

Country <b>IT</b>	Institution <b>INA</b>	Common Module <b>Naval Power Plants</b>	<b>ECTS</b> <b>2.0</b>
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<b>Service(s):</b> <b>Navy</b>	<b>Minimum Qualification of Instructors:</b> <ul style="list-style-type: none"> <li>PhD degree in Naval Engineering.</li> <li>English: Common European Framework of Reference for Languages (CEFR) Level B2 or NATO STANAG Level 2+.</li> </ul>
<b>Language:</b> <b>English</b>	
<b>SQF</b> <b>MILOF:</b>	<ul style="list-style-type: none"> <li><b>Competence area</b> – Military technician.</li> <li><b>Learning area</b> – Employment of weapon/ operating platform/ systems.</li> <li><b>Organisational level</b> – Single Arm/Branch.</li> </ul>

<b>Prerequisites for participants:</b> <ul style="list-style-type: none"> <li>English: Common European Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG Level 2.</li> </ul>	<b>Contents of the Module:</b> <ul style="list-style-type: none"> <li>Technical specifications and design of the marine power plant and propulsion system.</li> <li>Effective exploitation of the relevant marine power plant and propulsion system, with due consideration of safety measures.</li> </ul>
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<b>Learning outcomes</b>	<b>Knowledge</b>	<ul style="list-style-type: none"> <li>Formulate the basics of Fluid and Gas Dynamics.</li> <li>Perform review of the different types of engines and thrusters, elements and performance of marine propulsion systems, system pipeline and equipment necessary for safe navigation.</li> </ul>
	<b>Skills</b>	<ul style="list-style-type: none"> <li>Analyse ship propulsion systems on different types of ships and calculate engines' fuel consumption per hour for different speeds.</li> <li>Exploit and maintain different types of engines and propellers (F.P. – C.P.P.).</li> </ul>
	<b>Responsibility &amp; Autonomy</b>	<ul style="list-style-type: none"> <li>Manage propulsion plants autonomously across operational scenarios, maintaining safe engine-room practices and continuity of propulsion/auxiliary services under both routine and degraded conditions.</li> <li>Assume responsibility for performance- and safety-relevant decisions by monitoring key parameters, optimising operating regimes within technical limits (efficiency/fuel/power), documenting status, and escalating abnormal trends via the chain of command.</li> </ul>

<b>Verification of learning outcomes:</b>	
<ul style="list-style-type: none"> <li><b>Observation:</b> <ul style="list-style-type: none"> <li>Class time is primarily assigned to lecturing. Educational materials such as slides or videos may be used in order to illustrate some of the basic points in the lecture, in order to encourage discussions and debates about focus points.</li> <li>Methods of teaching/lecturing are: lecturing, heuristic conversation, explanation, discussions/debates, case study, and simulation of situations.</li> </ul> </li> <li><b>Tests:</b> final exam (written test).</li> <li><b>Evaluation:</b> the final exam will consist in examination based on a multiple-choice test and applications of the taught subject.</li> </ul>	

### Module details:

Main Topic	Recom- mended WH for the residential phase	Details
Ship propulsion systems	6	<ul style="list-style-type: none"> <li>Layout, Engines, Gears, Bearings, Seals, Shafts, Propeller, Diesel- Electric systems, Auxiliary systems.</li> <li>Terminology and definitions for main ship propulsion systems.</li> </ul>
Thermodynamics of combustion engines	6	<ul style="list-style-type: none"> <li>Ideal Thermodynamic Cycles and Actual Cycles (Rankine, Brayton, Diesel).</li> <li>Calculation and measurement methods for engine power output, fuel consumption, heat exchange, temperatures, pressures, flows, speed, and exhaust gas composition</li> </ul>
Combined Propulsion Plants	6	<ul style="list-style-type: none"> <li>General overview: Gas turbines. Electric motors. 2-stroke and 4-stroke diesel engines. Nomenclature. Layout.</li> <li>Redundancy and downgraded conduct.</li> </ul>
Safety and Environmental	5	<ul style="list-style-type: none"> <li>Safety in Engine Room (fire hazard, crankcase explosion).</li> <li>Marine fuels and emissions.</li> <li>Exhaust emissions.</li> <li>Energy Efficiency.</li> </ul>
<b>Total WH (contact hours)</b>	<b>23</b>	
<b>Additional hours (WH) to increase and assess the learning outcomes (during residential phase):</b>		
Self-studies	25	<ul style="list-style-type: none"> <li>The guidelines on Naval power plants;</li> <li>IMO/STCW rules and regulations for engine watch-keeping;</li> <li>NATO rules and regulations for naval operations in ETO service.</li> </ul>
Test / evaluation / assessment	2	<ul style="list-style-type: none"> <li>Students' evaluation</li> </ul>
<b>Total WH</b>	<b>50</b>	The detailed amount of hours for the respective main topic is up to the course director according to national law or the home institution's rules.



## List of Abbreviations:

- B1, B2, C1 ..... CEFR Levels
- BIP ..... Blended Intensive Programme
- CEFR ..... Common European Framework of Reference for Languages
- ECTS ..... European Credit Transfer and Accumulation System
- ESDC ..... European Security and Defence College
- IG ..... Implementation Group
- IT ..... Italy
- NATO ..... North Atlantic Treaty Organization
- STANAG ..... Standardisation Agreement
- WH ..... Working Hour (60 minutes)