

POLITEHNICA University of Bucharest (**UPB**)  
 Faculty of Industrial Engineering and Robotics (**IIR**)  
 Study Programme: Industrial Engineering (**IE**)  
 Form of study: Licence (Bachelor)

## COURSE SPECIFICATION

<b>Course title:</b>	Machine Tools	<b>Semester:</b>	6
<b>Course code:</b>	UPB.06.D.06.O.002	<b>Credits (ECTS):</b>	4

<b>Course structure</b>	Lecture	Seminar	Laboratory	Project	Total hours
<i>Number of hours per week</i>	2	-	1	2	6
<i>Number of hours per semester</i>	28	-	28	28	84

<b>Lecturer</b>	Lecture	Seminar / Laboratory / Project
<i>Name, academic degree</i>	Miron Zapciu, Professor	Marius Paraschiv, Lecturer
<i>Contact (email, location)</i>	<a href="mailto:miron.zapciu@upb.ro">miron.zapciu@upb.ro</a> , CB109	<a href="mailto:marius_d_paraschiv@yahoo.com">marius_d_paraschiv@yahoo.com</a> , CO03

<b>Course description:</b>
<p>Defining machine tools.            Technical and economical aspects of manufacture using machine tools.            Highlighting the main types of machine tools depending on specific processes.            Main kinematic chain structure (LCP). Structure, cutting speed, speed control devices. Illustrating kinematics of LCP for lathes, drilling, machining centers.            Advance kinematic chain structure (LCA). Types of advances. Motors used to drive the LCA.            Standardized system to define the axes. Features and machining capabilities. Lathes, milling machines, boring and milling machines, grinding machines.            Defining the origins and set-up. Machining capabilities for machine tools using 2, 2 and 1/2, 3, 4 and 5 CNC axis.            Kinematic chains with closed or open loop. Speed and position control of the CNC axes.            Interpolation working principle of linear and circular motion.            Defining and editing ISO codes. Preparatory functions, auxiliary functions.            Software Sinumerik 840D, using CNC equipment and stages in set-up and programming.            SINUTRAIN – documentation and training using Siemens software.            Canned cycle scheduling. Technological knowledge and programming test using Sinumerik 840D.            Machine tools for High Speed Cutting.            Trends and perspectives on the construction of machine tools.</p>
<b>Seminar / Laboratory / Project description:</b>

**Laboratory:**

Making kinematic calculations, machine tool selection, precision adjustment and verification. Practical programming and control of workpiece.

**Project:**

Design of kinematics and specific machine tool drive technology.  
CNC programming and interpretation of results.

**Intended learning outcomes:**

Familiarize students with specific notions of machine tools.  
Knowing the specific kinematics of machine tools.  
Determination of processing possibilities of machine tools according to their kinematics and technical characteristics of the machine.  
Interpretation of the numerical control instructions.  
Skills on programming a CNC equipment.  
Overall level design of kinematic chain from the machine tool structure.

<b>Assessment method:</b>	<b>% of the final grade</b>	<b>Minimal requirements for award of credits</b>
Written exam /Verification	20	50% of the test grid - correctly solved
Report / project	30	Project completed
Homework	10	
Laboratory	30	All laboratory work completed
Other / class participation	10	

**References:**

- [1] Zapciu M. – Course notes.
- [2] Zapciu M. *Modelare-Simulare-Proiectare in domeniul masinilor-unelte si sistemelor de masini*; cap. 3&4. PrintechEdition, Bucharest, 2014. ISBN 978-606-23-0290-0.
- [3] Zapciu M., Paraschiv M.D. – *Elemente de bază ale programării mașinilor-unelte cu comandă numerică*. Academy of Romanian Scientists Edition, Bucharest, 2015. ISBN 978-606-8636-12-2.
- [4] Zapciu M., Fabricatia asistata de calculator. Edition POLITEHNICA PRESS, Bucharest, 2003, ISBN 973-8449-14-6.
- [5] Ghionea, A., Predincea, N., Zapciu, M., Constantin, G., Sandu, C., Tanase, I., Hreanu, O. *MAȘINIUNELTE.Lucrări Practice*, Edition Agir, Bucharest, 2006. ISBN 973-720-107-8.
- [6] P.H.Joshi Machine Tools Handbook, McGraw-Hill, New Delhi, 2007. ISBN 10: 0070617392.
- [7] Sinutrain Complete Package Sinumerik 840D sI

**Prerequisites:****Co-requisites**

*(courses to be taken in parallel as a condition for enrolment):*

**Additional relevant information:**

<http://www.euromachinetools.com/> [www.machinetools.com](http://www.machinetools.com)  
<http://www.journals.elsevier.com/international-journal-of-machine-tools-and-manufacture/>  
<http://www.renishaw.com/en/machine-tool-probes-and-software--6073>

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05.07.2016

Professor Miron Zapciu