Transfer Phenomena
(TPPA - Ist Year of study, IInd Semester)

Credit value (ECTS) 4

Course category
Fundamental (Mandatory)

Course holder:
Iuliana MOTRESCU, Lecturer Ph.D.

Discipline objectives (course and practical works)

The aim of the course is to have students acquire knowledge on the fundamental transport phenomena and laboratory analysis techniques. The students will be able to understand the physical phenomena of heat, mass and impulse transfer, which explain some industrial and biological processes.

Practical works seek to familiarize students with basic measurements and experiments, data collection and interpretation of the results. Students will develop practical skills and knowledge on transport phenomena and tranfer operations, applying energy, mass and force conservation laws, with implications in food science and biotechnology.

Contents (syllabus)

Course (chapters/subchapters)
Vector calculus. Gradient. Divergence. Rotor. Interpretation and applications
Transport phenomena. General introduction.
Heat transfer. Introduction. Conduction. Convection. Forced convection. Thermal radiation. Phase change. Transfer phenomena with phase change. Complex heat transfer phenomena. Global heat exchange.
Mass transport. Basic concepts. Molecular diffusion. Fick's laws. Similarities between transfer phenomena. Mass transfer in gas-liquid, liquid-solid, and liquid-liquid systems. Operations with substance transfer. Applications.
Momentum transport. Basic concepts. Momentum transfer on one direction. Ideal fluids. Fluid dynamics. Viscosity of fluids. Newton s law. Newtonian and non-Newtonian fluids. Reynolds number. Bernoulli s equation. Pipe flow.

Practical works
Vector calculus and applications
Measuring the surface tension using the stalagmometer
Measuring the relative viscosity with Oswald viscometer

Measuring the dynamic viscosity with Oswald viscometer
Measuring the dynamic viscosity based on Stokes`law
Study of the thermal radiation. Stefan-Boltzman`s law
Study of the thermocouple
Measuring the specific heat of solids
Measuring the specific heat of water
Measuring the adiabatic index
Applications of heat transport
Applications of mass transport
Applications of momentum transport
Final laboratory evaluation

Bibliography

1. Rusănescu Nicolae, *Fenomene de transfer, procese și utilaje în industria alimentară*, 1999, Ed. Eurobit, Timisoara.
2. Bordean Despina Maria, Radu Florina, *Fenomene de transfer în industria chimică (alimentară)*, 2004, Ed. Mirton, Timisoara
3. Răşnescu Ioan, *Fenomene de transfer*, 1985, Ed. Didactică și Pedagogică, București.
4. Motrescu Iuliana, *Indrumar de lucrari practice*, Editura Societatii Academice „Matei Teiu Botez”, Iasi, 2015
5. Motrescu Iuliana, *Fizică – îndrumar de lucrări practice și seminarii*, Ed. As s, Iași, 2007.
6. Ghirișan Adina Lucreția, Drăgan Simion, *Fenomene de transfer și operații unitare în industria chimică*, Ed. Risoprint, Cluj-Napoca, 2009.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Written examination	70%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and laboratory colloquium.	30%

Contact

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