Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: Materials and Technologies for the Environment				
TEACHER: Antonio Telesca				
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Language: Italian				
ECTS: 6	n. of hours: 60	Academic year: 2014-2015	Campus: Potenza	Semester: II

TOPICS

Introduction to Material Science and Engineering. Atomic Structure and bonding. Solidification, crystalline imperfections and diffusion in solids. Mechanical properties of materials. Mechanical properties of metals. Phase diagrams. Engineering alloys. Main water treatment techniques. Gaseous, liquid and solid fuels. Biomasses.

TEACHING METHODS (please tick one or more options)

X Theoretical lessons
X Tutorials in classroom
□ Tutorials in laboratory
□ Project works
□ Technical visits
Other activities (please specify) _____

TEXTBOOKS

- Notes from lectures
- 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.

ON-LINE EDUCATIONAL MATERIAL

web address:

LEARNING OUTCOMES

Relationships among composition, microstructure and properties of metals, polymers and ceramics. Critical knowledge of materials and substances mainly related to the Environmental Engineering Field. Knowledge of the main physico-chemical water treatment techniques. Solid, liquid and gaseous fuels. Biomasses

REQUIREMENTS

None

EVALUATION METHODS (please tick one or more options)

□ Intermediate verifications
X Written examination
□ Discussion of a project work
□ Practical test
□ Oral examination
Other methods (please specify) _____

DETAILED CONTENT

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. TTT and CCT Diagrams. Iron based materials. Cast iron production process. Cast iron and steel classification. Water classification and analysisMain chimica-physical water treatments. Solid, liquid and gaseous fuels. Biomasses.

EXAMINATION SESSIONS (FORECAST): 14/01/2016; 22/02/2016; 18/04/2016; 23/05/2016; 27/06/2016; 21/07/2016; 19/09/2016; 17/10/2016; 21/11/2016; 19/12/2016.

SEMINARS BY EXTERNAL EXPERTS YES X NO □

FURTHER INFORMATION