



METALLURGY	
Enrollment year	2019/2020
Academic year	2021/2022
Regulations	DM270
Academic discipline	ING-IND/16 (PRODUCTION TECHNOLOGIES AND SYSTEMS)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	INDUSTRIAL ENGINEERING
Curriculum	Meccanica
Year of study	3°
Period	2nd semester (07/03/2022 - 17/06/2022)
ECTS	6
Lesson hours	45 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	CASAROLI ANDREA (titolare) - 6 ECTS
Prerequisites	Science of Materials
Learning outcomes	<p>The aim of this course is to highlight topics regarding metallic materials; the study in the Metallurgy course is based on the analysis of correlations between chemical composition, structure, properties and performances pointing out the method of choice of materials and the best thermal treatments to obtain the best results.</p>
Course contents	<ul style="list-style-type: none"><li>• Crystals and lattice defects</li><li>• Phase diagrams of metallic alloys</li><li>• Mechanical testing of metals and alloys (Tensile strength, hardness, fatigue, impact toughness)</li></ul>

	<ul style="list-style-type: none"> <li>• Bain experiences: TTT and CCT diagrams</li> <li>• Thermal treatments</li> <li>• Typical microstructures of steels</li> <li>• Surface treatments.</li> <li>• Fundamentals of ductile-brittle fracture, Fatigue, Corrosion of metallic materials, Wear damage, Creep</li> <li>• Properties and applications of steels (quenching and tempering steels, spring steels, case hardening steels, nitriding steels, stainless steels) and cast irons</li> <li>• Properties and application of selected non-ferrous alloys (Al, Cu alloys)</li> </ul>
<b>Teaching methods</b>	<ul style="list-style-type: none"> <li>• Lectures (hours/year in lecture theatre): 45</li> <li>• Practical class (hours/year in lecture theatre): 0</li> <li>• Practicals / Workshops (hours/year in lecture theatre): 0</li> </ul>
<b>Reccomended or required readings</b>	<ul style="list-style-type: none"> <li>• Marco V. Boniardi, Andrea Casaroli. Metallurgia degli acciai - Parte prima. Lucefin, Esine, 2017.</li> <li>• Marco V. Boniardi, Andrea Casaroli. Gli acciai inossidabili. Lucefin, Esine, 2014.</li> <li>• Silvia Barella, Andrea Gruttadauria. Metallurgia e materiali non metallici. Teoria e esercizi svolti. Società editrice Esculapio, Bologna, 2017.</li> </ul>
<b>Assessment methods</b>	Written proof in itinere, final oral examination.
<b>Further information</b>	Written proof in itinere, final oral examination.
<b>Sustainable development goals - Agenda 2030</b>	<a href="#">\$lbl legenda sviluppo sostenibile</a>