# GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

| Subject name and code | Multimedia Data Exchange and Storage, PG_00068232 | | |
|---|---|---|---|
| Field of study | Biomedical Engineering | | |
| Date of commencement of studies | October 2025 | Academic year of realisation of subject | 2027/2028 |
| Education level | first-cycle studies | Subject group | Optional subject group<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 | 3.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Department of Biomedical Engineering -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | prof. dr hab. inż. Jacek Rumiński | |
| | Teachers | | |

| Lesson types | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | 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 |
|---|---|---|---|---|---|
| | Number of study hours | 30 | 3.0 | 42.0 | 75 |

| Subject objectives | The aim of the subject is for the student to acquire skills in the implementation of tasks related to the exchange of data in health care information systems and to acquire knowledge of standards and methods, the knowledge of which is crucial in the development of the indicated skills. |
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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
|---|---|---|---|
| | [K6_W04] knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices | The student has acquired knowledge in the following areas:<br>- construction of multimedia medical data structures (DICOM, HL7),<br>- interpretation of the multimedia medical data recording format (DICOM, HL7),<br>- methods of multimedia data compression,<br>- requirements for multimedia data exchange systems, taking into account limitations in medicine,<br>- construction of data exchange systems based on PACS systems. | [SW1] Assessment of factual knowledge |
| | [K6_U07] can apply methods of process and function support, specific to the field of study | The student has acquired the ability to:<br>- interpret the format of multimedia medical data (DICOM, HL7),<br>- design data structures for multimedia medical data (DICOM, HL7),<br>- select multimedia data compression methods,<br>- design multimedia data exchange systems taking into account limitations in medicine,<br>- interpret standards and recommendations in the field of multimedia data storage and exchange. | [SU1] Assessment of task fulfilment |

| Subject contents | Course content – lecture<br>Objectives and methods of multimedia data exchange in medicine - introduction. Information systems in medicine - classification and architecture of systems.Introduction to multimedia data compression.Image compression using JPEG and JPEG 2000 methods,Video compression using MPEG family methods,MPEG 7 multimedia data representation. Multimedia data representation - use of deep learning methods for data representation.Medical data exchange standards: DICOM - data representation.Medical data exchange standards: data visualization. Medical data exchange standards: DICOM - data exchange.Medical data exchange standards - use in PACS systems.Medical data exchange standards: HL7 up to version 2.X,Medical data exchange standards: HL7 in version 3.0: RIM, CDA and their application in clinical systems,Medical data exchange standards: HL7 FHIR.<br><br>Laboratory:<br><br>Data exchange and interpretation in hospital information systems (HL7) Interpretation and visualization of image data in PACS systems (DICOM) Image data exchange in PACS systems (DICOM) Data anonymization, sharing and processing of DICOM data. JPEG data compression and image quality assessment metrics |
| --- | --- |
| Prerequisites and co-requisites | Knowledge and skills in the area of computer program construction, program design and computer program implementation. Knowledge and skills in the area of basic digital image representation. |

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
| --- | --- | --- |
| Written exam | 51.0% | 60.0% |
| Practical exercise | 50.0% | 40.0% |

## Recommended reading

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| --- | --- |
| Basic literature | HL7, norma i dokumenty HL7, dostęp: http://www.hl7.org K. R. Rao and P. Yip, Discrete Cosine Transform: Algorithms, Advantages, Applications (Academic Press, Boston, 1990). Materiały do przedmiotu opracowane w formie edukacji na odległość, dostęp: http://uno.biomed.gda.pl Metody i urządzenia do archiwizacji danych: http://www.storagestandard.pl/ N. Ahmed, T. Natarajan, and K. R. Rao, "Discrete Cosine Transform", IEEE Trans. Computers, 90-93, Jan 1974. NEMA, Norma DICOM, dostęp: http://medical.nema.org Skrypt z materiałami do przedmiotu Wymiana i składowanie danych multimedialnych |
| Supplementary literature | No requirements |
| eResources addresses | |

| Example issues/ example questions/ tasks being completed | |
| --- | --- |
| Practical activites within the subject | Not applicable |

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