



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2023/2024
BACHELOR'S DEGREE (BSC)	MECHANICAL ENGINEERING
SUBJECT	GENERAL TECHNOLOGIES OF MATERIALS
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50302-Ingegneria meccanica
CODE	07353
SCIENTIFIC SECTOR(S)	ING-IND/16
HEAD PROFESSOR(S)	MICARI FABRIZIO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	MICARI FABRIZIO Tuesday 08:00 10:00 Studio del docente, Edificio 8, primo piano

DOCENTE: Prof. FABRIZIO MICARI

PREREQUISITES	Basic knowledge of Calculus, Physics and Chemistry are requested.
LEARNING OUTCOMES	The student of Material Technologies has to acquire a deep knowledge of the properties of the material mostly utilized in the mechanical and aeronautical industries, namely steels, cast irons and copper, titanium and aluminum alloys. Their characterization, as well as their main properties (strength, hardness, resilience) and the most relevant thermo-mechanical treatments will be introduced. In this way the student will acquire the capability to carry out the best choice of the most effective material as a function of the design requirements for the mechanical component to be manufactured.
ASSESSMENT METHODS	The final exam consists of a written test, with includes a set of questions aimed to evaluate the capability of the student to select the best material for the assigned application. The mark is assigned over 30 points, 18/30 for an elementary level of learning, 30/30 if the student shows an excellent quality of learning.
EDUCATIONAL OBJECTIVES	The main objective is to provide to the student all the necessary knowledges to select the most effective material for the particular industrial application.
TEACHING METHODS	Lectures, seminars, numerical exercises and laboratory activities.
SUGGESTED BIBLIOGRAPHY	Alberto Cigada, Tommaso Pastore - Struttura e proprietà dei materiali metallici - McGraw Hill William F. Smith - Scienza e Tecnologia dei Materiali - McGraw Hill

SYLLABUS

Hrs	Frontal teaching
42	Crystals. Defects and dislocations. The concept of hardening. State diagrams. FeC diagram. Steels, cast irons, copper, titanium and aluminum alloys. Thermal treatments of steels and of non ferrous alloys. Thermal-mechanical and thermal-chemical treatment of steels. Material tests: strength, hardness, resilience, fatigue, quenchability, formability. Basic elements of composite materials.
Hrs	Practice
4	Numerical exercises on material properties.
Hrs	Workshops
8	Laboratory tests of strength, hardness, resilience. Metallography observations.