GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | Electronical Medical Equipment II, PG_00053504 | | |
| Field of study | Biomedical Engineering, Biomedical Engineering, Biomedical Engineering | | |
| Date of commencement of studies | October 2024 | Academic year of realisation of subject | 2026/2027 |
| Education level | first-cycle studies | Subject group | Obligatory subject group in the field of study<br>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 | 5 | ECTS credits | 1.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Tomasz Kocejko | |
| | Teachers | dr inż. Tomasz Kocejko | |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 0.0 | 0.0 | 15.0 | 0.0 | 0.0 | 15 |
| | 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 | 15 | 2.0 | 10.0 | 27 |

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| Subject objectives | To familiarize students with the types and requirements for the medical equipment, especially electronic medical equipment. |

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K6_W06] Knows and understands the basic processes occurring in the life cycle of devices, facilities and systems specific to a given field of study. | The student knows the requirements and standards for different classes of requirements for medical equipment, basic methods for solving engineering problems, ways to support vital functions, including the use of artificial organs and implants, knows the materials for their production and their properties | [SW1] Assessment of factual knowledge |
| [K6_W03] knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum | Student<br>-knows regulations dealing with medical devices<br>-identyfies hazards associated with given type of medical device | [SW1] Assessment of factual knowledge |
| [K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study | The student knows the basic measurement methods used in medical, diagnostic techniques known physiological systems and principles of imaging techniques | [SW1] Assessment of factual knowledge |
| [K6_W54] Knows and understands, to an advanced extent, selected aspects of biomedical diagnostics | The student knows the basic measurement methods used in medical, diagnostic techniques known physiological systems and principles of imaging techniques | [SW1] Assessment of factual knowledge |

**Subject contents**

1 Characteristics of medical equipment (AM) and the conditions to be met by construction of such devices, 2 Basics safety considerations, 3 Sources of electrical signals and their biological characteristics, 4. Electrography and their design, 5. Cell's electrography, 6. ECG - electrodes and measuring systems, 7. Vectorcardiography, 8. Holter equipment and special, 9. Electromyography and plethysmography, 10. Fundamentals of EEG measurement, 11. Problems of electrographic signal analysis, 12. Electroimpedance measurements - ICG, 13. Biomechanical signals measurements, 14. Polygraphs and their applications, 15. Nerve and muscle stimulators, 16. Defibrillators, pacemakers and cardioverter, 17. Spirometry, 18. Audiometry, 19. Intensice Care Medicine, 20. Equipment and screening systems, 21. Apparatus Ultrasound - basics, 22. Ultrasound, 23. Methods of Doppler ultrasound technique, 24. Fundamentals of radiological measurements, 25. X-ray detectors, 26 The concept of tomographic measurements, tomographic scanners types, 28. Magnetography and its applications, 29 Overview of optical diagnostic methods, 30. Development trends in the design of medical equipment

**Prerequisites and co-requisites**

Backgrounds of physics, mathematics and anatomy

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Exam | 60.0% | 100.0% |

**Recommended reading**

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| Basic literature | Materiały pomocnicze do wykładu i laboratorium, Gdańsk, 2010<br><br>M. Nałęcz [red.] Biocybernetyka i Inżynieria Biomedyczna, t.2. Biopomiary, Exit, Warszawa, 2001<br><br>J. D. Bronzino [ed.], The Biomedical Engineering Handbook, CRC, 2006<br><br>Laboratory instructions, KIBM-WETI |
| Supplementary literature | Enderle [red}, Introduction to biomedical engineering, Elsevier, 2005<br><br>Pawlicki G., Podstawy Inżynierii Medycznej, OWPW, Warszawa, 1997 |
| eResources addresses | Adresy na platformie eNauczanie: |

**Example issues/ example questions/ tasks being completed**

1. Describe factors determining a safety of medical equipment?

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| Work placement | Not applicable |

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