COURSE OUTLINE

1. GENERAL INFORMATION

SCHOOL	MARITIME AND INDUSTRIAL STUDIES		
DEPARTMENT	INDUSTRIAL MANAGEMENT AND TECHNOLOGY		
LEVEL OF STUDY	UNDERGRADUATE		
COURSE UNIT CODE	ΤΕΠΑΡ01-2	**SEMESTER OF STUDY**	3rd
COURSE TITLE	CHEMICAL INDUSTRIES I		
INDEPENDENT TEACHING ACTIVITIES *in case in which credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*		**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures, Exercises			5.5
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at section 4.			
COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Special background		
PREREQUISITE COURSES:	Introduction to Physical Sciences (for students with student ids starting from T22 and later)		
LANGUAGE OF INSTRUCTION and EXAMINATION/ASSESSMENT:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.unipi.gr/courses/BDT228/		

2. LEARNING OUTCOMES

LEARNING OUTCOMES

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:

APPENDIX A

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

The course aims to familiarize students with production and products of the inorganic chemical industry: mining products, acids and fertilizers, ceramics, iron and steal, gases During the lectures many case studies are presented focusing on topics of (a) chemical technology and flow charts (b) process operating parameters that influence the quality and properties of the final products, (c) water and materials saving, (d) industrial by-product exploitation and recycling, (e) environmental emissions.

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

- Demonstrate knowledge and handle the basic chemical technology concepts of industrial production of broad-use inorganic materials/products
- Use the methods presented for solving problems in inorganic systems
- Demonstrate knowledge on design and operational parameters of inorganic industry
- Handle the methods used in the determination of techno-economic production parameters for yielding products conforming to the required specifications

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aims

Search for, analysis and synthesis of data and information, by the use of technologies that are necessary according the case
Adapting to new situations
Decision-making
Independent work
Team work
Working in an international environment
Working in an interdisciplinary environment
Introduction of innovative research
Project planning and management
Respect for difference and multiculturalism
Environmental awareness
Social, professional and ethical responsibility and sensitivity to gender issues
Critical consciousness, criticism and self-criticism
Development of free, creative and inductive thinking

- Search for, analysis and synthesis of data and information, by the use of technologies that are necessary according the case
- Adapting to new situations
- Decision-making
- Independent work
- Environmental awareness
- Social, professional and ethical responsibility and sensitivity to gender issues
- Critical consciousness, criticism and self-criticism
- Development of free, creative and inductive thinking

2. COURSE CONTENT

The course includes the following topics:

Week	Topics
1st	Introduction to inorganic industrial branches: typical industries, flow charts, physical and chemical processes, management of by-products, wastewater and gaseous emissions, vertical and horizontal integration. • *Problem sets: expressions of mass fractions & chemical conversions*
2nd	Industrial uses of water: core applications, water consumption in mining and production, water treatment, recycling and desalination. • *Problem sets: Dilution/concentration of aqueous solutions - Humidity of raw materials & products*
3rd	Greek mining enterprises I: iron and steal. • *Case study: Environmental degradation from mining activities and rehabilitation methods* • *Problem sets: Purity of raw material and quality control* • *1st assignment due*
4th	Specific aspects associated with steal production and processing: models and estimation of parameter values. • *Problem sets: Reduction of iron ore (direct and indirect) – Product enrichment*
5th	Greek mining enterprises II: production of other metals and alloys from primary and secondary (recycled) materials. • *Problem sets: Processing of minerals with varying composition – Qualitative & quantitative determination of final products* • *2nd assignment due*
6th	Aluminum industry: materials, production methods, energy requirements and energy saving. • *Problem sets: Production of alumina and aluminum from bauxite*

7th	Optimizing aluminum production with techno-economic and environmental criteria. • *Case Study: Saving materials and energy in the production of aluminum*
8th	Utilization of energy production by-products. • *Case study: Co-production of fuel gas and raw materials* • *3rd assignment due*
9th	Construction materials industry: raw materials, production, products, uses • *Case Study: Selection of raw materials for production of construction materials and environmental cost minimization - Recycling and alternative uses of construction waste*
10th	Specific aspects associated with estimating final product composition from a given raw material and mixing raw materials for formulating products of given specifications.
11th	Fertilizer industry: phosphates, nitrogenous, potassic • *Case study: Production of nitrogenous fertilizers* • *4th assignment due*
12th	Production of gases. • *Case study: Ammonia production*
13th	Review topics. • *5th assignment due*

In addition, articles, audiovisual lecture material, web addresses, useful information and exercises are posted at eclass.

3. TEACHING METHODS - ASSESSMENT

<table>
<tr><td>TEACHING MODE
Face-to-face, in-class lecturing, on distance teaching and distance learning etc.</td><td>In-class lecturing</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY
Use of ICT in Teaching, Laboratory Education, Communication with students</td><td>Teaching: Lectures with audiovisual media, support of the learning process through the eclass platform
Communication with students: face-to-face at office hours, email, eclass</td></tr>
<tr><td>COURSE DESIGN
Description of teaching techniques, practices and methods:
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, clinical practice, Art Workshop, Interactive teaching, Educational visits, project, Essay writing, Artistic creativity, etc.

The study hours for each learning activity as well as the hours of non- directed study are given according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity / Method</th><th>Semester Workload</th></tr>
<tr><td>Lectures</td><td>52</td></tr>
<tr><td>Project (case studies & exercises)</td><td>20.65</td></tr>
<tr><td>Case studies</td><td>17.35</td></tr>
<tr><td>Self-study of lecture material and exercises</td><td>45</td></tr>
<tr><td>Counselling</td><td>0.5</td></tr>
<tr><td>Exams (written)</td><td>2</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course Total</td><td>137.5</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS
Detailed description of the evaluation procedures:
Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice questionnaires, short- answer questions, open-ended questions, problem solving, written work, Essay/report, oral exam, public presentation, laboratory work, art interpretation, other……etc</td><td>Language of exams: Greek

Assessment Methods: After the last lecture, the exam material is posted at eclass. The final course grade is formed as follows:
• By the written exams (85%) taken in the examination period of the winter semester and, in case of failure, in the September resits.
• By the mini projects (15%), handed over during the semester (optional).</td></tr>
</table>

Evaluation criteria are specifically defined and given as well as if and where they are reported and accessible to students.	The written examination includes problem solving / exercises. It is conducted with open books. The evaluation of students with special learning difficulties in writing and reading (as certified and qualified by a competent institution) is performed according to the relevant procedure decided by the Department Assembly. **Notification of the Assessment Criteria:** The evaluation criteria are made known during the first lecture and are clearly stated on the course website and e-class. The answers to the exam questions are posted at eclass after the exam date. Students have the opportunity to discuss their exam paper with the course instructor (at the posted office hours) after the announcement of the course grades.

4. SUGGESTED BIBLIOGRAPHY

-Suggested Bibliography :

- Book [18548719]: Inorganic Chemical Technology [in Greek], A. Sdoukoy, F. Pomonis

-Scientific Journals:

- Journal of Cleaner Production
- Critical Reviews in Environmental Science and Technology
- Journal of Hazardous Materials

-Lecture Notes