# STUDY MODULE DESCRIPTION FORM

| Name of the module/subject | | Code |
|---|---|---|
| **Languages and paradigms of programming** | | **1010334541010334960** |
| Field of study: **Information Engineering** | Profile of study (general academic, practical): **(brak)** | Year /Semester: **2 / 4** |
| Elective path/specialty: **-** | Subject offered in: **Polish** | Course (compulsory, elective): **obligatory** |
| Cycle of study: **First-cycle studies** | Form of study (full-time,part-time): **part-time** | |
| No. of hours: Lecture: **20** Classes: **-** Laboratory: **20** Project/seminars: **-** | | No. of credits: **4** |
| Status of the course in the study program (Basic, major, other): **(brak)** | (university-wide, from another field): **(brak)** | |
| Education areas and fields of science and art: **technical sciences**; **Technical sciences** | | ECTS distribution (number and %): **4 100%**; **4 100%** |

## Responsible for subject / lecturer:

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## Prerequisites in terms of knowledge, skills and social competencies:

| | | |
|---|---|---|
| 1 | **Knowledge** | Student has basic knowledge of mathematics, especially in such fields as algebra, analysis and logic, basic knowledge of program constructs, implementation of algorithms, formal languages and programming platforms. |
| 2 | **Skills** | Student is able to use basic techniques to create algorithms, to analyze their complexity, and to use software platforms and environments for simple programs encoding, running and testing. |
| 3 | **Social competencies** | Student understands the importance of stringent accomplishment of a given project with proper notation standards. |

## Assumptions and objectives of the course:

Presentation of declarative programming styles and rules of choosing the adequate style and language to a class of problems. Development of declarative programming skills in functional and logic programming environments.

## Study outcomes and reference to the educational results for a field of study

### Knowledge:

1. Student has organized and theoretically founded knowledge of creation, implementation and applicability of recursive data structures. - [[K_W04]]
2. Student has organized and theoretically founded knowledge of computation models and basic declarative program constructions. - [[K_W05] ]
3. Student is familiarized with state of the art and current trends in programming paradigms. - [[K_W19]]

### Skills:

1. . Student is able to create engineer work documentation and declaratively present the work result. - [[K_U03]]
2. Student can use techniques of logic and functional programming to create algorithms. - [[K_U09]]
3. Student is able to use declarative software platforms and environments for simple programs encoding, running and testing. - [[K_U10]]

### Social competencies:

1. Student understands and is aware of the importance of issues related to computer engineer activity. Student understands the responsibility for his engineering decisions. - [[K_K02]]
2. Student understands the importance of stringent accomplishment of a given project with proper notation standards, proper language. Student understands the importance of keeping deadlines. - [[K_K07]]

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## Assessment methods of study outcomes

Lecture

Written test based on lecture (basic concepts and techniques used in declarative programming).

Laboratory

Students? marks are based on continuous assessment of their programming activity and results of two written tests (creation of simple programs).

## Course description

Lectures

Logic as programming language (procedural aspect of SLD-resolution). Data structures and procedures in Prolog. Functional programming: data types, functions, overview of languages and environments. Current trends in declarative programming. Some non-classical programming techniques: evolutionary computation, constraint-based programming, artificial neural networks.

Teaching methods:

- presentation of the theory with references to practical examples of software implementations,
- lecture with multimedia presentation and examples drawn on blackboard,
- students being asked questions during the lectures in order to provoke discussions.

Course update 2017:

- Erlang as funcyional programming language,
- artificial neural networks as programming paradigm.

Laboratory

Creation of algorithms and their implementation in declarative programming languages: logic programming language Prolog, and functional programming language Erlang.

Teaching methods:

- presentation and analysis of generic programs,
- individual work with open-source programming environments,
- presentation and discusion of the final solutions prepared by students.

Course update 2017:

- functional programming environment Erlang.

## Basic bibliography:

1. Haber F.: Learn you someERLANG for great goog! A beginner's guide (on-line learnyousomeerlang.com), 2017.
2. Kowalski R.: Logic for problem solving, North-Holland, 1979.
3. Michalewicz Z.: Genetic Algorithms + Data Structures = Evolution Programs, 3rd edition, Springer-Verlag, Berlin, 1996.
4. Nilsen U., Małuszyński J.: Logic, Programming, and PROLOG, John Wiley & Sons, 2000.
5. Van Roy P., Haridi S.: Concepts, Techniques, and Models of Computer Programming, The MIT Press, 2004.

## Additional bibliography:

1. Armstrong J.: Programming Erlang. The Pragmatic Programmers, 2013.
2. Cesarini F., Thompson S.: Erlang Programming. O'Reilly Media, 2009.
3. Sterling L., Shapiro E.: The Art of Prolog. Advanced Programming Techniques, MIT Press, 1986.

## Result of average student's workload

| Activity | Time (working hours) |
|---|---|
| 1. Lecture | 20 |
| 2. Laboratory | 20 |
| 3. Preparation to laboratory and tests | 60 |

## Student's workload

| Source of workload | hours | ECTS |
|---|---|---|
| Total workload | 100 | 4 |

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| | | |
|---|---|---|
| Contact hours | 40 | 2 |
| Practical activities | 80 | 3 |

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