration.
Unit operations for the separation of heterogeneous liquid mixtures by centrifugal filtration.
Unit operations to separate solid mixtures.
Unit operations for grinding products from the food industry
Final colloquium of knowledge evaluation.

Bibliography

1. Amarfi, R. - *Operații unitare*, vol. I, CSIDD, Galați, 2003.
2. Amarfi, R. - *Operații unitare*, vol. II, CSIDD, Galați, 2003.
3. Amarfi, R. - *Fenomene de transfer*, vol. I, Galați, 1989.
4. Banu C., ș.a. – *Manualul inginerului din industria alimentară*, vol I și II , E.T., București 1999
5. Gutulescu I. – *Procese tehnologice moderne din industria conservelor de legume, fructe, carne și pește*, E. D. P., București 1986.
6. Ioancea L. – *Mașini, utilaje și instalații în industria alimentară*, Ed. Ceres, București 1988.
7. Rasenescu I. – *Operații și utilaje în industria alimentară*, Ed. Tehnică, București 1985.
8. Segal Brad – *Tehnologia industrializării fructelor și legumelor*, Ed. Ceres, București 1979.
9. Țenu I. – *Operații și aparate în industria alimentară*, vol.I, operații mecanice, hidrodinamice și aerodinamice, Ed. Ion Ionescu de la Brad Iași, 2008.
10. Țenu I. – *Operații și aparate în industria alimentară*, vol.II, operații cu transfer de căldură și masă, Ed. Ion Ionescu de la Brad Iași, 2014.
11. Cârlescu P. – *Procese și operații în industria alimentară*, vol. I, Ed. PIM Iași, 2016.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Writing examination	80%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and final laboratory colloquium.	20%

Contact

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Unit operation for the food industries (IInd Year of study, IVth Semester)

Credit value (ECTS) 5

Course category

Domain (Imposed)

Course holder:

Assoc. Prof. Dr. Eng. Petru Marian CÂRLESCU

Discipline objectives (course and practical works)

The aim of the course is to have students acquire knowledge about the unitary operations and the working processes specific to the appliances used in the food industry. Also of particular importance is the identification of various types of unit operations and appliances in the field of food engineering and the evaluation of technical and functional parameters.

Practical works seek to familiarize students with the unitary operations and the appliances in the technology and operation lines of the agro-food products processing, the recognition of the main sub-assemblies of a device and its operation. Special emphasis is placed on designing and interpreting a flowsheet specific to a production process.

Contents (syllabus)

Course (chapters/subchapters)
Unit operations for mixing agro-food products: mixing, stirring.
Unit operations for heat transfer in the food industry: pasteurization, sterilization.
Unit operations for mass and heat transfer in the food industry: drying agro-food products.
Unit operations for mass and heat transfer in the food industry: distillation, rectification.
Unit operations to concentrate food products.
Unit operations for condensation.
Unit operations for extraction.
Unit operations for crystallization.

Practical works
General training for NTN and PSI; substantiating, identifying and customizing unit operations in the food industry.
Unit operations for the pasteurization and sterilization of agri-food products.
Unit operations to concentrate food products.
Unit operations for drying agri-food products.
Unit operations for vapor condensation.
Unit operations to crystallize solutions.
Unit operations for oil extraction.
Unit operations for sugar extraction.
Unit operations for the distillation and rectification of alcoholic products.
Final colloquium of knowledge evaluation.

Bibliography

1. Amarfi, R. - *Operații unitare*, vol. I, CSIDD, Galați, 2003.
2. Amarfi, R. - *Operații unitare*, vol. II, CSIDD, Galați, 2003.
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