

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Flexible manufacturing systems		Code 1010222321010223544
Field of study Mechanical Engineering	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty Mechanical Engineering	Subject offered in: Polish	Course (compulsory, elective) elective
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 1 Classes: - Laboratory: 1 Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) major		(university-wide, from another field) from field
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: dr inż. Jan Uniejewski email: jan.uniejewski@put.poznan.pl tel. 616652062 Faculty of Mechanical Engineering and Management ul. Piotrowo 3 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of manufacturing techniques, of machine tools and automation
2	Skills	Student is able to obtain information from literature, databases and other sources; has abilities of the self-education for improving qualifications and the update of professional competence
3	Social competencies	Student is aware of a need to expand his competence and readiness to undertake the cooperation in the team; has an awareness of the importance and understands other aspects of engineering activity, including its influence on the environment
Assumptions and objectives of the course: student should obtain knowledge of flexibility in manufacturing systems		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Student knows the essence, aims and the domain of the elastic automation of production systems - [K2_W02, K2_W05] 2. Student knows the technical means of the elastic automation and their possibilities - [K2_W02] 3. Student knows the fundamentals of the systems theory in using to the elastic production - [K2_W02, K2_W05, K2_W11] 4. Student knows structure (subsystems) of flexible system - [K2_W02] 5. Student knows the principle of the modular design of the system and technical means - [K2_W02]		
Skills:		
1. Student is able to allocate subsystems of the flexible system appropriately to the tasks and the structure - [K2_U08, K2_U09] 2. Student is able to determine the methodology of the selection and to select groups of technical means of the flexible system - [K2_U08, K2_U09] 3. Student is able to determine the scope of the system flexibility appropriately to needs - [K2_U08, K2_U09]		
Social competencies:		
1. Student is aware to undertake the cooperation in the team - [K2_K03] 2. student is conscious of the role of flexible systems in the contemporary economy and for the society - [K2_K02, K2_K07]		

Assessment methods of study outcomes		
Written test		
Course description		
Flexible manufacturing systems (FMS) ? idea of FMS, range: elasticity of technical equipment, of technology, of lot of production, of article and of development, partition of automatized elastic manufacturing equipment: single machine (single machine tools NC and CNC, autonomous tooling stations), many machines (flexible manufacturing cell FMC, flexible manufacturing line), features and properties of FMS, rules of work of FMS, criterions of choice of automatized flexible means of production, basic functional subsystems of FMS (cutting, assembly, quality control, transportation and storage, process control), range and premises of usage of flexible automation, flow of articles and of tools in FMS, diagnostics and control in FMS, methods of economic estimation of FMS, technical and organizational aspects of FMS implementation		
Basic bibliography:		
1. Honczarenko J., Elastyczna automatyzacja wytwarzania. Obrabiarki i systemy obróbkowe, WNT Warszawa 2000 2. Krzyżanowski J., Wprowadzenie do elastycznych systemów wytwórczych, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2005		
Additional bibliography:		
1. Kosmol J., Automatyzacja obrabiarek i obróbki skrawaniem. WNT Warszawa 2000 2. Lis S., Santarek K., Strzelczyk S., Organizacja elastycznych systemów produkcyjnych, PWN, Warszawa 1994		
Result of average student's workload		
Activity		Time (working hours)
Student's workload		
Source of workload	hours	ECTS
Total workload	60	2
Contact hours	45	1
Practical activities	15	1