SYLLABUS

Name: ***Parallel Computing in Data Science (MakAu-DS>SM3PCIDS19)***
Name in Polish:
Name in English: ***Obliczenia Równoległe w Data Science***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

ZAL

Language:

English

Course homepage:

https://platforma.polsl.pl/rau1/course/view.php?id=608

Short description:

The aim of the course is to familiarise students with the design of parallel algorithms using freely available parallel programming systems. After the course the student will know how to build their own computational cluster and how to choose software to perform large computer calculations. During the course students will learn the most important paradigms of parallel programming and will also learn how to use the available resources of modern multi-core processors, in particular the use of queuing systems.

Description:

ECTS: 3
Total workload: 75 hours (60 contact hours, 15 students' own work hours)
Lecture 30h
Laboratory 30h

Students' own work: preparation for classes, writing reports.

Lectures topics:
Overview of computer architectures for parallel computing, discussion of construction, properties. Acceleration of computations - Amdahl's law. Flynn classification. Fastest computing systems in the world and in the country. Models of parallel programming. Design of parallel programs. Equal division of labour and dynamic allocation of resources. Process synchronization. Linux basics. Building a computing cluster. Cluster management systems. Queuing systems. Distributed computing. Programming with message passing. The use of accelerators in high-power computing - massively parallel programming. Examples of algorithms and their parallelized versions, applications in biotechnology.

Laboratories topics:
Linux basics
Multithreaded programming.
Parallel programming with message passing.
Dynamic resource allocation.
Using queue system for parallel calculations.
Massively parallel programming - hardware accelerators.

Bibliography:

Zomaya A. (ed.) "Parallel computing for bioinformatics and computational biology", Wiley-Interscience,2006

Learning outcomes:

Abilities: is able to

- solve complex engineering tasks, including unusual tasks in the field of automation, electronics, and computer science (K2A_U16)

typical technologies used in solving engineering tasks in the field of automation, robotics, electronics, telecommunications, and computer science related to the subject of the elective course

- assess the usefulness of methods and tools used to solve an engineering task, including recognizing the limitations of these methods and tools
(K2A_U18)

basic methods, techniques, and tools used in solving simple engineering tasks in the field of automation, robotics, electronics, telecommunications, and computer science related to the subject of the elective course

Assessment methods and assessment criteria:

Reports on the implementation of laboratory exercises. The final grade is a weighted average of the grades from the individual reports.

The syllabus is valid from academic year 2024/25 and its content cannot be changed during the semester.

Practical placement:

not applicable, not required

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	3	2021/2022-L	