GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Modern applications of functional programming, PG_00054419 | | |
| Field of study | Informatics, 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<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 | 1 | Language of instruction | Polish |
| Semester of study | 2 | ECTS credits | 3.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Department of Algorithms and Systems Modelling -> Faculty of Electronics, Telecommunications and Informatics | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Krzysztof Manuszewski | |
| | Teachers | dr inż. Krzysztof Manuszewski | |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 15.0 | 0.0 | 15.0 | 0.0 | 15.0 | 45 |
| | 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 | 45 | 6.0 | 24.0 | 75 |

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| Subject objectives | Makeing students familiar with functional paradigm. Learning of idiomatic programming in selected functional languages. Learning of particular applications and benefits of using functional approach |

## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
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| [K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it | Is able to practical application of functional patterns | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU1] Assessment of task fulfilment |
| [K7_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 | Knows and understands practical possibilities of application of functional approach to development of software solutions (e.g. functional modeling of domain etc.) | [SW3] Assessment of knowledge contained in written work and projects<br>[SW2] Assessment of knowledge contained in presentation |
| [K7_U41] can select methods of modelling and analysis of information systems and applications using selected elements of theoretical computer science and modern programming tools | Is able to practical application of functional patterns | [SU3] Assessment of ability to use knowledge gained from the subject<br>[SU1] Assessment of task fulfilment |
| [K7_W42] Knows and understands, to an increased extent, the principles and trends in the analysis and design of local and distributed IT systems and the basics of computer modeling and computerization of complex cognitive and decision-making processes. | Knows the benefits and implications that are connected to functional approach | [SW2] Assessment of knowledge contained in presentation<br>[SW1] Assessment of factual knowledge |
| [K7_W03] Knows and understands, to an increased 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. | Understands functional design patterns | [SW2] Assessment of knowledge contained in presentation<br>[SW1] Assessment of factual knowledge |

## Subject contents

- Wprowadzenie do wybranego jezyka programowania funkcyjnego
- Porównanie podejścia deklaratywnego oraz imperatywnego, rekurencja
- Idea niezmiennych wartości
- Porównanie funkcji operujących na niezmiennych wartościach do obiektów z metodami modyfikującymi ich stan
- Czystość oraz pierwszorzędność funkcji
- Adaptacja technik funkcyjnych w nowoczesnych językach obiektowych
- Wybrane zaawansowane zagadnienia jak np. Monady oraz ich zastosowania, obsługa błędów, wstrzykiwanie zależności, currying, funkcje wyższego rzędu, dopasowanie wzorca, przetwarzanie współbieżne i programowanie zorientowane na dane
- Przegląd języków funkcyjnych i ich cech charakterystycznych
- Wybrane aplikacje podejścia funkcyjnego np. efektywne przetwarzanie równoległe, eksploracja danych, aplikacje finansowe
- Wybrane narzędzia pozwalające np. równolegle przetwarzać dane / wykonywać obliczenia, tworzyć rowiązania aplikacyjne itp.

## Prerequisites and co-requisites

- high level programming language
- course about algorithms and datastructures

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| test | 40.0% | 30.0% |
| seminar-participation | 50.0% | 30.0% |
| laboratory | 50.0% | 40.0% |

## Recommended reading

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|---|---|
| Basic literature | • Becoming Functional, Joshua Backfield, O'Raily 2014 |
| Supplementary literature | Functional Thinking, Neal Ford, O'Raily 2014 |

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| | eResources addresses | Adresy na platformie eNauczanie: |
| Example issues/ example questions/ tasks being completed | | |
| Work placement | Not applicable | |