

DOCTORAL (PHD) STUDIES
COURSE UNIT DESCRIPTION

Course unit title	Scientific areas	Faculty	Institute, department
Parallel and distributed computing	Informatics Engineering (T 007)	Faculty of Mathematics and Informatics	DMSTI, Global Optimization Group
Study method	Number of credits	Study method	Number of credits
Lectures	1 (Spring semester)	Consultations	1
Individual works	4	Seminars	1

Summary
<p>Solution of real-world optimization problems usually requires a lot of computational resources. Since usual computers have performance limitations, parallel computers, computer clusters, and network computing are used to solve complex problems. This course covers parallel computers architecture and computer networks; designing parallel and distributed algorithms; parallel programming tools: MPI, OpenMP, and PThreads; complexity, speedup, and efficiency of parallel algorithms; examples of parallel computing application to solve practical problems.</p> <p>Topics:</p> <ul style="list-style-type: none"> • Parallel computers architecture and computer networks. • Designing parallel and distributed algorithms. • Message passing interface (MPI). • Shared-memory parallel computing using OpenMP. • Shared-memory parallel computing using POSIX Threads. • Parallelization skeletons. • Complexity, speedup, and efficiency of parallel algorithms. • Optimization of parallel computing. • Typical parallel algorithms. • Examples of parallel computing applications to solve practical problems. <p>Practical task – create parallel algorithms related to the PhD thesis and investigate in shared and distributed memory parallel computers.</p>
Main literature
R. Čiegis. Lygiagretieji algoritmai. Vilnius, Technika, 2001.
R. Čiegis. Lygiagretieji algoritmai ir tinklinės technologijos. Vilnius, Technika. 2005.

T. Rauber, G. Runger. Parallel Programming for Multicore and Cluster Systems. Springer, 2010.

B. Wilkinson, M. Allen. Parallel Programming. Prentice-Hall, 1999.

Lecturer(s) (name, surname)	Science degree	Main publications
Algirdas Laninskas	PhD	http://www.elaba.mb.vu.lt/dmsti/?aut=Algirdas+Laninskas
Viktor Medvedev	PhD	https://www.elaba.mb.vu.lt/dmsti/?aut=Viktor+Medvedev
Julius ilinskas	PhD	https://www.elaba.mb.vu.lt/dmsti/?aut=Julius+ilinskas