# COURSE OUTLINE

## 1. GENERAL

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|---|---|---|---|
| **SCHOOL** | School of Engineering | | |
| **DEPARTMENT** | Environmental Engineering | | |
| **LEVEL OF STUDIES** | Level 7 | | |
| **COURSE CODE** | **15ZE1N - K1** | **SEMESTER** | **8th** |
| **COURSE TITLE** | Integrated Industrial Plant Design | | |
| **TEACHING ACTIVITIES** *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.* | | **TEACHING HOURS PER WEEK** | **ECTS CREDITS** |
| | | 4 | 5 |
| | | | |
| | | | |
| *Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.* | | | |
| **COURSE TYPE** *Background, General Knowledge, Scientific Area, Skill Development* | General Knowledge, Skill Development | | |
| **PREREQUISITES:** | | | |
| **TEACHING & EXAMINATION LANGUAGE:** | Greek | | |
| **COURSE OFFERED TO ERASMUS STUDENTS:** | | | |
| **COURSE URL:** | https://eclass.duth.gr/courses/TMC377/ | | |

## 2. LEARNING OUTCOMES

**Learning Outcomes**

*Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.*

The aim of the course is the design of chemical processes and the expansion or reorganization of existing processes using principles and theories of engineering in conjunction with the practical application of the limits imposed by regulations on environmental protection, safety and hygiene.

After the successful completion of the course students will be able to:

- apply the knowledge gained from courses of previous years, for the design of industrial plants
- estimate the cost of installing and operating industrial plants
- assess the economic viability of the investments concerned;

**General Skills**

*Name the desirable general skills upon successful completion of the module*

*Search, analysis and synthesis of data and information, ICT Use*
*Adaptation to new situations*
*Decision making*
*Autonomous work*
*Teamwork*
*Working in an international environment*
*Working in an interdisciplinary environment*
*Production of new research ideas*
*Project design and management*
*Equity and Inclusion*
*Respect for the natural environment*
*Sustainability*
*Demonstration of social, professional and moral responsibility and sensitivity to gender issues*
*Critical thinking*
*Promoting free, creative and inductive reasoning*

Search, analysis and synthesis of data and information,
ICT Use
Teamwork
Critical thinking

## 3. COURSE CONTENT

1. Introductory course – Objective of design
2. The stages of design
3. The design data
4. Composition and development of a flowchart
5. Economic analysis of investment projects
6. Degrees of freedom. Design variables
7. Solving design systems
8. Energy Optimization
9. Energy integration
10. Process control
11. Study of investment idea I
12. Study of investment idea II
13. Study of investment idea III

## 4. LEARNING & TEACHING METHODS - EVALUATION

| | |
|---|---|
| **TEACHING METHOD**<br>*Face to face, Distance learning, etc.* | Face to face |
| **USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)**<br>*Use of ICT in Teaching, in Laboratory Education, in Communication with students* | Use of ICT in Teaching and in Communication with students |
| **TEACHING ORGANIZATION**<br>*The ways and methods of teaching are described in detail.*<br>*Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.*<br><br>*The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.* | |

| *Activity* | *Workload/semester* |
|---|---|
| Lectures | 39 |
| Tutoring | 39 |
| Bibliographic research & analysis | 13 |
| Preparation of study | 39 |
| | |
| | |
| | |
| Total workload | **150** |

| | |
|---|---|
| **STUDENT EVALUATION**<br>*Description of the evaluation process*<br><br>*Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others*<br><br>*Please indicate all relevant information about the course assessment and how students are informed* | Language of Assessment: Greek<br><br>Teamwork (30%)<br>Oral examination (10%)<br>Final exam (60%) |
| | |

## 5. SUGGESTED BIBLIOGRAPHY

Peters M., Timmerhaus K. D., West R. E., (2003), Plant Design and Economics for Chemical Engineers. McGraw-Hill Chemical Engineering. ISBN-13:063-9785503897

Klemes J., (2011), Sustainability in the Process Industry: Integration and Optimization, McGraw-Hill ISBN: 9780071605540

# ANNEX OF THE COURSE OUTLINE

## Alternative ways of examining a course in emergency situations

| | |
|---|---|
| **Teacher (full name):** | Costas ELMASIDES |
| **Contact details:** | kelmasid@env.duth.gr |
| **Supervisors:** (1) | NO |
| **Evaluation methods:** (2) | Written assignment and oral examination with distance learning methods |
| **Implementation Instructions:** (3) | The prepared study should be posted on the e-class no later than four days before the oral exam day. The oral examination will be related to the work delivered and will take place on the date set by the department starting at the time specified in the program and devoting half an hour to each group. The oral exam will take place through the TEAMS program. The link will be sent to students via eclass exclusively to the institutional accounts of those who have declared the course and have been informed of the terms of distance education. Students will have to log into the examination room through their institutional account, otherwise they will not be able to participate. They will also participate in the examination having their camera always open during the examination. Before the start of the examination, students will show their identity card to the camera, so that they can be identified. The work will be scored out of 5 and the oral examination with out of 5. The final grade of the course will be derived from the sum of the two above grades. |

**(1)** Please write YES or NO

**(2)** Note down the evaluation methods used by the teacher, e.g.

- *written assignment* or/and exercises
- written or oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured.

**(3)** In the **Implementation Instructions** section, the teacher notes down clear instructions to the students:

a) in case of **written assignment and / or exercises:** the deadline (e.g. the last week of the semester), the means of submission, the grading system, the grade percentage of the assignment in the final grade and any other necessary information.

b) in case of **oral examination with distance learning methods:** the instructions for conducting the examination (e.g. in groups of X people), the way of administration of the questions to be answered, the distance learning platforms to be used, the technical means for the implementation of the examination (microphone, camera, word processor, internet connection, communication platform), the hyperlinks for the examination, the duration of the exam, the grading system, the percentage of the oral exam in the final grade, the ways in which the inviolability and reliability of the exam are ensured and any other necessary information.

c) in case of **written examination with distance learning methods**: the way of administration of the questions to be answered, the way of submitting the answers, the duration of the exam, the grading system, the percentage of the written exam of the exam in the final grade, the ways in which the integrity and reliability of the exam are ensured and any other necessary information.

There should be an attached list with the Student Registration Numbers only of students eligible to participate in the examination.