ETE909 - Process Engineering and Development

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ETE909	**SEMESTER**	9
COURSE TITLE	Process Engineering and Development		

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/Labs	3	3
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Specialized general knowledge
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	NO

(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*

The managing of the problems of the production industry requires knowledge of chemical process engineering and unit operation engineering at the same time. By completing the course, the students are expected to have acquired the following:

Knowledge:

This course aims to get the students familiar with techniques for real industrial problems solving. Lectures are given on basic techniques for the development and integration of mass and energy balances of non-ideal reactors as well as of units' operation. Non-ideal flow modeling methods of industrial units are analyzed in detail targeting to accurate profile predictions of temperature and concentration of a process.

Abilities:

Using the theoretical knowledge and the skills for real system problems solution, the student

should be capable to complete a techno-economical study of an assigned work for the development of new units of a process.

Skills:

Student should get abilities to calculate design parameters for the scale up of the parts of a process under either steady or non-steady state. These abilities will be getting through the solving efforts for real process examples (Case Studies). The students will be familiar with the elaboration of calculus and design of real systems using the principles of both Chemical Process Engineering and Unit Operation.

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and 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
- Production of free, creative, and inductive thinking
- Team work
- Decision-making
- Adapting to new situations
- Project planning and management
- Criticism and self-criticism

(3) SYLLABUS

- Non-ideal Reactors.
- Responses to standard enforcements (Step, Palm).
- Residence Time Distribution studies (RTD).
- Peclet number.
- Delays in ideal plug flow and laminar flow reactors.
- Chemical process dynamics.
- Reactor design for multiple reactions.
- Non-Isothermal Reactor Design and Operation under steady and unsteady state conditions.
- Membrane Reactors.
- Fluidized bed Reactors.
- Design of Industrial Scale Reactors (Case Studies): Reactor-Absorber for gas separation by absorption with chemical reaction.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face teaching in the classroom
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	E-course web site, University of Ioannina, for notes downloading, relevant links, announcements and contact.
TEACHING METHODS *The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice,*	

Activity	***Semester workload***
Lectures	39
Non-directed study for	18

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*	surveying the literature (selection of an article and thorough study of it, which will be tested in the final examination)	
	Non-directed study for final exams preparation	18
	Course total (25 working hours per ECTS)	75
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.*	LANGUAGE OF EVALUATION: Greek METHOD OF EVALUATION: Final written examination	

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- Academic notes
- H. Scott Fogler, 2006. Elements of Chemical Reaction Engineering, Pearson Education Inc.
- Octave Levenspiel, 1999. Chemical Reaction Engineering, John Wiley & Sons Inc.
- W. L. McCabe, J. C. Smith, P. Harriott,2016. Unit Operations of Chemical Engineering, McGraw-Hill

-Related scientific journals:

There is plenty of available (to the students) literature in books and scientific journals (either hard copies or in electronic form) provided by the professors who teach this discipline, like

- Chemical Engineering Science
- AIChE Journal
- Industrial Engineering Chemistry Research