

## COURSE OF STUDY SCIENCES AND MANAGEMENT OF MARINE ACTIVITIES

ACADEMIC YEAR 2023-2024

NAME OF THE COURSE APPLIED ELECTRONICS

Main information on teaching	
Year of study	2023 - 2024
Delivery period	1st semester
University credits (CFU/ETCS):	9
SSDs	SSD ING-INF/01
Delivery language	ITALIAN
Frequency mode	optional

Professor	
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Site	TARANTO
Virtual office	
Receipt	WEDNESDAY 9.00-10.00

Organization of teaching			
Hours			
Totals	Frontal teaching	Practice (lab, field, tutorial, other)	Self study
225	72		153
Credits/ETCS			
9	9		

<b>Educational goals</b>	The course, lasting 80 frontal hours, is aimed at learning the basic notions to make the visitor understand the functioning of the main electronic devices in order to acquire an adequate theoretical preparation to deal with the application aspects of professional subjects.
<b>Prerequisites</b>	A knowledge of the laws of electrical engineering and of the fundamental components is required

<b>Teaching methods</b>	The course is developed through lectures. These are followed by interaction with learners through discussion groups on the e-learning platform or in the classroom. During the lessons, the use of the IWB is foreseen for the creation of additional diagrams in the classroom at the request of the students
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<b>Expected learning outcomes</b> <i>To be indicated for each Dublin Descriptor (DD=</i>	<ol style="list-style-type: none"> <li>1. Knowledge and understanding (knowledge and understanding): The acquisition of the methodology necessary for the knowledge and understanding of circuit diagrams;</li> <li>2. Ability to apply knowledge and understanding (applying knowledge and understanding): The acquisition of the methodology necessary for the study of electronic circuits and the choice of components</li> <li>2. Autonomy of judgment (making judgments).</li> </ol>
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<p><b>DD1 Knowledge understanding and</b></p> <p><b>DD2 Applied knowledge and understanding</b></p> <p><b>DD3-5 Transversal skills</b></p>	<p>The acquisition and development of the ability to critically study the characteristics of basic electronic devices.</p> <p>3. communication skills (communication skills): The acquisition of the ability and language necessary for the interpretation of circuits, graphic diagrams and the peculiarities of the various electronic components.</p> <p>4. Learning skills: The acquisition of the methodology necessary for learning the operating principle of basic electronic devices.</p> <p>- Dublin 1 descriptor: knowledge and understanding Knowledge of the main components used in electronics Knowledge of the functioning of the components</p> <p>- Dublin 2 descriptor: ability to apply knowledge Applications in which the various electronic components are used</p> <p>- Dublin 3 descriptor: judgment and critical skills They will be able to identify the components shown on diagrams and graphs, having the opportunity to intervene</p> <ul style="list-style-type: none"> <li>Judgment autonomy</li> </ul> <p>At the end of the course the student should be able to</p> <ul style="list-style-type: none"> <li>Identify the components of the various electronic circuits and understand the functioning of complex devices</li> </ul> <p>- Dublin 4 descriptor: ability to communicate what has been learned Communication skills</p> <p>At the end of the course the student should be able to</p> <ul style="list-style-type: none"> <li>Being able to understand and communicate with industry experts as they will know the basics of applied electronics</li> </ul> <p>- Dublin 5 descriptor: ability to continue learning autonomously throughout life The knowledge of the course will allow to deepen the topics as the basics will be necessary for the interpretation of more complex circuits Ability to learn independently</p> <p>At the end of the course the student should be able to</p> <ul style="list-style-type: none"> <li>xxxxxxx.</li> </ul>
<p><b>Teaching contents (Programme)</b></p>	<p>The course will explore the following aspects:</p> <p>1 introduction – semiconductors – current in semiconductors – PN junction 2 PN Junction DIODE – Diode VI graph – Breakdown diode models – Junction diode circuits – Zener diode – Zener diode circuits – Schottky diodes 2 diode rectifiers 3 BJT characteristics - BJT characteristics – BJT connections and VI curves – graphical analyzes – BJT operating point - BJT operating point – BJT bias circuits 4 amplification – amplification and distortion BJT amplifiers - small signal BJT models – analysis and design of BJT amplifiers – common emitter-common collector BJT amplifier - common collector BJT amplifier – common base – common emitter with resistance on emitter – comparison of BJT amplifiers 5 field effect transistor JFET – field effect transistor with metal-oxide-semiconductor structure MOSFET – graphic analysis of FET circuits - polarization and stabilization circuits JFET operating point - MOSFET operating point 6 amplification, bias, load line FET amplifiers – small-signal FET models – FET amplifiers: types of amplifiers, analysis criteria – common source FET amplifier – common drain – common gate – common source FET amplifier with resistance on source – comparison of FET amplifier types</p>

	<p>7 multistage amplifiers – direct coupled cascade amplifiers – Darlington configuration</p> <p>8 Differential amplifiers – BJT differential amplifiers</p> <p>9 basic characteristics of Operational Amplifiers – characteristic parameters of AOs</p> <p>10 features linear and non-linear circuits with op amps</p> <p>11 power amplifiers in class A – class B – class AB – class C - Power devices and circuits – SCR, DIAC, TRIAC, GTO</p> <p>12 Regulated power supplies - shunt type - series type - switching</p> <p>13 Boolean algebra - basic logic gates - Logic families</p> <p>Sequential machines</p>
<b>Reference texts</b>	Jacob Millmann, Arvin Grabel – Microelectronics Ed. Mc Graw - Hill
<b>Notes to the reference texts</b>	
<b>Educational materials</b>	
<b>Assessment</b>	
Learning verification methods	Tests will be carried out to verify the level of learning of the class and a final verification will be carried out
Evaluation criteria	<p>For each expected learning outcome indicated above, describe what the student is expected to know or be able to do and at what level in order to demonstrate that a learning outcome has been achieved and at what level (for example : ability to discursively organize knowledge; critical reasoning ability on the study carried out; quality of exposure, competence in the use of specialized vocabulary, effectiveness, linearity, etc.).</p> <ul style="list-style-type: none"> <li>• Knowledge and understanding: <ul style="list-style-type: none"> <li>○ Component knowledge</li> </ul> </li> <li>• Applied knowledge and understanding: <ul style="list-style-type: none"> <li>○ Knowledge of the applications of the various components</li> </ul> </li> <li>• Making judgments: <ul style="list-style-type: none"> <li>○ Ability to identify the correct component for each activity</li> </ul> </li> <li>• Communication skills: <ul style="list-style-type: none"> <li>○ Ability to communicate through diagrams and graphics</li> </ul> </li> <li>• Ability to learn: <ul style="list-style-type: none"> <li>○</li> </ul> </li> </ul>
Measurement criteria of learning and assignment of the final mark	Tests will be carried out to verify the learning level of the class and a final verification will be carried out through a multiple choice test
<b>Other</b>	
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