



COURSE: Materials and Technologies for the Environment

ACADEMIC YEAR: 2019-2020

TYPE OF EDUCATIONAL ACTIVITY: Characteristic

TEACHER: Antonio Telesca

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mobile (optional):

Language: ITALIAN

ECTS: 9

n. of hours: 90

Campus: Potenza
School of Engineering
Program: Civil and Environmental
Engineering

Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The main knowledges refer to:

- Relationships among composition, microstructure and properties of metals, polymers and ceramics.
- Materials and substances mainly related to the Civil and Environmental Engineering Fields.
- Main physico-chemical water treatment techniques.
- Solid, liquid and gaseous fuels.

Skills:

The student will be able to:

- select the most suitable materials to be employed in the Civil and Environmental Engineering Fields
 - determine the most effective methodology for the treatment of civil water on the basis of the required chemical-physical characteristics
 - evaluate the main fuel technological parameters
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PRE-REQUIREMENTS

Basic concepts of Fundamentals of Chemistry

SYLLABUS

Cycle, classification and obtainment and choice of materials. The structure of crystalline solids: unit cells. Metallic crystal structures. Point coordinates, crystallographic directions, crystallographic planes, linear and planar densities, close-packed crystal structures. polymorphism and allotropy. Imperfections in Solids: Vacancies and Self-Interstitials, impurities in solids, specification of composition, dislocations–linear defects, interfacial defects, bulk or volume defects, atomic vibrations. Mechanical properties of metals. Failure: fracture, fatigue and creep. Phase diagrams. solubility limit, phases, microstructure, phase equilibria, one-component phase, diagrams. binary isomorphous systems, interpretation of phase diagrams, development of microstructure in isomorphous alloys, mechanical properties of isomorphous, alloys, binary eutectic systems, development of microstructure in eutectic alloys, equilibrium diagrams, eutectic and peritectic reactions, congruent phase transformations, the Gibbs phase rule. The iron–iron carbide (Fe–Fe₃C) phase diagram, development of microstructure in iron–carbon alloys. The influence of other alloying elements. Applications and processing of metal alloys. Iron based materials. Cast iron production process. Cast iron and steel classification. Surface hardening of steels. Ceramic materials. Glasses. Bricks. Inorganic binders: ordinary cement, lime and gypsum. Water classification and analysis. Main chemical-physical water treatments. Solid, liquid and gaseous fuels.

TEACHING METHODS

Theoretical lessons, Classroom tutorials.

EVALUATION METHODS

Written examination lasting 2 hours.



TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- Notes from lectures
- W.D. Callister, D.G. Rethwisch – Scienza ed Ingegneria dei Materiali - EdiSES
- J.M. Shackelford – Introduction to Materials Science for Engineers – Prentice Hall I.E.
- W. F. Smith – Scienza e Tecnologia dei materiali, McGraw Hill Italia.
- C. Brisi – Lezioni di Chimica Applicata, Editrice Universitaria Levrotto & Bella, Torino.
- AIMAT – Manuale dei materiali per l'ingegneria, McGraw Hill Italia.
- L. Bertolini – Materiali da costruzione, CittàStudi Edizioni.

INTERACTION WITH STUDENTS

Wednesday 3-5 pm. Other appointments can be arranged with students by e-mail.

EXAMINATION SESSIONS (FORECAST)¹

06/02/2020; 20/03/2020; 08/05/2020; 12/06/2020; 16/07/2020; 17/09/2020; 06/11/2020; 11/12/2020

SEMINARS BY EXTERNAL EXPERTS YES X NO

FURTHER INFORMATION

¹ Subject to possible changes: check the web site of the Teacher or the Department/School for updates.