STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Concurrent programming**		Code **1010331441010335200**

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						No. of credits **4**
Lecture: **2**	Classes: **-**	Laboratory: **1**	Project/seminars: **-**			

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**	ECTS distribution (number and %**)** **4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of numeric algorithms and combinatorics Basics of calculus, algebra and set theory.
2	**Skills**	Proficiency in any OOP language. Win32 or .NET programming.
3	**Social competencies**	students are expected to be quiet during the lecter

Assumptions and objectives of the course:

Proficiency in concurrent programming. Designing of synchronization schemes. Ability to efficiently and correctly identify possible application of available standard design paterns.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. complete and well founded knwoledge of fundamental programming constructs, algorithms , paradigms and programming styles, software verification, formal languages,compilers and programming platforms - [K_W05]

Skills:

1. abilitiy to analyse and use selected programming platforms available for network & distributed programming   -[K_U18]

2. complete knwoledge and theoretically founded knowledg of telecomunication, network protocols and network services -[K_W15]

Social competencies:

1. responsibility of one's work and ability to comply with general regulations of group work and to accept responsibility of the final result of group work - [K_K04]

2. awareness of the work quality impact,of notational standard accordance and impact of timliness and language quality of reports - [K_K07]

Assessment methods of study outcomes

examination, laboratory reports, projects.

Course description

Sequential optimization. Superscalar optimization. Machine code level optimizations recommended by AMD for FPU operations. Declarative concurrency supported by OpenMP.

Operating System level facilities for concurrent/parallel programming. Constructs and techniques availble on win32, .net,java. Intel TBB dynamic parallelism optimally exploiting the harware and computational state (cache buffering, data availability and internal redundance of processing components)

Basic bibliography:

1. M.Herlihy, N.Shavit: The Art of Multiprocessor Programming

2. M. Ben-Ari The Principles of concurrent programming

Additional bibliography:

1. Concurrent Programming in Java?: Design Principles and Patterns, Second Edition, Doug Lea

2. Operating Systems: Concurrent and Distributed Software Design, Jean Bacon, Tim Harris

3. Concurrent and Real-Time Programming in Java, Andy Wellings

Result of average student's workload

Activity	Time (working hours)
1. Lecture	30
2. Labs	15
3. Consultation	5
4. Labs preliminaries	20
5. Reports	15
6. Individual study	15

Student's workload

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	50	2
Practical activities	50	2