



# UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2022/2023
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	<b>MICARI FABRIZIO</b> Tuesday    08:00    10:00    Studio del docente, Edificio 8, primo piano

**DOCENTE:** Prof. FABRIZIO MICARI

<b>PREREQUISITES</b>	Basic knowledges of Calculus, Physics and Chemistry are requested.
<b>LEARNING OUTCOMES</b>	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 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.
<b>ASSESSMENT METHODS</b>	The final exam consists of a written test, which 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.
<b>EDUCATIONAL OBJECTIVES</b>	The main objective is to provide to the student all the necessary knowledges to select the most effective material for the particular industrial application.
<b>TEACHING METHODS</b>	Lectures, seminars, numerical exercises and laboratory activities.
<b>SUGGESTED BIBLIOGRAPHY</b>	Alberto Cigada, Tommaso Pastore - Struttura e proprietà dei materiali metallici - McGraw Hill A. Barcellona - Tecnologie Generali dei Materiali - V edizione – progetto editoriale EVerus.

## SYLLABUS

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