a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM108E02	*Semester*	8
Course title	**Transport phenomena**		

Independent teaching activities	*Weekly teaching hours*	*ECTS*
Lectures	4	4.0
Laboratory exercises		

Course type	Knowledge deepening/consolidation
Course category	Compulsory Elective for Direction 1
Prerequisite courses	-
Language of instruction and examinations	Greek
Is the course offered to Erasmus students	No
Course website (url)	https://eclass.uniwa.gr/courses/MECH166/

b) Learning outcomes and general competences

b1. Learning outcomes

Upon successful completion of this course, the student will be able to:

- Describes the way in which the basic phenomena of heat and mass transfer take place in basic flows and draws up the methodology for solving these flows,
- Solves practical problems of Newtonian and non- Newtonian, single-phase and multi-phase heat transfer / mass transfer flows,
- Implements the necessary procedures for conducting detailed and computational solutions to the problems under study and submit a technical report on them,
- Evaluates the computational results of practical mechanical applications of fluid mechanics and heat / mass transfer and suggests optimal solutions.

b2. General competences

- Search for, analysis and synthesis of data and information with the use of the necessary technology
- Working independently
- Team work
- Working in an international environment

c) Syllabus

Introduction to transport phenomena. Molecular and convective transport - similarities and differences. Interphase transport and momentum, heat and mass transfer coefficients. Dependence of the transfer coefficients from pressure and temperature. Kinetic theory of gases and simple models. Introduction to mass transport. Definitions (concentrations, velocities and mass fluxes). Fick's law of diffusion. Diffusional mass transfer. Combined heat and mass transfer. The equations of change. Non-Newtonian fluid flows. Multiphase flows.

d) Teaching and learning methods - Evaluation

Delivery	Face-to-face, Distance learning
Use of information and communications technology	- Commercial/free/open source software - Multimedia applications - MS Teams and eclass - Open courses

Teaching methods	*Activity*	*Semester workload*
	Lectures	39
	Tutorials	13
	Laboratory exercises	0
	Computational exercises	0
	Individual work	78
	Course total	130
Student performance evaluation	Intermediate assessment and written final examination.	

e) Suggested bibliography

1. Ασημακόπουλος Δ., Λυγερού Β., Αραμπατζής Γ. (2012). *Μεταφορά Μάζας και Θερμότητας*. Εκδ. Παπασωτηρίου.
2. R.B. Bird, R.B., Stewart, W.E., Lightfoot, E.N. and Klingenberg, D.J. (2018). *Εισαγωγή στα Φαινόμενα Μεταφοράς*. Εκδ. Τζιόλα.
3. R.S. Brodkey & H.C. Hershey (2012). *Φαινόμενα Μεταφοράς- Μια ενοποιημένη προσέγγιση*. Εκδ. Τζιόλα.
4. Anderson, D.A., Tannehill, J.C. & Pletcher R.H. (1997). *Numerical Heat Transfer & Fluid Flow*. London: Taylor & Francis.
5. Tosun, I. (2007). *Modeling in transport phenomena – A conceptual approach*. Elsevier Science & Technology Books.