# SYLLABUS

**Name:** ***Elective subject - High performance computing in bioenergetics (BioAIS-BF>SMs2HPp2F)***
**Name in Polish:**
**Name in English:** ***High performance computing in bioenergetics***

## Information on course:

**Course offered by department:** Faculty of Energy and Environmental Engineering
**Course for department:** Silesian University of Technology
**Term:** Winter semester 2022/2023
**Cordinator of course edition:** Dr inż. Damian Borys

**Default type of course examination report:**
ZAL

**Language:**
English

**Course homepage:**
https://platforma2.polsl.pl/rau1/course/view.php?id=572

**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:**
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:**
Knowledge: knows and understands
1. basic issues concerning the life cycle of technical devices, objects and systems (K2A_W12)
2. detailed issues of engineering programming, organization, management and operation of computer networks and information stores (K2A_W18)

Abilities: is able to
3. use a foreign language and use the source information in this language (K2A_U02)
4. use the knowledge acquired in the specialization in professional activity (K2A_U26)

Social competence: is ready to
5. determine priorities and identify and resolve dilemmas associated with the implementation of the task set by themselves and others (K2A_K03)

**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.

**Practical placement:**
not applicable, not required

## Information on course edition:

**Default type of course examination report:**
ZAL

**Bibliography:**
*missing bibliography in English*

## Details of classes and study groups

lecture (30 hours)

### Study groups details

Group number 1

**Class instructors:**
Dr inż. Damian Borys

classes (15 hours)

## Study groups details

Group number 1

| Class instructors: |
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| Dr inż. Damian Borys |

### Element of course groups in various terms:

| Course group description | First term | Last term |
| --- | --- | --- |
| *missing group description in English* (BioAIS-BF>2(1)) | 2020/2021-Z | |

### Course credits in various terms:

| Biotechnology, full-time master degree studies 3 sem. (BioAIS-SM3) | | | |
| --- | --- | --- | --- |
| Type of credits | Number | First term | Last term |
| European Credit Transfer System (ECTS) | 2 | 2020/2021-Z | |