STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Real-time systems - manufacturing systems		**1010334271010335184**
Field of study **Automatic Control and Robotics**	Profile of study (general academic, practical) **(brak)**	Year /Semester **4 / 7**
Elective path/specialty **Computer Control Systems**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **22** Classes: **-** Laboratory: **-** Project/seminars: **24**		No. of credits **5**
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		ECTS distribution (number and %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student has knowledge in mathematical fields of logic and discrete mathematics necessary to description and analysis of sequential and discrete systems, description of control algorithms and stability analysis of dynamical systems. Student has knowledge in selected fields of physics. Has also systematized knowledge of methods and technics of procedural and object programming.
2	**Skills**	K_U01: Student is able to gain information from literature, data basis and other springs. Has skills in self-education aimed in levering and actuation of professional competences. K_U03: Student can elaborate documentations and presentations of results achieved in solving engineering tasks.
3	**Social competencies**	K_K01: Student understands and knows possibilities of permanent self-education, levering professional and social competences, and can inspire and organize learning process oh other persons. K_K04: Student is aware of the necessity of professional approach to technical tasks, closely reading documentations, taking in account environmental conditions for elements and devises to function in. Student is also aware of the necessity to presere principles of professional ethics, paying regard to different opinions and cultures.

Assumptions and objectives of the course:

Acquaintance of the basic knowledge about real-time applications and supporting them real-time operating systems

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

Knowledge:

1. - [K_W13:] - [-]
2. - [K_W15:] - [-]
3. - [K_W21:] - [-]

Skills:

1. [K_U10:] - [-]
2. [K_U17:] - [-]
3. [K_U21:] - [-]

Social competencies:

1. [K_K02:] - [-]
2. - [K_K06:] - [-]

Assessment methods of study outcomes

Written tests and laboratory assesment.

Course description

The matter of real-time applications and programs for critical applications. Require-ments for real-time operating systems. The architecture of the real-time operating sys-tems. The systems kernel and its functions. Creation of processes and methods of their scheduling. Real-Time Scheduling Algorithms: RMS, EDF, LLF, MLLF, MUF, MMUF. Interprocess communications. Message-passing system. Process Synchronization. Principles of constructing client-server applications. Basic system management func-tions. Contraction of real-time applications. Examples of real-time operating systems: QNX, ECOS, and WXWorks systems.

Basic bibliography:

1. Kwiecień, A., Gaj, P. (Red.): Współczesne problemy systemów czasu rzeczywistego. WNT, Warszawa, 2004.
2. Sacha, K.: Systemy czasu rzeczywistego. PW, Warszawa, 1998.
3. Silberschatz, A., Galvin, P.B., Gagne, G.: Podstawy systemów operacyjnych. WNT, Warszawa 2006.
4. Szymczyk, P.: Systemy operacyjne czasu rzeczywistego. Uczelniane Wydawnictwa Naukowo-Dydaktyczne, Kraków, 2003.

Additional bibliography:

1. Cottet, F., Delacroix, J., Mammeri, Z., Kaiser, C.: Scheduling in real-time systems J.Wiley & Sons, 2002.
2. Ułasiewicz J.: System czasu rzeczywistego QNX Neutrino. Wyd. BTC Legionowo, 2007.

Result of average student's workload

Activity	Time (working hours)
1. Lecture	30
2. Preparation to the exam	15
3. Project	24
4. Self work on project	24

Student's workload

Source of workload	hours	ECTS
Total workload	70	5
Contact hours	26	2
Practical activities	48	0