COURSE OUTLINE

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MINERAL RESOURCES ENGINEERING		
LEVEL OF STUDIES	*Undergraduate*		
COURSE CODE	MRE993	**SEMESTER**	9th
COURSE TITLE	Industrial and Mining Steel Frame Structures		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	2	5
Laboratory or Tutorials	2	
Overall	4	

COURSE TYPE	Special background -Scientific Area
PREREQUISITE COURSES:	Mechanics - Structures (MRE204) Mechanics - Strength of Materials (MRE302) Steel Structures Design (MRE502)
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course is an extension and continuation to the introductory course of Steel Structures Design and contributes to the contact of students in more advanced and special topics on Industrial and Mining Steel Frame Structures. The course material aims to deepen students' knowledge in the Steel Structures Design. To learn the special provisions of the regulations and the current technological developments in the issues of steel structures adapted to the specific requirements of the Industrial & Mining Works and Projects.

Upon successful completion of the course students will have the ability to:

- Recognize the general typology of structural steel frame projects.
- Model and analyse simple and advanced steel structures.
- Distinguish and compose projects of structural steel that serve on-ground and underground exploitation of mineral resources.
- Shape the load-bearing structure of a steel structure and can suggest ways to withstand the vertical and horizontal actions (wind-earthquakes) acting on the steel structure.
- Understand the behavior and be able to dimension both the members (Section Properties) and the connections/joints of a steel structure.
- Apply the provisions of the European Regulation for the Steel Structures Design, EC3, and the special provisions for steel structures of the European Earthquake Regulation, EC8. EC! Will be the basis for actions design.
- Know the technological and construction requirements for real projects such as mining store-buildings and infrastructure of steel frames, industrial sheds, steel canopies, towers, and steel footbridges and conveyor belts, etc.
- Relate the regulations to the theoretical principles of engineering, so that they can be easily adapted to future amendments of the regulations.

General Competences

The course contributes to the acquisition of the following skills:

- Applying knowledge in practice,
- Researching, Analyzing & Synthesizing of bibliographic Data & Information using necessary technologies from Eurocodes,
- Design of members of steel structures,
- Systematic application of the provisions of Eurocode 3 & 8 with the help of static knowledge and durability of materials for proper design in terms of safety, functionality and economy,
- Adapting to new situations,
- Decision-making,

- Working independently,
- Working in an international environment,
- Working in groups (Teamworking),
- Promoting Free, Creative & Inductive thinking.

3. SYLLABUS

Theory: Introduction. Typology of structures-Modelling and Design of steel structures. Design of sheds, ramps for materials storage structures. Lifting systems-Cranes. Conveyor belts. Pipe -coduits. Silos-Tanks. Design of steel support systems for mining projects.
Tutorial exercises: Design configuration of typical steel structures. Design applications in sheds, ramps, above ground and underground support and support systems.

More details:

- ✓ Advantages and disadvantages of steel structures. Properties, section properties, description of steel. Forms of steel sections.
- ✓ Steel structures (generally for steel structural members, structural steels, stress-strain behavior, deformations, standards, Eurocode 1 & 3 & 8).
- ✓ Strength of steel sections in combined stresses.
- ✓ Member stability control, without lateral bracing, in compression and biaxial bending, flexural and Latera;-Torsional Bending (LTB).
- ✓ Connection/Joint formation, beam-column, beam-beam and column-foundation moment connections.
- ✓ Earthquake design of steel frame buildings, capacity design, construction arrangements.
- ✓ Examples of steel frame structures. Concept design of the body, formation of a bearing structural arrangement, study and implementation (mobilization and construction).
- ✓ Special Calculations and Analysis/Design, such as: Conveyor belts. Steel Pipework. Silos-Tanks. Design of steel support systems for mining projects, etc.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	In the classroom and in the laboratory (Face-to-face). Webinars. Tutorials. Laboratory demonstrations. Possibility of distance lectures if required via Zoom Cloud Meeting.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Presentation of lectures using PC (presentations, experimental videos, etc.). Support of learning process through the electronic platform eLearning and electronic communication with students (Online announcements and comments, forum, email etc.). Self-assessment questionnaires in the eLearning environment of the course and asynchronous training platform - eclass. Assistance in completing assignments through result files for each individual student.
TEACHING METHODS	

Activity	***Semester Workload***
Lectures	60
Tutorial - exercise solutions integrated in lectures	20
Individual assignments on laboratory exercises & theory (Coursework) and application exercises	20
Independent Home Study	
Overall Course Set (20 hours of workload per credit unit)	***100***

STUDENT PERFORMANCE EVALUATION	• Written final exam: Theory 50% -Exercises 50%, which includes: Solving problems related to the design of steel structures, and Critical evaluation of theory elements. • Laboratory: Individual work 100%.

5. SUGGESTED BIBLIOGRAPHY

- I. Vagias, I. Ermopoulos, G. Ioannidis, Design of Steel Structures, Klidarithmos Publications, 2006.
- I. Vagias, I. Ermopoulos, G. Ioannidis, Iron Constructions, Volume I, Key Number Publications, 2005. ISBN 960-209-872-4 ATHENS 13899.
- Eurocode 3, Design of Steel Structures, Part 1-1: General Rules and Rules for Buildings, EN 1993-1-1, 2005 Eurocode 3, Design of Steel Structures, Part 1-8: Design of Nodes, EN 1993-1-8 , 2005.
- Androic, Dujmovic and Dzeda, Eurocode Examples 3. Calculations and Dimensioning of Steel Structures. Giourdas Publications.
- Kounadis, A., Iron constructions behavior and analysis (volumes I & II). Symeon Publications.
- Charalambos K. Baniotopoulos. Steel Constructions (Design Principles in the Context of Eurocode 3) Ziti Publications ISBN: 978-960-456-184-7 2009 THESSALONIKI 11063.
- LRFD Code. Load and Resistance Factor Design Specification for structural steel buildings. American Institute of Steel Construction Inc.