

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Concurrent programming		Code 1010331541010335200
Field of study Information Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 4
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) elective
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: - Laboratory: 15 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: dr inż. Krzysztof Zwierzyński email: Krzysztof.Zwierzynski@put.poznan.pl tel. +48 61 665 3755 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Mathematics in the basics of matrix calculus, linear algebra. Basic knowledge of object-oriented programming, using the Windows API, the basics of UNIX. Knowledge and understanding of the basic concepts of programming
2	Skills	Ability to programming in object-oriented language. Design and analysis of algorithms for combinatorial including sorting and processing base graphs. solve simple tasks in the field of mathematical analysis.
3	Social competencies	Conscientiousness in communicating the results of laboratories.
Assumptions and objectives of the course: Skills in the concurrent programming		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. The student is versed in the current state, and the latest development trends of computer science - [K_W19]		
Skills:		
1. The student can make critical analysis of how computer hardware, operating system (or parts thereof) and computer networks operate - [K_U11]		
Social competencies:		
1. The student is aware of the importance and understanding of the non-technical aspects and effects of the activity of the IT engineer and the associated responsibility for the decisions made. - [K_K02]		
Assessment methods of study outcomes		
Assignments, reports from laboratories		
Course description		

<p>Programming in languages: C, C++, ADA, Java. Memory models, synchronization, avoiding race conditions and deadlocks. Overhead time associated with concurrency. Programming in OpenMP, OpenCL, CUDA. Concurrent code optimization. Update 2017: Kepler Project, PN Director (Process Network)</p>		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. Mordechai Ben-Ari, Podstawy programowania współbieżnego i rozproszonego, Wydawnictwa Naukowo-Techniczne, Warszawa 2009. 2. Michael McCool, James Reinders, Arch Robison, Structured Parallel Programming: Patterns for Efficient Computation, 2013. 3. Anthony Williams, Język C++ i przetwarzane współbieżne w akcji, Helion, 2013. 4. Michel Raynal, Concurrent programming : algorithms, principles, and foundations, Springer, 2013. (w bibliotece PP) 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. Maurice Herlihy, Nir Shavit, Sztuka programowania wieloprocesorowego, Wydawnictwo Naukowe PWN, Warszawa 2010. 		
<p>Result of average student's workload</p>		
<p>Activity</p>		<p>Time (working hours)</p>
<p>1. Participation in lectures, preparation of programs for laboratory classes and individual work with manual</p>		<p>70</p>
<p>Student's workload</p>		
<p>Source of workload</p>	<p>hours</p>	<p>ECTS</p>
Total workload	100	3
Contact hours	45	1
Practical activities	50	2