THEORETICAL PHYSICS AND ASTROPHYSICS

Programme type	Master's studies
Field of study	Physical Sciences
Study area	Physics
Degree	Master in Physical Sciences
Duration	2 years
Workload	120 ECTS
Language of instruction	English
Location	Vilnius, Lithuania
Starting date	1st of September
Tuition fee	4234 EUR/per year

PROGRAMME DESCRIPTION

- *The objective*

Present technologies of multi scale supercomputing in a broad range of problems require specialists with original and creative mindset reinforced by scientific theoretical tools of material science. Such people are able to develop models, perform computations, analyse data and come up with ideas of improvement based on efficiency as dictated by rationale of physical science. They can easily adapt to ever changing scope of problems create and implement projects by employing supercomputing facilities and global outreach. This is achieved by learning latest "unfinished" subjects of theoretical physics and practicing scientific research interfaced with supercomputing. Our program prepares such specialists.

- *Career opportunities*

Our graduates are welcome in strategical positions in various companies: data mining and analysis, decision-making and optimization. Positions range from financial organizations, public administration, and international businesses. Joining academic and research institutions worldwide guarantees carrier in academic area.

KEY LEARNING OUTCOMES

- Expertise in optimization and automation including artificial intelligence
- Expertise in supercomputing
- Expertise in advanced mathematical / theoretical physics

COURSE INFORMATION

The programme has the following structure:

Course Type	1st Semester	2nd Semester	3rd Semester	4th Semester
Compulsory Courses	Methods of Parallel Computing in Physics (5 ECTS)	Computational Optimization (5 ECTS)	Artificial Intelligence (5 ECTS)	Research Project (30 ECTS)
	Research Project (10 ECTS)	Research Project (10 ECTS)	Research Project (10 ECTS)	
Elective Courses	Mathematical Modeling and Synergetics (5 ECTS)	Quantum Statistical Physics (5 ECTS)	Quantum Information and Cryptography (5 ECTS)	
	Physical Kinetics (5 ECTS)	Response Function Theory (5 ECTS)	Elementary Particles (5 ECTS)	
	Non Local Mathematical Physics (5 ECTS)	Cosmology (5 ECTS)	Theory of Quantum Relaxation (5 ECTS)	
	Methods of Data Analysis (5 ECTS)	Theory of Atoms and Molecules (5 ECTS)	Low Temperature Physics (5 ECTS)	
	Instrumentation and Data of Spectrofotometry (5 ECTS)	Physics of Galaxies (5 ECTS)	Selected courses in astrophysics (5 ECTS)	
	Star Atmospheres (5 ECTS)	Data Processing in Spectrofotometry (5 ECTS)	Modern problems in astrophysics (5 ECTS)	
		Evolution of Stars (5 ECTS)		

During the four semesters of studies, students get hands onto parallel computing methods for scientific applications, computational optimization approaches and artificial intelligence as compulsory courses. Apart from that, they can choose from a range of theoretical physics and astrophysics courses, which include mathematical modeling, non-local mathematical physics, physical kinetics, spectrometry, data mining, star atmospheres, advanced statistical physics, response theory, cosmology, quantum theory of atoms and molecules, quantum information, low temperature physics, quantum thermodynamics, physics of galaxies. In addition to that, every semester students join research groups for practice and experiencing the research.

GRADUATION REQUIREMENTS

All the subjects of the programme should be passed and positive assessment of the Master's Thesis public defense.

EXAMINATION AND ASSESSMENT REGULATIONS

The main form of assessment is an examination. Every course unit is concluded with either a written or written-oral examination or pass/fail assessment. Student's knowledge and general performance during the examination are assessed by using the grading scale from 1 (very poor) to 10 (excellent).

APPLICATION AND SELECTION REQUIREMENTS

- Bachelor degree or its equivalent in Physics, Engineering or Technologies;
- English language proficiency - the level not lower than B2 (following the Common European Framework of Reference for Languages (CEFR) (Internationally recognized certificate or *Skype* interview)
- The selection criterion is based on the weighted average of all grades recorded in the transcript of your academic report.

Additional points could be obtained for scientific publications and scientific conference presentations

Academic contact	Admission contact

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