Subject-name	**MANUFACTURING TECHNOLOGY**	**Code:**	**M170**
Degree: of studies	**I**		
Form of studies:	**Stationary**		
Field of studies:	**MiBM/MTR/IPEH**		
Subject - type:	**Obligatory**		
Speciality:	**All specialities**		
Type of classes:	**45L**		

Conducting of classes:	**Ryszard Kuryjański, dr inż.**

Synopsis of classes	
Lecture:	1. Definition of machining. Chipless forming as alternative to machining. 2. Cutting tools. Types and characteristics. 3. Tool materials. Coatings. 4. Kinematics of cutting process. Cutting conditions: cutting speed, feed rate and the depth of cut. 5. Machining process: formation and classification of chips, built-up edge of tool, heat and temperature in cutting, cutting fluids. 6. Tool wear. Tool life curve. 7. Selection of cutting speed, feed rate and the depth of cut depending on production rate, costs, tolerances and stage in cutting. 8. Cutting economics. Production rate vs cutting speed curve and machining cost vs cutting speed curve. Machining cost vs tolerance curve. 9. Cutting machines: types and application. 10. Finish machining: grinding, honing, lapping, polishing. Advanced machining techniques: electrochemical erosion, laser and water jet cutting. 11. Manufacturing of spur, bevel and worm gears. 12. Casting process. Moulding box, moulding material, flask, core and core box. 13. Casting materials. 14. Classification of casting processes. 15. Design requirements of casting (draft, the gating system, parting surface, shrinkage). 16. Basic of welding. Welding joint. 17.Different materials weldability depending on the type of welding process. Welding defects: main causes, type of cracks, distortion. 18. Classification and industrial application of gas and arc welding. 19. Electric resistance welding, laser beam welding, plasma arc welding and electron beam welding. 20. Soldering, brazing and adhesive (gluing). 21. Design of welding joint. 22. Short theory of plasticity and metal forming. Typical stress vs. strain diagram with various stages of deformation. Flow curve. Temperature in metal forming: cold, warm and hot working. 23. Forging, rolling, sheet metalworking: bending, deep drawing and shearing (die cutting), press forming. 24. Forming machines (rolling mill, forging machine, pres, drawing machine, swaging machine) Design of forming manufacturing system (groups of machines or production line). Materials for forming tools. Occupational safety and health. 25. Forming manufacturing process documentation. Examples of forming manufacturing processes.

International learning outcomes: Student who has completed subject	Form of classes/Type	Method for checking (evaluation)*	Reference to the EK direction
has knowledge of cutting tools types and characteristics.	Lecture	Test	K_W11++
has knowledge of cutting process and selection of cutting speed, feed rate and the depth of cut.	Lecture	Test	K_W11++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++
has knowledge of machining process phenomena and their influence on tool life.	Lecture	Test	K_W11++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++
has knowledge of cutting machines and their industrial application	Lecture	Test	K_W11++ K_U15++; K_U16++; K_U18++ K_U19++; K_U19+++
has knowledge of spur, bevel and worm gears and their manufacturing.	Lectured	Test	K_W11++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++
has knowledge of casting materials and their properties.	Lecture	Test	K_W11++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++
has knowledge of casting processes and casting design principles.	Lecture	Test	K_W11++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++
is able to select casting process depending on casting material, tolerance and scale of production.	Lecture	Test	K_W11+++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++ K_U05+++
is able to design simple casting.	Lecture, discussion, examples.	Test	K_W11+++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++ K_U05+++
has knowledge of permanent joint, welding joint and welding defects: cracks, distortion and welding stresses.	Lecture	Test	K_W11+++
has knowledge of gas and arc welding, electric resistance welding, soldering, brazing and adhesive.	Lecture	Test	K_W11+++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++ K_U05+++
has knowledge of forging, rolling, press forming, sheet metalworking: bending, deep drawing and shearing (die cutting),	Lecture	Test	K_W11+++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++ K_U05+++
has knowledge of forming manufacturing documentation design principles.	Lecture	Test	K_W11+++ K_U15++; K_U16++; K_U17++ K_U19++; K_U19+++ K_U05+++
Student can work individually and in a team	Lecture	Preparation for the classes	K_U20+++ K_K01+++ K_K02+++

* mentioned ways of checking (assessment) relate to summative assessment; for the formative assessment are used colloquium tasks