



## Subject card

Subject name and code	ENGINEER GRAPHICS, PG_00063448						
Field of study	Biotechnology						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	second-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	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Robert Aranowski					
	Teachers	dr inż. Robert Aranowski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	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	30	5.0		40.0		75
Subject objectives	The aim of the course is to acquire knowledge in the field of the basics of descriptive geometry and construction notation (technical drawing) and the ability to read technical drawings and technological diagrams, as well as to create technical drawings in CAD software selected by the teacher.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U03] designs technological solutions for obtaining useful goods using biomolecules and living organisms based on the state of the art in accordance with the latest scientific literature	has the ability to prepare technical documentation of technological devices used in biotechnology			[SU1] Assessment of task fulfilment		
	[K7_W04] selects methods of data analysis, including bioinformatics, statistical and molecular modeling, useful for solving technological and scientific problems in biotechnology and related fields	has knowledge enabling proper preparation of technical documentation of the designed device used in biotechnological processes			[SW3] Assessment of knowledge contained in written work and projects		
Subject contents	Basics of the principles of creating a technical drawing: drawing sheet formats, principles of arranging information on sheets, drawing tables; graphical representation of spatial elements on a plane - projection, drawing scales, methods of graphical representation of the structural form and dimension system, graphical recording of structural connections, assembly and manufacturing drawings. Inventor 2021 or later support: creating your own part model templates, assembly model, technical documentation; User interface basics; Introduction to part design; Parametric 2D modeling, sketches and sketch planes, defining the sketch plane; Solid modeling methods, standard modeling tools and techniques (extruding, rotating, extruding along a path), sharing a sketch; sharing structural elements; Unzipping surfaces (Loft); Creating ribs (Rib); Inserted elements; Holes: types and types of holes, methods of determining the position of holes; Editing and editing technical documentation of parts; types of documentation files, preliminary steps; creating a drawing file; application options for drawing; document settings; drawing templates; permanent drawing elements; editing the sheet layout; editing object properties (i-properties); object style; general standard settings; main and dependent styles; text style; dimensioning style; managing standard elements (styles); basics of creating projections; creating a base model projection; creating basic derived projections, creating sections and details; Dimensioning; editing drawing tables. Selected elements of the machine element design module.						
Prerequisites and co-requisites	Basics computer skills on MS Windows operating system, ability to use pointing tools (mouse, tablet). Knowledge of the MS Windows file and directory system and the ability to perform operations on them (copying, deleting, searching, creating folders). Ability to use FTP, HTTP and file compression software.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Assessment of skills in creating technical documentation using Inventor software	60.0%	50.0%
	Written test on knowledge of technical drawing	60.0%	50.0%
Recommended reading	Basic literature	<p>1.Koczyk H.: Geometria wykreślna. PWN, Warszawa 1995.</p> <p>2.Dobrzański T.: Rysunek techniczny maszynowy. WNT Warszawa 2005.</p> <p>3. Jakulski A., Autodesk Inventor Professional 2021 PL / 2021+ / Fusion 360. Metodyka projektowania, Helion 2020, ISBN 978-83-283-7310-5.</p> <p>4.Suseł M., Makowski K., Grafika inżynierska z zastosowaniem programu AutoCAD, ISBN: 83-7085-910-0, Oficyna Wydawnicza Politechniki Wrocławskiej.</p> <p>5.Mazur J., Kosiński K., Polakowski K., Grafika inżynierska z wykorzystaniem metod CAD, Wydawnictwo: Oficyna Wydawnicza Politechniki Warszawskiej, Rok wydania: 2004, ISBN: 8372074631.</p> <p>6.Drożdżel P., Krzywonos L., Kudasiewicz Z., Zniszczyński A.: Grafika Inżynierska. Zbiór zadań dla mechaników. Cz 1. Liber Duo, Lublin 2005.</p>	
	Supplementary literature	<p>1. PN-EN ISO 128-24: 2003. Rysunek techniczny. Zasady ogólne przedstawiania. Część 2 Linie na rysunkach technicznych maszynowych.</p> <p>2. PN-EN ISO 3098-0: 2002. Dokumentacja techniczna wyrobu. Pismo. Część 0. Zasady ogólne.</p> <p>3. PN-EN ISO 3092-2: 2002. Dokumentacja techniczna wyrobu. Pismo. Część 2. Alfabet łaciński, cyfry i znaki.</p> <p>4. PN-EN ISO 5456-1: 2002. Rysunek techniczny. Metody rzutowania. Część 1. Postanowienia ogólne.</p> <p>5. PN-EN ISO 5456-2: 2002. Rysunek techniczny. Metody rzutowania. Część 2. Przedstawianie prostokątne.</p> <p>6. PN-EN ISO 5456-3: 2002. Rysunek techniczny. Metody rzutowania. Część 3. Przedstawianie aksonometryczne.</p>	
	eResources addresses	<p>Adresy na platformie eNauczanie:            GRAFIKA INŻYNIERSKA - Moodle ID: 40847  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=40847">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=40847</a></p>	

<p>Example issues/ example questions/ tasks being completed</p>	<p><b>Sample questions from the knowledge of technical drawing:</b></p> <ol style="list-style-type: none"> <li>1.What is the purpose of a very thick continuous line in a technical drawing?</li> <li>2.What is the purpose of a thin line in a technical drawing?</li> <li>3.Give an example of marking surface convergence</li> <li>4.Give an example of marking the development length</li> <li>5.Explain the terms: diagram, sketch, technical drawing</li> <li>6.Explain the concepts: part drawing, detail drawing, outline drawing, executive drawing</li> <li>7.Enter the size of the A4 and A1/2 sheet in mm</li> <li>8.Give an example of marking the development length</li> <li>9. How do we define the average surface roughness deviation Ra?</li> <li>10.Draw an Archimedes spiral with pitch h. Describe the individual activities</li> </ol> <p>Examples of questions about using Inventor software:</p> <ol style="list-style-type: none"> <li>1. Design the parts using Inventor based on the technical documentation below</li> <li>2. Assemble the parts according to the technical documentation below</li> <li>3. Make connections with welded parts</li> <li>4. Make technical drawings of parts and assemblies of objects</li> <li>5.Determine the physical parameters such as mass, volume, centre of gravity of the part</li> </ol>
<p>Work placement</p>	<p>Not applicable</p>

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