

**APPROVED by**

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**for continuing education**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Ibrayev A.M.**

**“\_\_\_\_”\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2024**

**Syllabus for the discipline**

**«Programming Principles II»**

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| **Author (lecturer) (full name, position, academic degree, contact information)** | Kelgenbayev A., Senior lecturer, MSc, [a.kelgenbayev@kbtu.kz](mailto:a.kelgenbayev@kbtu.kz)) |
| **Academic year and semester** | 2023-2024, 2 (spring) semester |
| **Educational program** | Макрофинансы и Data Science (MBA), Финансовый риск-менеджмент и Data Science (MBA), Финансовые технологии (МВА) |
| **Number of academic credits / ECTS** | 6 ECTS |

1. **Brief description of the discipline**

Objective of this course is to teach students how to use basic programming principles for creating console and desktop applications. This course uses Python as the main programming language. The course will teach students how to use Python core libraries like IO, Pygame, Serialization, Forms, Database and etc. to create applications. Students who successfully pass this course may expect to acquire firm grasp on programming principles.

1. **Purpose of the discipline and learning outcomes**

* Learn the fundamentals of Python
* Work with primitive types and expressions
* Work with non-primitive types (classes, structs, arrays and enums)
* Learn the difference between value types and reference types
* Control the flow of programs using conditional statements
* Use arrays and lists
* Work with files and directories
* Work with text
* Work with date and time
* Debug Python applications effectively
* Understand the problems with inheritance and how composition solves these problems
* Learn how to create Graphical User Interface Elements

**3. Summary of the discipline**

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| --- | --- | --- | --- | --- | --- |
| Dates (week of study) | Topics of the discipline | Brief summary of the topic (questions) | Number of hours | | |
| Contact hours | IWS | |
| IWMS | IWMSL |
| 1 | Lecture 1. Python fundamentals | 1. Python Intro 2. Python User Input 3. Python Get Started 4. Python Syntax 5. Python Comments 6. Python Variables 7. Python Data Types 8. Python Numbers 9. Python Casting 10. Python Strings 11. Python String Formatting 12. Python Booleans 13. Python Operators 14. Python If...Else 15. Git | 4 | 7 | 1 |
| 2 | Lecture 2. Python fundamentals | 1. Python While Loops 2. Python Lists 3. Python For Loops 4. Python Arrays 5. Python Tuples 6. Python Sets 7. Python Dictionaries | 4 | 7 | 1 |
| 3 | Lecture 3 | 1. Python Functions 2. Python Lambda 3. Python Classes and Objects. 4. Python Inheritance | 4 | 7 | 1 |
| 4 | Defense 1 |  | 4 | 7 | 1 |
| 5 | Lecture 4 | 1. Python Iterators, Generators 2. Python Scope 3. Python Modules 4. Python Dates 5. Python Math 6. Python JSON | 4 | 7 | 1 |
| 6 | Lecture 5. Regex in Python | Using Regex to search and match string patterns in text.   1. Metacharacters 2. Special Sequences 3. compile function | 4 | 7 | 1 |
| 7 | Lecture 6 | **Directories and files.**   1. Python File Handling 2. Python Read Files 3. Python Write/Create Files 4. Python Delete Files 5. Working with directories   **Python builtin functions.**   1. Builtin function of python. | 4 | 7 | 1 |
| 8 | Defense 2 |  | 4 | 7 | 1 |
| 9 | Lecture 7. Pygame | 1. Getting Started 2. Working with Images 3. Music and Sound Effects 4. Geometric Drawing 5. Timer | 4 | 7 | 1 |
| 10 | Lecture 8. Pygame | 1. Fonts and Text 2. More on Input 3. Centralized Scene Logic 4. Game Creation | 4 | 7 | 1 |
| 11 | Defense 3 |  | 4 | 7 | 1 |
| 12 | Lecture 9. Databases | Saving data to database. Reading from the database. Updating and deleting data in the database. | 4 | 7 | 1 |
| 13 | Lecture 10. Databases | Additional topics | 4 | 7 | 1 |
| 14 | Lecture 11. Introduction to data analytics | Introduction to data analytics with Python. | 4 | 7 | 1 |
| 15 | Defense 4 |  | 4 | 7 | 1 |
| TOTAL | | | 60 | 105 | 15 |

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| IWMSL Schedule**\*** | | | |
| Наименование задания | Краткое содержание задания | Форма завершения | Срок предоставления преподавателю |
| TSIS 1 | Solve problems for laboratory work#1 according to lecture topics. | GitHub uploaded project | Week 1 |
| TSIS 2 | Solve problems for laboratory work#2 according to lecture topics. | GitHub uploaded project | Week 2 |
| TSIS 3 | Solve problems for laboratory work#3 according to lecture topics. | GitHub uploaded project | Week 3 |
| TSIS 4 | Solve problems for laboratory work#4 according to lecture topics. | GitHub uploaded project | Week 5 |
| TSIS 5 | Solve problems for laboratory work#5 according to lecture topics. | GitHub uploaded project | Week 6 |
| TSIS 6 | Solve problems for laboratory work#6 according to lecture topics. | GitHub uploaded project | Week 7 |
| TSIS 7 | Solve problems for laboratory work#7 according to lecture topics. | GitHub uploaded project | Week 9 |
| TSIS 8 | Solve problems for laboratory work#8 according to lecture topics. | GitHub uploaded project | Week 10 |
| TSIS 9 | Solve problems for laboratory work#9 according to lecture topics. | GitHub uploaded project | Week 12 |
| TSIS 10 | Solve problems for laboratory work#10 according to lecture topics. | GitHub uploaded project | Week 13 |
| TSIS 11 | Solve problems for laboratory work#11 according to lecture topics. | GitHub uploaded project | Week 14 |

\*- indicate which are subject to assessment as part of current control

1. **List of recommended literature**

Basic literature:

1. <https://www.w3schools.com/python/default.asp>
2. Python documentation - <https://docs.python.org/>
3. Pygame documentation - <https://www.pygame.org/docs/>
4. Pygame documentation in Russian - <https://docs-python.ru/tutorial/>
5. Harvard CS50 course - <https://cs50.harvard.edu/python/2022/>
6. **Teaching methodology (educational technology)**

Class discussion, class assignments, A/V presentation, real-life experience, classroom

exercises, and self-study.

1. **Monitoring the achievement of learning outcomes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Current monitoring of progress (60% or 60 points in the final grade) | | | | |
| Forms of control | Dates (week, dates) | Brief description of the form of control | Share in the final grade/maximum score | Learning outcome |
| Midterm | 8 week | Solve online quiz at ejudge system | 30 % / 30 points | [1], [2], [3], [4] |
| Current control, including implementation of IWMS | During the semester | Solve laboratory works at ejudge system | 30 % / 30 points | [1], [2], [3], [4] |
| Final control (final exam) (40% or 40 points in the final grade) | | | | |
| Examination form | Brief description of the format | | Evaluation criteria | |
| Offline in computer class | The final examination has a format of a test. Students have to choose 1 correct answer among 4 given options during the given time. The questions may contain code snippets. | | The final score is calculated based on the number of correctly answered questions. | |

*\*-* указать виды заданий текущего и рубежного контроля с указанием максимального балла по каждому заданию. При этом максимальная сумма, набранная обучающимися по результатам текущего контроля, включая рубежный контроль, должна быть не более 60 баллов. Допускается применение бонусной системы при оценивании текущего контроля успеваемости, при обязательном выполнении требования: максимальная сумма, набранная обучающимися по результатам текущего контроля, включая рубежный контроль, должна быть не более 60 баллов.

***\*\*-*** указать номер (-а) релевантных результатов обучения из пункта 2 силлабуса

1. **Assessment criteria for monitoring the achievement of learning outcomes**

|  |  |  |
| --- | --- | --- |
| **Form of control** | **Points** | **Evaluation criteria** |
| **Solving practical tasks (problems)** | 90-100 (excellent) | The correct algorithm for completing (solving) the task has been compiled, there are no errors in logical reasoning, in the choice of formulas and solutions, the correct answer has been received, the task has been completed in a rational way |
| 70-89 (good) | The correct algorithm for completing (solving) the task has been compiled; there are no significant errors in logical reasoning and solution; the choice of formulas for the solution was made correctly; there is an explanation for the solution, but the problem was solved in an irrational way or no more than two insignificant errors were made, the correct answer was obtained. |
| 50-69 (satisfactory) | The task is understood correctly, there are no significant errors in logical reasoning, but significant errors were made in the choice of formulas or in mathematical calculations; the problem has not been solved completely or in general terms. |
| 25-49 (unsatisfactory) | The task was completed (solved) incorrectly. |

Each type of educational work is evaluated on a 100-point scale and is included in the average assessment of the current control in accordance with the table:

|  |  |
| --- | --- |
| **Type of activity** | **Final scores** |
| Github submission | 11% |
| Practice defense | 49% |
| Final exam | 40% |
| **Total** | **100%** |

**8.** **Point-rating system for assessing student’s educational achievements**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Assessment criteria** | **Weeks** | | | | | | | | | | | | | | | | **Total scores** |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16-17** |
| 1. | Github submission | \* | \* | \* |  | \* | \* | \* |  | \* | \* | \* |  | \* | \* |  |  | 11% |
| 2. | Practice defense |  |  |  | \* |  |  |  | \* |  |  | \* |  |  |  | \* |  | 49% |
| 3. | Final exam |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | \* | 40% |
|  | **Total** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **100%** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Letter grade** | **Digital equivalent** | **Points (in percent)** | **Traditional assessment** |
| А | 4,0 | 95-100 | Excellent |
| А- | 3,67 | 90-94 |
| В+ | 3,33 | 85-89 | Good |
| В | 3,0 | 80-84 |
| В- | 2,67 | 75-79 |
| С+ | 2,33 | 70-74 |
| С | 2,0 | 65-69 | Satisfactory |
| С- | 1,67 | 60-64 |
| D+ | 1,33 | 55-59 |
| D- | 1,0 | 50-54 |
| FX | 0,5 | 25-49 | Unsatisfactory |
| F | 0 | 0-24 |

**9.** **Academic honesty**

Respect intellectual property rights, be conscientious when receiving, presenting and evaluating the results of scientific and other creative activities, avoid plagiarism, counterfeiting and other violations of intellectual rights.

Consider it your duty to fight all types of academic dishonesty, including:

- cheating and asking other people for help when passing knowledge control procedures;

- presentation of someone else's work, presenting it as the results of one's own labor;

- using family or professional connections to obtain a higher grade;

- absenteeism, tardiness and missed training sessions, including online classes during distance learning, without a valid reason;

- deception and disrespectful attitude towards the lecturer;

- forgery of documents directly or indirectly related to studying at the university.

**10. Academic behavior**

**Students must:**

* comply with the Code of Ethics of students at JSC “Kazakh-British Technical University”;
* treat the lecturer and other students with respect;
* turn off mobile phones during classes;
* comply with deadlines for completing and submitting all types of tasks;
* come to class prepared and actively participate in class work;
* enter the classroom before the start of class;
* attend all classes unless there is a valid reason for missing them;
* comply with KBTU academic policy regarding grades;
* do not allow actions that in any way interfere with the conduct of the lesson and create inconvenience for the acquisition of knowledge by others, such as free movement around the audience during the lesson, conversations, including through mobile communications;
* when taking tests, intermediate and final assessments using remote technologies, do not interfere with the use of the proctoring system.

**Students have the right** to**:**

* consult with the lecturer on any questions related to the course;
* make any proposals to improve the educational process.

**Lecturer:** Kelgenbayev A. \_\_\_\_\_\_\_\_\_\_\_\_\_\_