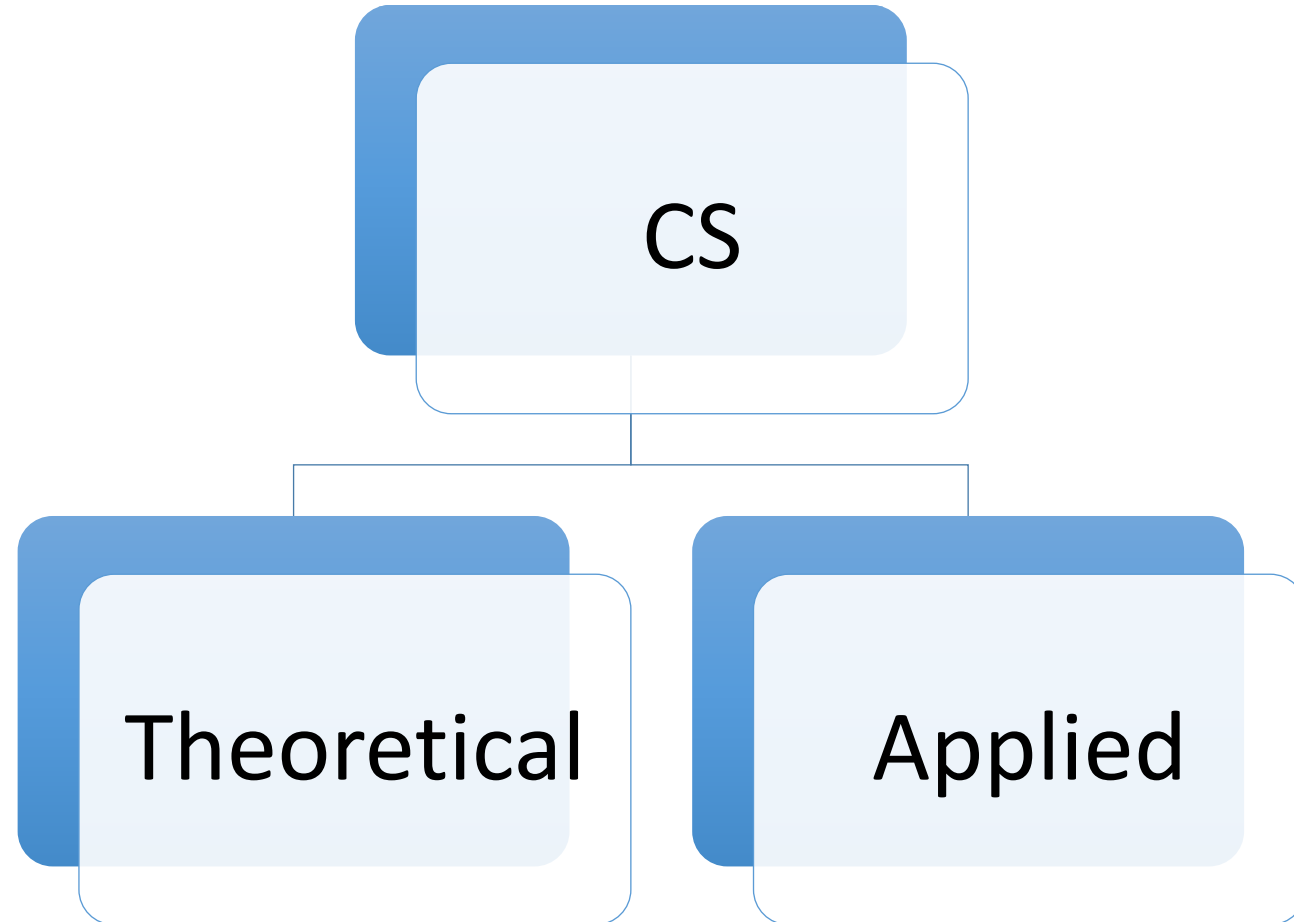


Computer Science

Domains

Important notice

- **Invited guest 13.12.2021**



Theoretical Computer Science



ALGORITHM & DATA
STRUCTURES



THEORY OF
PROGRAMMING
LANGUAGES



THEORY OF
INFORMATION AND
CODE



THEORY OF
COMPUTATION



FORMAL METHODS

Algorithms & data structures

- Study computational models and their efficiency:
 - Algorithms
 - Algorithms' analysis
 - Data structures
 - Complexity

Theory of programming languages

- Programming languages
- Compiler design
- Type theory

Formal methods

- Specification, development, verification
- Instruments: formal languages, semantics of programming languages, predicate logic, Petri networks etc.

Applied Computer Science



Artificial Intelligence



Computer
Architecture



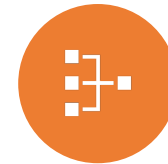
Graphics and image
processing



Security and
cryptography



Computer networks,
web



Concurrent, parallel,
distributed systems



Data Bases



Software Engineering

Artificial Intelligence

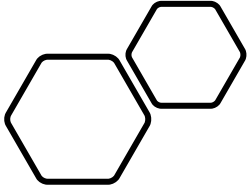
- Solve problems, decision, learning:
 - Machine learning
 - Evolutive algorithms
 - Genetic algorithms
 - Data mining
 - Knowledge Representation
 - NLP (Natural Language Processing)
 - Robotics

Computer Architecture

- Logic Design (circuits)
- System architecture
- Operating Systems

Software Engineering

- Analysis, design, development, testing, deployment, maintainance, quality
- Software processes
- Development methodologies
- Design and programming frameworks (IDEs)



Current Research Topics

Teamwork



1. Big Data



2. Machine Learning



3. Artificial Intelligence



4. IoT



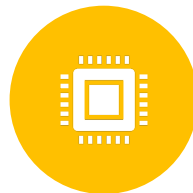
5. Security



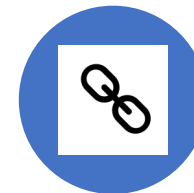
6. Software Engineering



7. Formal Methods



8. HPC (High Performance Computing)



9. Blockchain

<domain>

Description: problems + methods

Examples

HOW:

- Google.com
- Wikipedia
- scholar.google.com
- www.cs.ubbcluj.ro:
 - Department of Computer Science
 - Research groups
 - Curriculum & Syllabus

People: (2-3) + 1 UBB

2-3 courses

- Process large volumes of data
- Computing power
- Business Intelligence: data analysis -> predictions
- Example:
 - Sales
 - Health
 - Security: prevent attacks, predict attacks

1. Big data



- Machine learning
- Classification & clustering
- Bioinformatics
- Robots / bots / chatbots
- Computer Vision
- Application to different domains

2. Artificial Intelligence



- Smart Watch
- fitness: monitor physical activity, monitor body functions
- Virtual/augmented reality
- Medical devices

3. Wearable devices



4. IoT (Internet of Things)



Smart houses:

Monitor energy consumption,
Monitor air quality,
control TV, radio etc.
Kitchen, garage



Smart cities:

Monitor traffic
Monitor air quality
Monitor waste



Industry 4.0 - complete automation, data analysis

5. Security



SOFTWARE



DATA

6. Software engineering



INTEROPERABILITY



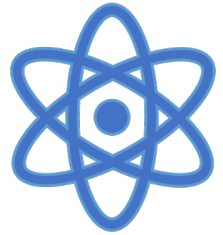
CLOUD



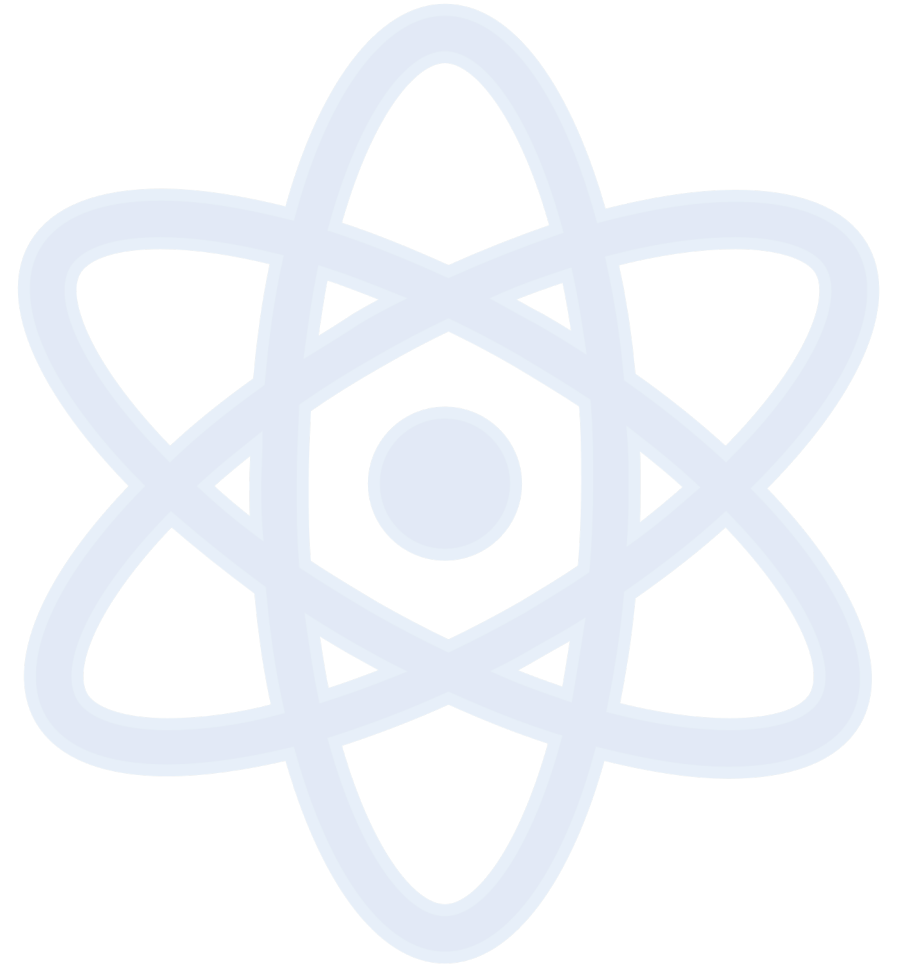
VERIFIED



EMPIRICAL



7. Quantum computing



The future is yours



- 04.01.2022 – deadline – send CV
- – written paper = 10.01.2021, 18.30
- Final grade = 50% written paper + 30% CV + 20% activity
- Activity: 7 courses = grade 10; 6 courses = grade 9, ...
- Retake exam = 14.02.2021, 17.30