STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Distributed programming		**1010335511010335196**

Field of study	Profile of study (general academic, practical)	Year /Semester
Information Engineering	**(brak)**	**1 / 1**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
Second-cycle studies	**part-time**

No. of hours				No. of credits
Lecture: **16**	Classes: **-**	Laboratory: **8**	Project/seminars: **8**	**6**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**6 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student has theoretical and practical knowledge on algorithm design and analysis, on abstract data structures and their implementation and on computationally hard problems; he/she has theoretical and practical knowledge on computer system architectures, on operating systems and on popular information engineering technologies.
2	**Skills**	Student is able to design algorithms using basic algorithmic techniques and analyse the algorithm complexity; he/she knows how to apply programming environments and platforms to develop, execute and test simple programs implemented in imperative, object-oriented and declarative languages.
3	**Social competencies**	Student understands the need of permanent learning and improving the professional, personal and social competencies; a student realises the responsibility for his/her work done individually or in a team; he/she is also ready to accept the rules of group work.

Assumptions and objectives of the course:

providing students with basic models of distributed systems and with general methods of communication and synchronization in systems of this type; presentation of selected problems in design of distributed systems.

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

Knowledge:

1. Student has theoretical and practical knowledge on algorithm design and analysis, on abstract data structures and their implementation and on computationally hard problems - [K_W04]
2. Student has theoretical and practical knowledge on network technologies - [K_W07]
3. Student has theoretical and practical knowledge on internet technologies - [K_W11]

Skills:

1. Student is able to work individually and in a team; he/she can estimate a time for the given task and construct a schedule for it - [K_U02]
2. Student is able to plan and perform experiments and to apply mathematical methods and models in order to test, analyse and evaluate information systems and their parts - [K_U07]
3. Student is able to analyse a functioning of a computer system and also a functioning of operating systems and computer networks or their parts - [K_U11]

Social competencies:

1. Student understands the need of permanent learning and improving the professional, personal and social competencies - [K_K01]
2. Student understands the importance of a thorough design of a given project, respecting notation standards, using a proper language and keeping deadlines - [K_K07]

Assessment methods of study outcomes

Lecture. Written exam consisting of theoretical questions and simple problems to solve.

Labs. Oral or written tests for preparation of a student to exercises, rating a student's activity during exercises, evaluation of reports including their punctual delivery.

Project. Keeping all milestone deadlines of the project; evaluation of the final report.

More than 50% points are necessary for passing the exam, project and labs.

Course description

Lecture. Distributed programming vs. parallel programming, a distributed model of a parallel program, network transparency, client-server model, MPI library, Open CL environment, synchronisation of threads and processes, efficiency measures of distributed systems, design of distributed algorithms, elements of programming in the client-server model, problems of security and fault-tolerance in distributed systems, distributed programming in the multiparadigm programming methodology.

Labs. Distributed programming using the MPI standard and the GPGPU technology. Distributed programming as a variant of the multiparadigm programming in the Mozart/Oz environment. Task queuing in supercomputer systems (optional).

Project. The project illustrates capabilities of distributed programming of a given software or hardware platform.

Basic bibliography:

1. Programowanie współbieżne i rozproszone, Weiss Z., Gruźlewski T., Wyd. Naukowo-Techniczne, Warszawa, 1993

2. Programowanie. Koncepcje, techniki i modele, Roy P. van, Haridi S., Wyd. Helion, Gliwice, 2005

3. Systemy rozproszone. Zasady i paradygmaty, Tanenbaum A.S., Steen M. van, Wyd. Naukowo-Techniczne, Warszawa, 2006

Additional bibliography:

1. Sztuka programowania wieloprocesorowego, Herlihy M.,Shavit N., PWN, Warszawa, 2008

2. Introduction to Parallel Computing, Barney B., https://computing.llnl.gov/tutorials/parallel_comp/

3. A User's Guide to MPI, Pacheco P.S., http://www.wellesley.edu/CS/courses/CS331/notes/mpi.guide.pdf

4. Ericcson AB, Erlang/OTP System Documentation, http://erlang.org/doc/pdf/otp-systemdocumentation.pdf

Result of average student's workload

Activity	Time (working hours)
1. Lectures	16
2. Labs	8
3. Project	8
4. Consultations and the exam	18
5. Preparation to labs, preparing the reports	21
6. Design of the project	38
7. Preparation to the exam	41

Student's workload

Source of workload	hours	ECTS
Total workload	150	6
Contact hours	50	2
Practical activities	75	3