

## WFY MODULE DESCRIPTION

<b>Subject</b>	
<b>Basics of Physics / Basics of Technics</b>	
<b>Semester</b>	<b>Semester hours per week</b>
<b>1 &amp; 2</b>	<b>5</b>
<b>Module description</b>	
<p><b>First Semester (Basics of Physics):</b></p> <p>The students already have a good knowledge of the German language. Therefore, basic contents and correlations of basic physics can be taught using the German technical terms.</p> <p>The students first expand and deepen their knowledge of physics, learn the mathematical methodology and scientific approach and then apply their knowledge in solving physical-technical tasks.</p> <p>Content is taught in the following main areas:</p> <ol style="list-style-type: none"> <li>1. physical basics</li> <li>2. kinematics - types of movement</li> <li>3. dynamics - Newton's laws; forces; work; power; energy</li> <li>4. rotation - torque; moment of inertia; angular momentum</li> <li>5. thermodynamics</li> </ol> <p><b>Second Semester (Basics of Technics):</b></p> <ol style="list-style-type: none"> <li>1. introduction to manufacturing technology</li> <li>2. classification of manufacturing processes according to DIN 8580 <ol style="list-style-type: none"> <li>2.1 Primary forming (processes with permanent moulds, processes with lost moulds)</li> <li>2.2 Cutting (processes with geometrically defined cutting edge, processes with geometrically undefined cutting edge, tools, technological parameters)</li> </ol> </li> <li>3. basic concepts of company organisation in industrial enterprises <ol style="list-style-type: none"> <li>3.1 Contents of work preparation in the enterprise</li> <li>3.2 Work plan preparation in parts production</li> <li>3.3 Basics of cost accounting (calculation, economic batch size)</li> </ol> </li> <li>4. basics of construction</li> </ol>	

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**Participation requirement: German/English language level**

German B1

**Module objectives****First Semester:**

- Repetition, expansion and deepening of the basic knowledge of physics in the fields of mechanics and thermodynamics.
- Acquisition of knowledge of scientific structures, contexts and technical terms in the German language
- Carrying out and internalising practical exercises related to the theoretical learning content
- Independent solving of physicaltechnical tasks in text form
- Introduction to modern examination methods

**Second Semester:**

- The students expand their technical knowledge in the module, especially in the areas of production and construction technology.
- The module aims to develop the basics for subsequent engineering studies in the field of mechanical engineering or similar.

### Descriptions of the subjects by semester week

Semester	Learning outcomes and summary of module content
1	<p><b>Physical basics:</b></p> <p>The students have important basic knowledge about the structure and composition of scientific work. Building on this, they learn the German technical terms and expand their knowledge.</p> <ul style="list-style-type: none"> <li>• Meaning of physical laws and equations</li> <li>• Structure and application of the International System of Units (SI) with base units and derived units, conversion of units.</li> <li>• Structure and application of the International System of Units (ISQ) with basic and derived units; transforming units.</li> <li>• Dealing with physical laws as mathematical equations</li> <li>• Understanding and application of physical models</li> </ul>
1	<p><b>Kinematics - types of movements:</b></p> <p>The students have important knowledge of kinematics. Building on this, they learn the German technical terms and expand their knowledge. They can solve tasks independently. They grasp the problem, compile the necessary formulas and, if necessary, transform them, present the solution with the use of units in the calculation and can discuss the result.</p> <ul style="list-style-type: none"> <li>• uniform and uniformly accelerated motion in a straight line</li> <li>• uniform and uniformly accelerated circular motion</li> <li>• compound motion (throw and fall)</li> <li>• uniform and uniformly accelerated circular motion</li> </ul>
1	<p><b>Dynamics - Newton's laws; forces; work; power; energy:</b></p> <p>The students have important knowledge of dynamics. Building on this, they learn the German technical terms and expand their knowledge. They can solve tasks independently. They grasp the problem, compile the necessary formulas and, if necessary, transform them, present the solution with the use of units in the calculation and can discuss the result.</p> <ul style="list-style-type: none"> <li>• Basic concepts of dynamics (force, momentum, mass, inertia)</li> <li>• Newton's laws (law of inertia, law of action and law of interaction)</li> <li>• The most important types of forces (weight force, friction force, pressure force, tension force, radial force)</li> <li>• Work, power and energy</li> </ul>

1	<p><b>Rotational dynamics - torque; moment of inertia; angular momentum:</b></p> <p>The students have important knowledge of rotational dynamics. Building on this, they learn the German technical terms and expand their knowledge. They can solve tasks independently. They grasp the task, compile the necessary formulae and, if necessary, reformulate them, present the solution with the use of units in the calculation and can discuss the result.</p> <ul style="list-style-type: none"> <li>• Understanding of rotation with the help of the physical model of the rigid body; degrees of freedom</li> <li>• Torque and laws of leverage</li> <li>• Moment of inertia, angular momentum and conservation of angular momentum</li> </ul>
1	<p><b>Thermodynamics:</b></p> <p>The students have important knowledge of thermodynamics. Building on this, they learn the German technical terms and expand their knowledge. They can solve tasks independently. They grasp the problem, compile the necessary formulae and, if necessary, reformulate them, present the solution with the use of units in the calculation and can discuss the result.</p> <ul style="list-style-type: none"> <li>• Definition of thermodynamics</li> <li>• Temperature, heat, density, ideal gas</li> <li>• Main laws of thermodynamics and general gas equation</li> <li>• Thermal expansion: length, area, volume</li> <li>• Heat expansion</li> </ul>
1	<p><b>Laboratories:</b></p> <p>The students have important basic knowledge about the structure and organisation of scientific work. Building on this, they learn the German technical terms and expand their knowledge.</p> <ul style="list-style-type: none"> <li>• Laboratory experiments on the topics:</li> <li>• Motion with constant velocity</li> <li>• Movements with constant acceleration Compound spring constant</li> <li>• Radial force</li> <li>• Forces on the inclined plane</li> <li>• Torques</li> <li>• Phase transition</li> <li>• Thermal expansion</li> </ul>

Semester	Learning outcomes and summary of module content
2	<p>The students can assign the manufacturing processes to the main groups. They can name the main group definitions of the manufacturing processes according to DIN 8580. They have in-depth knowledge of the processes of the main groups</p> <ul style="list-style-type: none"> <li>• primary forming</li> <li>• Forming</li> <li>• cutting</li> </ul> <p>They have important knowledge in the field of forming and cutting technology. They know the technology of the sand casting process. They can explain the technological requirements and the process sequences in context. They know the processes with geom. determined and indeterminate cutting edges and can assign the corresponding tools to the processes and the mould elements to be produced.</p>
2	<p>The students are enabled to recognise simple spatial geometries and learn basic technical representation methods, as well as learn to sketch simple components and describe their manufacture using basic manufacturing processes. They learn basic standard-compliant representation in construction drawings (title block contents, projection methods, types of representation and types of lines). They learn the importance and responsibility of design in the product life cycle. They learn the basics of the development of a simple design in the individual development stages.</p>
2	<p>The students are familiarised with the most important basic terms of company organisation and receive information about the technical and commercial processes in an industrial company. Based on this, there is a presentation of trends in modern automated planning and control.</p> <ul style="list-style-type: none"> <li>• Organisational structure and process organisation</li> <li>• Types of production</li> <li>• Forms of production</li> <li>• Work systems</li> <li>• CIM / Digital Factory / Industry 4.0</li> <li>• -Product classification / drawings / parts lists</li> </ul>