

# Computer Programming 2 - course description

| General information |   |
|---------------------|---|
| Course name         | Computer Programming 2  |
| Course ID           | 11.3-WK-MATP-PK2-W-S14_pNadGenWTPHZ                                       |
| Faculty             | <a href="#">Faculty of Mathematics, Computer Science and Econometrics</a> |
| Field of study      | Mathematics   |
| Education profile   | academic  |
| Level of studies    | First-cycle studies leading to Bachelor's degree                          |
| Beginning semester  | winter term 2020/2021   |

| Course information  |  |
|---------------------|--|
| Semester            | 2  |
| ECTS credits to win | 6  |
| Course type         | obligatory   |
| Teaching language   | polish   |
| Author of syllabus  | <ul style="list-style-type: none"><li>dr Florian Fabiś</li></ul> |

| Classes forms  |                                |                            |                                |                            |                    |
|----------------|--------------------------------|----------------------------|--------------------------------|----------------------------|--------------------|
| The class form | Hours per semester (full-time) | Hours per week (full-time) | Hours per semester (part-time) | Hours per week (part-time) | Form of assignment |
| Lecture        | 30                             | 2                          | -                              | -                          | Exam               |
| Laboratory     | 30                             | 2                          | -                              | -                          | Credit with grade  |

## Aim of the course

The ability of advanced programming in Pascal: processing of arrays and records, saving to and reading from file, dynamic data structures. The ability to implement sorting, selection and searching algorithms in programs. The basic knowledge of NP-completeness problem (classes P, NP, NP – complete).

## Prerequisites

Computer programming 1.

## Scope

### Lecture

1. Structured programming in Pascal. Structured types: arrays, sets, records. Unit structure and syntax. File types. Pointers and pointer types. Dynamic data structures: stacks, queues, lists. (24 h)
2. The basic algorithms of searching. Linear search, binary search, interpolation search. (2 h)
3. NP-completeness. Optimization and decision problems. Models of computation: deterministic Turing machine, non-deterministic Turing machine, RAM machine. The classes P, NP and NP-complete. (4 h)

### Laboratory

1. Writing and running of programs containing the algorithms for sorting and selection. Analysis of the computational complexity of these algorithms. (4 h)
2. Units. (2 h)
3. Processing arrays of records. (5 h)
4. Processing files. (6 h)
5. Dynamic data structures: dynamic arrays, stacks, queues, lists. (7 h)
6. Writing of program be simple database. (6 h)

## Teaching methods

Lecture: problem lecture.

Laboratory: laboratory exercises in computer lab – writing and running programs on assigned leading themes, analysis of these programs and analysis of algorithms applied.

Students will work on some programs in groups consisting of 2-3 persons.

Besides, each student is required to present on last classes a self written application, including all Pascal elements learned during the classes, with documentation according to assigned specification.

## Learning outcomes and methods of theirs verification

| Outcome description  | Outcome symbols   | Methods of verification   | The class form   |
|--|---|---|--|
| Student recognizes the problems that can be solved algorithmically and can make a problem specification; knows the basic algorithms for sorting and searching, and can implement them in programs written in Pascal. | <ul style="list-style-type: none"><li><a href="#">K_U27</a></li></ul> | <ul style="list-style-type: none"><li>a test</li><li>an exam - oral, descriptive, test and other</li><li>an observation and evaluation of activities during the classes</li></ul> | <ul style="list-style-type: none"><li>Lecture</li><li>Laboratory</li></ul> |

| Outcome description  | Outcome symbols   | Methods of verification   | The class form  |
|--|---|---|---|
| Student is able to compile, run and test advanced program written in Pascal and to carry out an analysis of the computational complexity simpler algorithms. | <ul style="list-style-type: none"> <li>• <a href="#">K_U25</a></li> </ul> | <ul style="list-style-type: none"> <li>• a test</li> <li>• an exam - oral, descriptive, test and other</li> <li>• an observation and evaluation of activities during the classes</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Laboratory</li> </ul> |
| Student has a basic knowledge of NP-complete problems.   | <ul style="list-style-type: none"> <li>• <a href="#">K_W08</a></li> </ul> | <ul style="list-style-type: none"> <li>• a test</li> <li>• an exam - oral, descriptive, test and other</li> <li>• an observation and evaluation of activities during the classes</li> </ul> | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Laboratory</li> </ul> |
| Student can use ready-made libraries without disturbing someone else's intellectual property.  | <ul style="list-style-type: none"> <li>• <a href="#">K_K04</a></li> </ul> | <ul style="list-style-type: none"> <li>• an observation and evaluation of activities during the classes</li> </ul>  | <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Laboratory</li> </ul> |

## Assignment conditions

Lecture. Written examination verifying the education outcome in area of knowledge and skills.

Laboratory. Final grade is granted based on number of points received during studies. Points are received for written tests, active participation in classes and on last classes presented application.

Final course grade consists of laboratory classes' grade (60%) and examination grade (40%). Positive grade from laboratory classes is the necessary condition for participation in examination. The positive grade from examination is the necessary condition for course completion.

## Recommended reading

1. Banachowski L., Diks K., Rytter W. : Algorytmy i struktury danych, WNT, W-wa 1996.
2. Koleśnik K.: Wstęp do programowania z przykładami w Turbo Pascalu, Helion, 1999.
3. Sielicki A. (pod red.) : Laboratorium programowania w języku Pascal, Pol. Wr., Wrocław 1996.

## Further reading

1. Cormen T.H., Leiserson Ch.E, Rivest R.L. : Introduction to Algorithms, MIT Press, 2001.
2. Wirth N.: Algorithms and Data Structured, 1985.
3. Kwasowicz W.: Wprowadzenie do Object Pascal i Delphi, MIKOM, 2002.
4. Szmit M.: Delphi, Helion, 2006.

## Notes

Modified by dr Alina Szelecka (last modification: 18-09-2020 13:45)

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