Material Cutting and Cutting Tools

Course Overview for gr. 158L3A, 6-th semester

Level of study	**Bachelor Degree**
Workload	**ECTS: 4** **Total Hours: 117** **Contact Hours: 56** • **Lectures: 40** • **Labs: 8** • **Seminars: 8**
Course Code	B3.B.1.1
Semester	**Summer**
Prerequisites	*Structural Materials Engineering, Metrology, Standardisation and Certification, Materials Science*
Course Objectives	*The objective of the course is to develop knowledge, skills and experience in the field of metal cutting*
Learning Outcomes	*Will know:* • *physics of cutting;* • *types of chip and ways of chip management;* • *chip formation, machined surface workhardening;* • *characteristics of cutting tool wear, optimal tool life;* • *Will be able to:* • *rationally choose methods of machining;* • *choose type and grade of coolant depending on surface finish requirements and economy;* • *calculate cutting mode and forces, required machine tool power;* • ~~*calculate values of the cutting tool geometric parameters;*~~ • ~~*calculate cutting parameters*~~
Syllabus	*1. Basics of Cutting, Cutting Mode* *2. Measurement of Cutting Force Components* *3. Schemes of Cutting, Types of Chip* *4. Chip Formation, Methods of Investigation.* *5. Surface Layer Quality, Methods of Investigation* *6. Heat Generation in Cutting, Methods of Investigation* *7. Strength and Wear of Cutting Tools, Tool Life* *8. Machinability, Methods of Improovement, Cutting Fluids* *9. Turning Operations, Types and Geometrical Parameters of Cutters, Calculation of Cutting Mode, Forces and Power* *10. Drilling Operations, Types and Geometrical Parameters of Drill, Calculation of Cutting Mode, Forces and Power* *11. Milling Operations, Types of Milling Cutteers, 2 schems of Milling, Uniform Milling Condition, Calculation of Cutting Mode, Forces and Power* *12. Grinding Operations, Scemes and Types of Grinding, Types of Abrasives, Selection of Grinding Wheel, Calculation of Cutting Mode, Force and Power*
Labs	*1. Geometry of Cutting Tools* *2. Dynomometers and Load Cells* *3. Cutting Forces vs Cutting Parameters* *4. Heat Generation and Build-Up Edge*

Practical works	*1. Calculation of cutting mode, force and power in turning* *2. Calculation of cutting mode, force and power in cutiing with sizing tools* *3. Calculation of cutting mode, force and power in milling* *4. Calculation of cutting mode and power in grinding*
Projects	
Assessment	*Grading Test*
Resources	• *Material cutting and cutting tools : учебное пособие / С. В. Кирсанов (http://www.lib.tpu.ru/fulltext2/m/2014/m261.pdf)* • *Technology of Mechanical Engineering, part 1: study aid / V. N. Kozlov; Tomsk Polytechnic University (TPU). — Tomsk: Tomsk Polytechnic University Publishing House, 2002.* • *Cutting Tool Applications. George Schneider, 2005* • *Manufacturing Engineering and Technology. Fifth edition. Serope Kalpakjian, Steven R. Schmid, 2006*
Instructors	*Kim Alexey Bogowhich* *http://portal.tpu.ru/SHARED/b/BOGOWHICH* *Kozlov Viktor Nikolaevich*