(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: PERFORMANCE EVALUATION OF COMPUTER SYSTEMS	**2. Course code** **PECS**
3. Validity of course description: 2015/2016	
4. Level of studies: MSc	
5. Mode of studies: intramural studies	
6. Field of study: **computer science (informatics)**	RAU
7. Profile of studies: general academic	
8. Programme: --	
9. Semester: 2	
10. Faculty teaching the course: Institute of Informatics	
11. Course instructor: Prof. dr hab. inż. Tadeusz Czachórski	
12. Course classification: common	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: knowledge of probability theory and stochastic processes on the level taught at BA courses; rudiments of computer networks and computer systems architectures and principles of their performance	
16. Course objectives: to achieve skills in the use of mathematical methods used in modelling and performance evaluation of computer systems.	

17. Description of learning outcomes:

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Student gets knowledge on operational models and other analytical queueing models (Markov chain models, diffusion approximation) of computer systems	test	Lecture	K_W04
2.	Student gets knowledge on mean value analysis applied to model computer systems.	test	Lecture	K_W01
3.	Student gets knowledge on Markov chain models in the performance analysis of computer systems.	test	Laboratory	K_U10
4.	Student gets knowledge on the use of simulation to evaluate performances of computer systems. Student is able to evaluate simulation errors.	test	Laboratory	K_U09
5.	Student is able to apply the acquired knowledge to study the performances of a proposed topology of a computer system.	test	Laboratory	K_U08

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

Sem 1 (8): lecture - 15 h, laboratory - 15 h

19. Syllabus description:

Lecture:

Operational models of computer systems: basic laws for the resource utilization, throughput and response time. Definition of a system bottleneck. Asymptotic and based on balanced systems bounds on a system throughput and response time.

The use of bounds in analysis of the impact of various modifications (exchange of disks, balancing disks, faster processor, virtual memory) on the performance of a computer system. Queueing networks as a model of a system - the use of mean value analysis (MVA), models of the open and closed network, introduction of multiple classes of customers, the use of approximate MVA algorithm. Simple probabilistic models and their justification. Single server models based on Markov chains, introduction of limited queue and loss probability, parallel service channels, limited set of customers; examples of. Markov models of a central server system and data base system. An analysis of the complexity of models versus their results. Numerical methods of solution of complex Markov models.

Laboratory: Simple simulation queueing models and models of computer systems written with the use of OMNET++ system.

20. Examination: no examination

21. Primary sources:

1. T. Czachórski, "Modele kolejkowe w ocenie efekty wności sieci i systemów komputerowych", Wydawnictwo Pra cowni Komputerowej Jacka Skalmierskiego, Gliwice 1999.

22. Secondary sources:

1. M. Hassan and R. Jain, "High Performance TCP/IP Networking: Concepts, Issues, and Solutions", Prentice-Hall, 2003, ISBN:0130646342, ISBN:0131272578

2. R. Jain, The Art of Computer Systems Performance Analysis, Wiley Interscience 1991

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15/15
2	Classes	
3	Laboratory	15/15
4	Project	/
5	BA/ MA Seminar	/
6	Other	/
	Total number of hours	30/30

24. Total hours: 60

25. Number of ECTS credits: 2

26. Number of ECTS credits allocated for contact hours: 1

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):1

26. Comments:

Approved:

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(date, Instructor's signature)

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(*date , the Director of the Faculty Unit signature)*