SYLLABUS

Name: ***Parallel Computing (MakAu>SI7PC19)***
Name in Polish:
Name in English: ***Parallel Computing***

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/rau2/course/view.php?id=1715

Short description:

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

Description:

ECTS: 2
Total workload: 50 hours (30 contact hours, 20 students' own work hours)
Forms of contact hours:
Lecture 15h
Laboratory 15h

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

Contents of the lectures
Overview of computer architectures for parallel computing, discussion of design, and properties. Acceleration of computation - Amdahl's law. Flynn's classification. Fastest computing systems in the world. Models of parallel programming.
Design of parallel programs. Equal division of the work and dynamic resource allocation. Process synchronisation. Linux basics. Building a computing cluster. Cluster management systems. Queuing systems. Distributed computing. Message-passing programming. Use of accelerators in high power computing - massively parallel programming. Examples of algorithms and their parallelized versions, applications of parallel algorithms.

Laboratory content:
Linux basics. Using the queue system for parallel computing.
Multithreaded programming.
Massively parallel programming - hardware accelerators.
Parallel programming with message passing. Dynamic resource allocation.

Bibliography:

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

Learning outcomes:

At the completion of the course, students:
Knows and understands:

K1A_W16 - basic methods, techniques and tools used to solve simple engineering tasks in the field of automation, robotics, electronics, telecommunications and computer science

K1A_W22 - typical technologies used in solving engineering tasks in the field of automation, robotics, electronics, telecommunications and computer science

K1A_U05 - independently plan and implement your own lifelong learning

Assessment methods and assessment criteria:

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

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

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	2	2023/2024-Z	