



Subject card

Subject name and code	IT tools in the work of an engineer, PG_00060210						
Field of study	Technical Physics						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
Education level	first-cycle studies	Subject group				Obligatory subject group in the field of study	
Mode of study	Full-time studies	Mode of delivery				at the university	
Year of study	1	Language of instruction				Polish	
Semester of study	1	ECTS credits				3.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Division of Theoretical Physics and Quantum Informaton -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marta Łabuda				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	45.0	0.0	0.0	45
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	45		5.0		25.0	75
Subject objectives	The main objective of the course is to familiarize students with the latest information technology tools useful in an engineer's work.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W05] has knowledge of programming methodologies and techniques, as well as the use of selected IT tools in physics and engineering.	The student possesses knowledge in using selected information technology tools to solve various engineering problems.			[SW3] Assessment of knowledge contained in written work and projects		
	[K6_U02] is able to analyse and solve complex and non-standard scientific and technical problems using appropriate analytical, computational, numerical, simulation or experimental methods.	The student can analyze and solve simple scientific and technical problems using selected information technology tools.			[SU1] Assessment of task fulfilment		
	[K6_K02] demonstrates readiness to use competences creatively for the benefit of society, including in an entrepreneurial manner.	The student is able to creatively apply their knowledge and skills for the benefit of society, including in entrepreneurial activities.			[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	<p>Course content – laboratory Introduction to Molecular Modeling on a Computer Screen. Modeling and Analysis of Molecular Properties. Data Analysis.</p> <p>Modeling and Analysis of Molecular Vibrational Frequencies. IR Spectrum. Molecular Orbitals.</p> <p>Introduction to Molecular Dynamics.</p> <p>Introduction to WolframAlpha, which allows for quick engineering calculations, including in the fields of mathematics, physics, and chemistry.</p> <p>Introduction to MATLAB as a tool for numerical calculations and engineering simulations.</p> <p>Introduction to LabVIEW as a tool used to create measurement systems, control them, and monitor them.</p> <p>Introduction to FreeFEM, which is software used to solve various mathematical problems using finite element methods and is often used to solve partial differential equations (PDEs) in various fields of science and engineering.</p> <p>Introduction to OpenEMS (Open Electromagnetic Field Solver) as simulation software used for the analysis of electromagnetic fields in three-dimensional structures. OpenEMS is used in the field of electromagnetic engineering, microwave engineering, antenna design, optics, and other areas where there is a need for the analysis and design of electromagnetic devices and structures.</p> <p>Introduction to the Linux operating system, using the example of the Ubuntu distribution.</p> <p>Introduction to Gnuplot as a tool for flexible data visualization.</p> <p>LaTeX as a sophisticated typesetting system widely used to create professional scientific, technical, and mathematical documents, enabling precise and aesthetically pleasing document formatting.</p> <p>Introduction to symbolic computations using Mathematica software.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 1491 794 1514">Subject passing criteria</th> <th data-bbox="799 1491 1137 1514">Passing threshold</th> <th data-bbox="1142 1491 1481 1514">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1520 794 1543">Attendance during labs</td> <td data-bbox="799 1520 1137 1543">60.0%</td> <td data-bbox="1142 1520 1481 1543">43.0%</td> </tr> <tr> <td data-bbox="456 1550 794 1572">Seven short tasks</td> <td data-bbox="799 1550 1137 1572">60.0%</td> <td data-bbox="1142 1550 1481 1572">57.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Attendance during labs	60.0%	43.0%	Seven short tasks	60.0%	57.0%
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Recommended reading	Basic literature	<p>Gabedit : A graphical user interface to computational chemistry packages</p> <p><a href="https://www.faccts.de/orca/">https://www.faccts.de/orca/</a></p> <p>WolframAlpha: <a href="https://www.wolframalpha.com/">https://www.wolframalpha.com/</a></p> <p>Matlab: <a href="https://www.mathworks.com/help/matlab/">https://www.mathworks.com/help/matlab/</a></p> <p>LabVIEW: <a href="https://www.ni.com/docs/en-US/bundle/labview/page/what-is-labview.html">https://www.ni.com/docs/en-US/bundle/labview/page/what-is-labview.html</a></p> <p>FreeFEM: <a href="https://doc.freefem.org/documentation/index.html">https://doc.freefem.org/documentation/index.html</a></p> <p>openEMS: <a href="https://docs.openems.de/">https://docs.openems.de/</a></p> <p>Ubuntu Linux: <a href="https://ubuntu.com/tutorials/command-line-for-beginners#1-overview">https://ubuntu.com/tutorials/command-line-for-beginners#1-overview</a></p> <p>Gnuplot: <a href="http://www.gnuplot.info/docs_5.4/Gnuplot_5_4.pdf">http://www.gnuplot.info/docs_5.4/Gnuplot_5_4.pdf</a></p> <p>Latex/Overleaf: <a href="https://www.overleaf.com/learn">https://www.overleaf.com/learn</a></p> <p>Mathematica: <a href="https://reference.wolfram.com/language/">https://reference.wolfram.com/language/</a></p>
	Supplementary literature	<p><a href="https://www.faccts.de/orca/">https://www.faccts.de/orca/</a></p> <p>WolframAlpha: <a href="https://www.wolframalpha.com/">https://www.wolframalpha.com/</a></p> <p>Matlab: <a href="https://www.mathworks.com/help/matlab/">https://www.mathworks.com/help/matlab/</a></p> <p>LabVIEW: <a href="https://www.ni.com/docs/en-US/bundle/labview/page/what-is-labview.html">https://www.ni.com/docs/en-US/bundle/labview/page/what-is-labview.html</a></p> <p>FreeFEM: <a href="https://doc.freefem.org/documentation/index.html">https://doc.freefem.org/documentation/index.html</a></p> <p>openEMS: <a href="https://docs.openems.de/">https://docs.openems.de/</a></p> <p>Ubuntu Linux: <a href="https://ubuntu.com/tutorials/command-line-for-beginners#1-overview">https://ubuntu.com/tutorials/command-line-for-beginners#1-overview</a></p> <p>Gnuplot: <a href="http://www.gnuplot.info/docs_5.4/Gnuplot_5_4.pdf">http://www.gnuplot.info/docs_5.4/Gnuplot_5_4.pdf</a></p> <p>Latex/Overleaf: <a href="https://www.overleaf.com/learn">https://www.overleaf.com/learn</a></p> <p>Mathematica: <a href="https://reference.wolfram.com/language/">https://reference.wolfram.com/language/</a></p>
	eResources addresses	

<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> <li>1. Modeling and Analysis of Molecular Properties of water. Data Analysis.</li> <li>2. Analysis of Molecular Vibrational Frequencies. IR Spectrum. Molecular Orbitals.</li> <li>3. Simulations of Molecular Dynamics.</li> <li>4. Matlab: Solve a sample system of 10 equations with 10 unknowns.</li> <li>5. . Gnuplot: Create a 3D plot.</li> <li>6. Write text and mathematical expressions in LaTeX</li> </ol>
<p>Practical activities within the subject</p>	<p>Not applicable</p>

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