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|---|---|---|
| **1.** | **Field of study** | **Mathematics** |
| 2. | Faculty | Faculty of Science and Technology |
| 3. | Academic year of entry | 2023/2024 (winter term) |
| 4. | Level of qualifications/degree | first-cycle studies |
| 5. | Degree profile | general academic |
| 6. | Mode of study | full-time |

| **7.** | **General information about the module** |
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| **Module name** | **Advanced Programming** |
| Module code | W4-MT-S1-23-PZaw |
| Number of the ECTS credits | 3 |
| Language of instruction | Polish |
| Purpose and description of the content of education | 1. Obsługa plików w języku Python.<br>2. Wyjątki w języku Python.<br>3. Moduły definiowane przez użytkownika.<br>4. Programowanie strukturalne a programowania obiektowe; cechy programowania obiektowego.<br>5. Podstawy programowania obiektowego w języku Python:<br>- klasa a obiekt; metody i pola,<br>- konstruktory,<br>- przeładowanie operatorów,<br>- dziedziczenie,<br>- polimorfizm,<br>- hermetyzacja.<br>6. Listy dowiązane; algorytmy operujące na listach.<br>7. Drzewa binarne; podstawowe algorytmy operujące na drzewach binarnych. |
| List of modules that must be completed before starting this module (if necessary) | [W4-MT-S1-23-WPr] Introduction to Programming |

**8. Learning outcomes of the module**

| Code | Description | Learning outcomes of the programme | Level of competenc (scale 1-5) |
|---|---|---|---|
| PZawS1_1 | Student potrafi pisać programy przetwarzające pliki oraz komunikujące się poprzez standardowe wejście i wyjście. | KN_I_U03<br>KN_I_U04<br>K_U26<br>K_U27<br>K_W08 | 3<br>5<br>5<br>5<br>5 |
| PZawS1_2 | Student ma uporządkowaną wiedzę w zakresie składni języka wysokiego poziomu. Student zna w stopniu podstawowym zasady konstruowania programów wielomodułowych. | KN_I_U03 | 3 |

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| | | KN_I_U04<br>K_U26<br>K_U27<br>K_W08 | 5<br>5<br>5<br>5 |
| PZawS1_3 | Student zna  podstawowe pojęcia związane z programowaniem obiektowym. | KN_I_U03<br>KN_I_U04<br>K_U26<br>K_U27<br>K_W08 | 3<br>5<br>5<br>5<br>4 |
| PZawS1_4 | Student potrafi współpracować w zespole pracującym nad różnymi aspektami tego samego projektu. | KN.2023_KS01<br>KN.2023_KS03<br>KN_I_U11<br>K_U43 | 3<br>3<br>2<br>3 |
| PZawS1_5 | Student rozumie potrzebę samokształcenia oraz przestrzegania zasad etycznych i prawnych. | KN_I_K01<br>KN_I_K02 | 5<br>5 |
| PZawS1_6 | Student zna zasady BHP pracowni komputerowej. | KN_I_U12<br>KN_I_W10 | 5<br>5 |

**9. Methods of conducting classes**

| Code | Category | Name (description) |
|---|---|---|
| b07 | Problem-solving methods | Activating methods: a case study<br>*a comprehensive description of a phenomenon connected with the selected discipline; reflecting the reality, presenting the 'what', 'where' and 'how' of the phenomenon, i.e., all of its key aspects to be discussed in class; used as a reproduction, presentation, discussion or diagnosis of factors that shape the phenomenon or interact with it; an in-depth qualitative analysis and evaluation of a selected phenomenon* |
| b08 | Problem-solving methods | Activating method – peer learning<br>*learning through the exchange of knowledge in a group/team/pair of students, i.e., in the so-called learning cell; a kind of mutual learning; an approach focused on student activity under the guidance of the person teaching the course; a learning situation where students with a similar level of experience learn from one another* |
| b09 | Problem-solving methods | Activating method – flipped classroom<br>*anticipatory learning; work in class is based on previously studied material indicated by the person teaching the course; preparation outside the classroom serves the purpose of getting familiar with the issues whose knowledge is necessary for participating in the in-class discussion and the training in the related practical skills; the activity is based on the work of students under the guidance of the person teaching the course* |
| c07 | Demonstration methods | Screen presentation<br>*a presentation of synthetic image content using computer graphics, e.g., a series of slides or other multimedia forms, usually accompanied by a commentary; typical components of a screen presentation include text organized into bulleted points, charts, images and animations, sometimes sound effects or music; a multimedia illustration of course content presented in the form of a projected image* |
| d01 | Programmed learning methods | Working with a computer |

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|---|---|---|
| | | *e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline* |
| e01 | Practical methods | Laboratory exercise / experiment<br>*[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment* |
| e07 | Practical methods | Simulation<br>*an indirect method; imitating reality in order to gain experience approximating a real one; recreating a real-world situation so that its participant can acquire an experience close to the authentic one; work on "replacement" material* |
| f02 | Methods of self-learning | Individual work with a text<br>*searching for and acquiring new information using textbooks and other written sources (including their digital versions); searching for texts, selecting fragments for analysis/interpretation, using other texts to solve a problem related to the studied issue* |

**10. Forms of teaching**

| Code | Name | Number of hours | Assessment of the learning outcomes of the module | Learning outcomes of the module | Methods of conducting classes |
|---|---|---|---|---|---|
| W4-MT-S1-23-PZaw | laboratory classes | 45 | course work | PZawS1_1, PZawS1_2, PZawS1_3, PZawS1_4, PZawS1_5, PZawS1_6 | b07, b08, b09, c07, d01, e01, e07, f02 |

**11. The student's work, apart from participation in classes, includes in particular:**

| Code | Category | Name (description) | Is it part of the BUNA? |
|---|---|---|---|
| a01 | Preparation for classes | Search for materials and review activities necessary for class participation<br>*reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes* | Yes |
| a02 | Preparation for classes | Literature reading / analysis of source materials<br>*reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class* | No |
| a03 | Preparation for classes | Developing practical skills<br>*activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)* | No |
| a04 | Preparation for classes | Consulting materials complementary to those indicated in the syllabus<br>*agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation* | Yes |
| b01 | Consulting the curriculum and the organization of classes | Getting acquainted with the syllabus content<br>*reading through the syllabus and getting acquainted with its content* | No |
| b02 | Consulting the curriculum and the organization of classes | Verification / adjustment / discussion of syllabus provisions<br>*consulting the content of the syllabus, possibly in the presence of the year tutor or members of the class group, and, if necessary, reassessing the provisions concerning special conditions for class* | Yes |

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| | | *participation, e.g., space and time requirements, technical and other requirements, including conditions for participation in classes outside the walls of the university, classes organized in blocks, organized online, etc.* | |
| c02 | Preparation for verification of learning outcomes | Studying the literature used in and the materials produced in class<br>*exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class* | No |
| c03 | Preparation for verification of learning outcomes | Implementation of an individual or group assignment necessary for course/phase/ examination completion<br>*a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course* | Yes |

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: https://usosweb.us.edu.pl.