

**Anexa 1.a**

**Fundamental domain:** *Engineering sciences*

**Field of study:** *Mechanical Engineering*

**Studies Programme:** *Integrated Mechanical Engineering Design*

**Grid 1L – Description of the field / programme of studies by professional competences and transversal competences**

<p><b>Qualification name:</b> <i>Mechanical Engineering</i></p> <p><b>Qualification level :</b> <i>MASTER</i></p>	<p><b>Possible occupations (according to COR):</b> 214485 - research engineer in machines and mechanical installations, 214438 - mechanical engineer designer, 214434 - mechanical engineer expert, 214435 - specialized inspector mechanical engineer, 214436 – expert reviewer mechanical engineer.</p>					
<p><b>Professional skills *</b></p> <p><b>Descriptors of the levels of structural elements of the professional skills. **</b></p>	<p><b>C1</b> <b>Identification, definition, use of notions in fundamental sciences specific to the field of mechanical engineering.</b></p>	<p><b>C2</b> <b>Using first principles and graphic instruments to describe and design mechanical systems and processes.</b></p>	<p><b>C3</b> <b>Ability to research and conduct experimental investigations in order to solve technical problems of mechanical engineering.</b></p>	<p><b>C4</b> <b>Applying the design, analysis and testing methods of components and mechanical systems.</b></p>	<p><b>C5</b> <b>Interpretation and substantiation on technological, functional and economic criteria of mechanical systems solutions.</b></p>	<p><b>C6</b> <b>Using software and computer technologies for designing mechanical equipment.</b></p>
<p><b>SKILLS</b></p>						
<p><b>1. Knowledge, understanding of the concepts, theories and basic methods of the field and the area of specialization; their adequate use in professional communication.</b></p>	<p><b>C1.1</b> Expression by written and oral communication in technical language of the theoretical foundations in the field of engineering; Understanding mathematical and physical notions in solving engineering problems.</p>	<p><b>C2.1</b> Definition and classification of concepts, theories and description of methods used in designing Mechanical equipment and technological processes.</p>	<p><b>C3.1</b> In-depth knowledge of: (a) measuring devices and standard experimental methodologies in mechanical engineering; (b) methods for processing experimental data. Knowledge and proper use of technical terms and specific means of presenting the results.</p>	<p><b>C4.1</b> Description of the principles of operation of equipment at individual and systems level and of sizing, designing and testing methods.</p>	<p><b>C5.1</b> Understanding criteria for selecting variants of components and mechanical systems based on concepts, theories and methods of technical and economic analysis.</p>	<p><b>C6.1</b> Identifying tools, methods and software (databases, assisted design environments) for design in mechanical engineering.</p>
<p><b>2. Using basic knowledge for explaining and interpreting various types of concepts, situations, processes, projects, etc. associated with the domain.</b></p>	<p><b>C1.2</b> The formulation of assumptions and the use of key concepts for the explanation and interpretation of mechanical engineering processes.</p>	<p><b>C2.2</b> Explaining and interpreting specific projects through the use of theoretical concepts and graphical and computing tools.</p>	<p><b>C3.2</b> Using specialised knowledge to explain and interpret the results obtained by experimental determinations / tests specific to mechanical engineering.</p>	<p><b>C4.2</b> Applying principles and methods for the construction, design and execution of mechanical systems and equipment.</p>	<p><b>C5.2</b> Interpretation of technological and functional problems of mechanical systems by applying basic knowledge and using new technologies.</p>	<p><b>C6.2</b> Using specialized knowledge to explain and interpret the notions used and the results obtained by using dedicated design software.</p>

**ABILITIES**

\* Up to 6 professional skills will be identified

\*\* The level descriptors present in the grid matrix shown in the level descriptors of the National Qualifications Higher Education (Figure 3) on the basis of the qualification (Bachelors/ Masters/ PhD)

<p><b>3. Applying basic principles and methods for solving well-defined problems / situations typical of the field under qualified assistance conditions.</b></p>	<p><b>C1.3</b> Selection of research, methods and research procedures - design in order to solve specific mechanical engineering issues.</p>	<p><b>C2.3</b> The formulation and application of the methods and techniques / principles studied for the design of mechanical structures and systems.</p>	<p><b>C3.3</b> Applying predefined research and experimental methodologies to execute / perform experiments in order to solve mechanical engineering problems.</p>	<p><b>C4.3</b> The description and critical assessment of conventional and unconventional technologies and their correlation with the optimal exploitation parameters of mechanical systems and equipment.</p>	<p><b>C5.3</b> Critical and constructive evaluation of ways to achieve and apply technological methods.</p>	<p><b>C6.3</b> Applying the concepts, methods and dedicated software to the design and develop mechanical engineering projects.</p>
<p><b>4. Appropriate use of criteria and standard assessment methods to assess the quality, merits and limits of processes, programs, projects, concepts, methods and theories.</b></p>	<p><b>C1.4</b> Comparative data analysis and their assessment based on theories and methods used in the applied research of mechanical systems in a well-defined context.</p>	<p><b>C2.4</b> Using criteria, evaluation methods, concepts, theories and programs in the design of mechanical systems.</p>	<p><b>C3.4</b> The use of research and experimental methods to evaluate and classify the performance of mechanical equipment and their components.</p>	<p><b>C4.4</b> Formulation and application of basic methods and principles for designing or choosing devices to facilitate the exploitation of mechanical systems and equipment.</p>	<p><b>C5.4</b> Use of principles, established methods and working strategies appropriate to the domain.</p>	<p><b>C6.4</b> Use of IT techniques for design, modeling, simulation and monitoring of mechanical equipment.</p>
<p><b>5. Elaboration of professional projects with the use of established principles and methods in the field.</b></p>	<p><b>C1.5</b> Developing projects, models and prototypes of mechanical structures and systems, using principles and established methods in the engineering field.</p>	<p><b>C2.5</b> Design of technological processes and equipment needed to manufacture mechanical systems and structures.</p>	<p><b>C3.5</b> Designing and conducting research and experimental investigations specific to mechanical engineering using: (a) standard experimental methodologies; (b) standard data processing methods experimental.</p>	<p><b>C4.5</b> Adoption of criteria and methods for assessing concepts, theories and design programs for mechanical systems components.</p>	<p><b>C5.5</b> Adoption of appropriate operational strategy, using modern technologies by applying the principles of sustainable development.</p>	<p><b>C6.5</b> Elaboration of general mechanical engineering projects using computer-assisted design and specific digital technologies.</p>
<p><b>Minimum performance standards for competency assessment:</b></p>	<p>Identification and expression of the principles of operation of a mechanical system using the technical language and physico-mathematical and computer system specific to the engineering domain.</p>	<p>Develop a project including the calculation and graphical representation of some components / processes of mechanical systems.</p>	<p>Use of appropriate methods and tools for measuring mechanical sizes, fluid parameters and electrical size parameters and determination of mechanical characteristics of materials.</p>	<p>Use of simulation and optimization methods for mechanical systems and equipment.</p>	<p>Elaboration of a technical-economic documentation for mechanical systems.</p>	<p>Elaboration of projects in the field of mechanical engineering using modern design and simulation methods.</p>

Level descriptors of transversal competences**	Transversal skills	Minimum performance standards for competence assessment
<b>6. Responsible execution of professional tasks under restricted autonomy and qualified assistance.</b>	<b>CT1</b> Compliance with the principles, norms and values of the Code of Professional Ethics by addressing a rigorous, efficient and responsible work strategy in solving problems and decision-making.	Developing, under qualified assistance, of a management project – organization of a production space in the field of mechanical engineering under conditions of economic efficiency.
<b>7. Familiarizing with specific roles and activities and distribution of tasks for subordinate levels.</b>	<b>CT2</b> Applying multidisciplinary relationship techniques and efficient teamwork on various hierarchical levels within the team of work-specific project management.	Elaboration, with qualified assistance, of a draft of execution / conception / maintenance, including following of the existing technological procedures specific to the specialization, with the establishment of the communication tasks and the roles and responsibilities in the project team members.
<b>8. Awareness of the need for continuous training; Effective use of learning resources and techniques for personal and professional development.</b>	<b>CT3</b> Appropriate use of efficient lifelong learning methods and techniques; Suitable use of information and oral communication and written in an international language.	Elaboration of a professional development plan or a summary in the field of mechanical engineering and editing the summary in an international language.