GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Medical Telematics, PG_00053406		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional subject group 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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	2.0
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 hab. inż. Mariusz Kaczmarek	
	Teachers	dr hab. inż. Mariusz Kaczmarek	

Lesson types and methods of instruction

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	3.0	17.0	50

Subject objectives

Familiarizing students with selected techniques and standards used in telemedicine as well as developing the knowledge acquired so far in the field of programming for software for portable and wearable devices such as smartphones and fitbands

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W53] Knows and understands, to an increased extent, selected aspects of biomedical diagnostics.	Knows the basics of physiology and anatomy. Is able to determine the sources of signals in a living organism.	[SW1] Assessment of factual knowledge
[K7_W05] Knows and understands, to an increased extent, methods of process and function support, specific to the field of study.	Is able to organize his/her work environment, recognizes the possibilities of using external sources and libraries to improve the solution implementation process.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U03] can design, according to required specifications, and make a complex device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Is able to select electronic components to build a sensor of selected vital signs and then program a data acquisition and transfer system. can write a program for a mobile device with popular operating systems using existing APIs.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	Writes a program using user interaction, designs and implements SI using SOA and Web Services technologies, designs and develops the basis for the functioning of a medical IT system.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Lecture:

1. Basic concepts of medical telematics.
2. Systems of remote acquisition of medical data, basic concepts, definitions, standards.
3. Principles and quality of telematics systems in medicine, aspects of biometric authentication of remote services, etc.
4. Selected aspects of ISO 11073 standard
5. Practical applications of AI - e.g. remote recognition of emotions, diseases, telemedicine, etc.
6. Methods and standards of data exchange in medicine - specification of requirements and limitations.
7. Exchange and remote evaluation of medical signals (ECG, others)
8. Integration of systems and networks in medicine
9. Wireless communication standards used in biomedical monitoring (WiFi, Bluetooth, GPRS, mWLAN)
10. Principles and good practices of creating software for mobile devices (Android, www) in the Agent-Manager architecture
11. Preparation of a research project in the field of medical telematics

Project::

1. Problem definition, analysis of the state of knowledge, definition of functional and non-functional requirements and solution design
2. Implementation of the solution prototype
3. Testing and verification of the solution
4. Optimization and corrections of the prototype
5. Preparation of design documentation

Prerequisites and co-requisites

Information technology

Programming methods and techniques

1. Program structure in structured programming

1.1. Variables, data types, functions

1.2. Control instructions

1.3. Compilation and execution of programs

1.4. Basic data structures

1.5. The ability to move from ideas through algorithm to program

2. Program structure in object-oriented programming

2.1. Class design and writing

2.2. Creating and using objects

2.3. Elements of the object-oriented paradigm (abstraction, encapsulation, inheritance, polymorphism)

2.4. Using class libraries

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written reports on problem analysis	51.0%	20.0%
Test	51.0%	20.0%
Project	51.0%	60.0%

Recommended reading

Basic literature	1. Almathami HKY, Win KT, Vlahu-Gjorgievska E. Barriers and facilitators that influence telemedicine-based, real-time, online consultation at patients homes: systematic literature review. J Med Internet Res 2020;22:e16407. 2. Zhai Y. A call for addressing barriers to telemedicine: health disparities during the COVID-19 pandemic. Psychother Psychosom. 3. **Tom 7. Informatyka w medycynie**, pod redakcją A. Nowakowskiego, INŻYNIERIA BIOMEDYCZNA - Podstawy i zastosowania, ISBN 978-83-7837-087-1, 2020
Supplementary literature	https://www.medicaid.gov/medicaid/benefits/telemedicine/index.htmlexternal icon. https://www.cdc.gov/coronavirus/2019-ncov/hcp/telehealth.html. https://www.federalregister.gov/d/2020-17364/improving-rural-health-and-telehealth-accessexternal icon.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	As part of design classes, students will complete the software development process, from learning about the topic of the task, through design analysis and design, to code implementation, testing and documentation. At the first project meeting, the teacher will present the rules of project implementation (including the availability of document templates, schedule of project meetings, consultation hours) and divide the task topics. Subsequent meetings will be devoted to presenting individual stages of the student's project implementation. During the meetings, the instructor will provide students with tips on recommended changes in a given phase of the project. Two weeks before the end of classes in a given semester, students will prepare a complete solution along with documentation and upload it to the distance education platform. During the last two weeks of classes, all students will present the effects of their work (during project meetings).
Work placement	Not applicable

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