GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | , PG_00056101 | | |
| Field of study | Mechanical and Medical Engineering | | |
| Date of commencement of studies | October 2021 | Academic year of realisation of subject | 2023/2024 |
| Education level | first-cycle studies | Subject group | |
| 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 | assessment |
| Conducting unit | Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Beata Majkowska-Marzec | |
| | Teachers | dr inż. Beata Majkowska-Marzec<br>dr inż. Alicja Stanisławska<br>dr inż. Michał Bartmański<br>dr inż. Magda Rościszewska | |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
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| | Number of study hours | 15.0 | 0.0 | 15.0 | 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 |
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| | Number of study hours | 30 | 0.0 | 0.0 | 30 |

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| Subject objectives | The aim of the course is to obtain by students basic knowledge and skills related to the technology of producing metal, ceramic, polymer and composite biomaterials, methods of producing implants for various applications, process control and research methods. |

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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
| | [K6_W04] he/she has skills in the field mechanical testing of materials used in engineering and mechanical-medical area | Student is able to characterize the main technologies of producing biomaterials and implants, justify them, provide the necessary methods of control and development research. | [SW1] Assessment of factual knowledge<br>[SW2] Assessment of knowledge contained in presentation |
| | [K6_W13] he/she has knowledge related to application of engineering approaches in medicine or application of medical devices and rehabilitation devices | Student is able to characterize the basic techniques of producing biomaterials and implants, including subtractive and additive methods. | [SW1] Assessment of factual knowledge<br>[SW3] Assessment of knowledge contained in written work and projects |
| | [K6_K01] he/she knows his/her proficiencies and his/her limitations in performing professional tasks, he/she is aware of needing to improve his/her skills through the whole life, he/she has entrepreneurship and innovation skills, he/she is aware of engineering skills from the society point of view | The student is able to explore the professional literature on the technology of producing biomaterials and implants, determine the degree of innovation of the proposed methods and purposeful progress in these areas. | [SK4] Assessment of communication skills, including language correctness<br>[SK1] Assessment of group work skills<br>[SK2] Assessment of progress of work |
| | [K6_U07] he/she is able to identify the problem and list simple engineering tasks to solve this problem in practice, he/she is able to critically analyze the proposed technical solutions and conclude whether these solutions can be implemented to solve problems related to design of mechanical devices and mechanical-medical devices | The student knows how to assess the production technologies existing in the field of biomaterials and implants, their advantages and disadvantages, methods of control and research. | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools<br>[SU5] Assessment of ability to present the results of task |
| | [K6_W07] he/she is able to design, manufacture and utilize machine parts and technical devices, he/she can prepare a technical documentation | The student has the necessary knowledge about the design of technology for the production of biomaterials and implants, technological diagrams, technical documentation. | [SW1] Assessment of factual knowledge<br>[SW3] Assessment of knowledge contained in written work and projects |
| Subject contents | Technologies for the production of metallic biomaterials and implants: molding, additive methods, subtraction methods, post-treatment, process control, research methods. Technologies for the production of ceramic biomaterials and implants: powder metallurgy, additive methods, chemical methods, process control, research methods. Technologies for the production of polymer biomaterials and implants: additive methods, subtractive methods, electrospinning, process control, research methods. Technologies for the production of composite biomaterials and implants: additive methods, process control, research methods. | | |
| Prerequisites and co-requisites | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Laboratory exercices | 50.0% | 50.0% |
| | Written examination | 50.0% | 50.0% |
| Recommended reading | Basic literature | B. Świeczko-Żurek, A. Zieliński, A. Ossowska, S. Sobieszczyk: Biomateriały. Wyd. Politechniki Gdańskiej, Gdańsk, 2011.<br><br>A. Zieliński, W. Serbiński, T. Seramak, A. Ossowska, B. Świeczko-Żurek: Innowacyjne technologie kształtowania właściwości materiałów konstrukcyjnych i biomedycznych. Wyd. Politechniki Gdańskiej, Gdańsk, 2018.<br><br>J. Marciniak, M. Błażewicz, W. Torbicz: Biomateriały. [W} Inżynieria biomedyczna. Podstawy i zastosowania. Tom 4. Akad. Ofic. Wydawn. Exit, Katowice, 2016. | | |

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| | Supplementary literature | M. Bartmański, A. Hernik, M. Jażdżewska, B. Majkowska-Marzec, A. Ossowska, B. Świeczko-Żurek, B. Trybuś, J. Wosek, K. Zasińska, A. Zieliński: Nanotechnologia w medycynie i kosmetologii. Wyd. Politechniki Gdańskiej, Gdańsk, 2018.<br><br>H. Singh. S. Singh, C. Prakash: Current Trends in Biomaterials and Bio-manufacturing. [W] Biomanofacturing, Chapter 1, pp. 1-39. https://www.researchgate.net/publication/331161230_Current_Trends_in_Biomaterials_and_Bio-manufacturing. |
| | eResources addresses | Adresy na platformie eNauczanie:<br>Technologie wytwarzania biomateriałów, IMM, UMIiB, Ist., sem.6 - Moodle ID: 38322<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38322 |
| Example issues/ example questions/ tasks being completed | 1. What is the production of implants by 3D printing and what are its varieties for polymers (example)?<br><br>2. How are ceramic dental implants made?<br><br>3. What is the intraoral scanner used for in prosthetics and how does it affect the accuracy of prosthetic components in dentistry? | |
| Work placement | Not applicable | |

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