GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Implants and Endoprotheses, PG_00064142		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Bartmański	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	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	15.0	50

Subject objectives

The purpose of the course is to familiarize students with the basic definitions related to implants and endoprostheses, the areas of application of implant materials (including dentistry, orthopedics, cardiac surgery, ophthalmology, soft tissue treatment), the basic procedures for implantation into the human body, the complications and problems associated with the implantation procedure and the procedure for designing implants, including for the individual patient.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K02] is aware of importance of professional dealing and to fulfill ethics obligations, he/she understands other (nontechnical) abilities of mechanical engineering professional, their influence on the society and security of environment, he/she is aware of importance of social cooperation	The student/student has a basic knowledge of ethics related to implantology and the use of new materials in research with living tissues and organisms.	[SK1] Assessment of group work skills [SK2] Assessment of progress of work
[K6_W06] has knowledge in specific areas related to the application of mechanical engineering in medicine or in the field of medical and rehabilitation devices	The student/student has an elementary knowledge of the use of biomedical materials in various implant areas.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U08] is able to assess the human body physic and functioning of the body organs and is able to use medical knowledge to solve mechanical-medical problems in the scope of the study	The student has knowledge of the anatomy and functioning of the human body.	[SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Lecture: basic definitions related to implants; materials used for implants and endoprostheses; types of implants; use of implants in orthopedics, dentistry, neurology, cardiac surgery, ophthalmology; procedure for hip, knee and dental implants; problems of modern implants; sterilization of implants; elements of ethics in implantology.Project: selection of material, design of an implant for a specific patient along with selection of implant manufacturing technique, methods of surface modification and sterilization of the finished product, cost estimate</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Project</td><td>56.0%</td><td>40.0%</td></tr>
<tr><td>Lecture</td><td>56.0%</td><td>60.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>J. Marciniak, Biomateriały, Wydawnictwo Politechniki Śląskiej, Gliwice, 2013.

B. Świeczko-Żurek, Biomateriały, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2009.

J. Łaskawiec, R. Michalski, Zagadnienia teoretyczne i aplikacyjne w implantach, Wydawnictwo Politechniki Śląskiej, Gliwice, 2002.

M. Nałęcz, S. Błażewicz, L. Stoch, Biomateriały, Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2003.</td></tr>
<tr><td>Supplementary literature</td><td>English articles in the field of implantology, such as:

G.M. Raghavendra, K. Varaprasad, T. Jayaramudu, Biomaterials: Design, Development and Biomedical Applications, Nanotechnology Applications for Tissue Engineering. (2015) 2144. doi:10.1016/B978-0-323-32889-0.00002-9.

Q. Chen, G.A. Thouas, Metallic implant biomaterials, Materials Science and Engineering R: Reports. 87 (2015) 157. doi:10.1016/j.mser.2014.10.001.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Definition of biomaterial and implant.
2. The components of a typical total hip endoprosthesis with a statement of the material.
3. The components of a typical dental implant with mention of the material from which each component could be made.
4. Methods of spinal stabilization.
5. Construction of a stent and a stent graft with an indication of the difference between the two.
6. Definition of sterilization.
7. Selection of material and surface modification for a specific implant, including for an individual patient.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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