



## LASER SAFETY

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	FIS/03 (MATERIAL PHYSICS)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	ELECTRONIC ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	2nd semester (07/03/2022 - 17/06/2022)
ECTS	6
Lesson hours	45 lesson hours
Language	English
Activity type	WRITTEN TEST
Teacher	MILANI DANTE (titolare) - 6 ECTS
Prerequisites	Understanding of basic principles of electromagnetic theory, geometrical and wave optics.
Learning outcomes	<p>The course is designed to teach the necessary knowledge and to understand the rational of laser safety. At the end of the course the students learned to classify a laser product, carry out laser risk assessment and prescribe prevention and protection measures in all work environments.</p> <p>The program, articulated in lectures and practical lessons, meets the training requirements for the TSL outlined by the CEI (Italian Electrotechnical Committee) and for LPA (Laser Protection Adviser) outlined by IEC International Standards.</p>
Course contents	<p>Basic knowledge:</p> <p>Laser fundamental physics and applications</p>

	<p>Italian laws, european directives and international standards about laser safety</p> <p>Biological effects of laser radiation</p> <p>Exposure Limit Values (ELVs) and Maximum Permissible Exposures (MPEs)</p> <p>Accessible Emission Levels (AELs) and classification of laser products</p> <p>Laser risk assessment</p> <p>Laser radiation collateral hazards</p> <p>Selecting control measures</p> <p>Laser guards and viewing windows</p> <p>Personal protective equipment</p> <p>Lasers in the healthcare environment</p> <p>Lasers in the industrial environment</p> <p>Expertise:</p> <p>Mathematical approach</p> <p>How to measure the laser radiation</p> <p>Manufacturer's requirements</p> <p>Protective eyewear, laser guard and viewing window choice</p> <p>Numerical exercises and measures</p> <p>Will be proposed numerical examples and measurements:</p> <p>Calculation of the Exposure Limit Values (ELVs)</p> <p>Calculation of Accessible Emission Levels (AELs)</p> <p>Classification of continuous and pulsed lasers</p> <p>Nominal Ocular Hazard Distance</p> <p>Protective eyewear, laser guard and viewing window choice</p>
<b>Teaching methods</b>	<p>Lectures (hours/year in lecture theatre): 42</p> <p>Practical class and measures (hours/year in lecture theatre): 6</p>
<b>Reccomended or required readings</b>	<p>Laser safety laws, standards (IEC-EN-CEI, UNI) in force. Lecture notes</p>
<b>Assessment methods</b>	<p>Written test generally, which includes theory and numerical exercises.</p> <p>The sufficient students can be accept the mark gotten in the written test or they can do a oral test.</p>
<b>Further information</b>	
<b>Sustainable development goals - Agenda 2030</b>	<p><a href="#">\$lbl_legenda_sviluppo_sostenibile</a></p>