COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Mechanical Engineering		
LEVEL OF STUDIES	*Undergraduate*		
COURSE CODE	EN0901	**SEMESTER**	7th
COURSE TITLE	Transport Processes		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Practical Exercises	5	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Core
PREREQUISITE COURSES:	
~~LANGUAGE OF INSTRUCTION~~ and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://mie.uth.gr/?page_id=18367&lang=en

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

This course aims to provide the design methodology for a wide range of transport processes, using mass and energy balances. The methodology is applied in the processes of fractional distillation, absorption and humidification.

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

- organize the basic stages of design,
- apply integral mass and energy balances in order to compute unknown variables of inlet/outlet streams,
- propose potential control loops selecting appropriate manipulation and control variables,
- retrieve and apply the appropriate per process thermodynamic equilibrium data,
- design and analyse simple and fractional distillation processes,
- design and analyse absorption processes,
- design and analyse all processes that involve humidity change of air streams,
- design and rate the performance of cooling towers.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and

Working independently	*sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive*
thinking Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Search for, analysis and synthesis of data and information with the use of the necessary technology,
- Decision making
- Working in an interdisciplinary environment
- Project planning and management

(3) SYLLABUS

Representative transport processes and basic design considerations. Integral mass and energy balances. Application examples in a variety of processes. Dynamic operation and automatic control of transport processes. Thermodynamics of mixtures. Vapor-liquid equilibrium: Raoult and Henry's laws, Deviations from ideality. Simple distillations. Fractional distillation of binary mixtures. McCabe-Thiele calculation of tray columns. Tray efficiency. Gas absorption. Design of columns with packing. Humidification processes. Use of the psychrometric chart. Wet-bulb and adiabatic saturation temperatures. Design of air humidifiers. Rating of cooling towers. Introduction to adsorption processes.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY ***Face-to-face, Distance learning, etc.***	In class lectures.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	- Retrieval of constructor information on process equipment - Use of physico-chemical property databases - Spreadsheet calculations
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non- directed study according to the principles of the ECTS*	*Activity* / *Semester workload* Lectures: 70 Self-evaluating exercises: 30 Autonomous work: 50 ***Course Total***: ***150***
STUDENT PERFORMANCE EVALUATION ***Description of the evaluation procedure*** *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open- ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Final written exam (100%) undertaken with open books and notes. The exam involves problem solving, detailed design calculations and open-ended questions. Zero-credit homeworks with past-exam problems are assigned during the semester, and full solutions are subsequently posted. The evaluation criteria are made known to the students at the beginning of the semester and are posted on the course's website.

(5) **ATTACHED BIBLIOGRAPHY**

- Suggested bibliography:

- Lecture notes (e-book)
- Seader, Henley, Roper “Separation Process Principles”
- Cussler "Diffusion: Mass Transfer in Fluid Systems"
- McCabe, Smith, Harriott “Unit Operations In Chemical Engineering”
- Himmelblau, Riggs "Basic Principles and Calculations in Chemical Engineering”

- Related scientific journals:

- Fluid-Phase Equilibria
- International Journal of Heat and Mass Transfer
- Industrial and Engineering Chemistry Research
- Desalination