

University POLITEHNICA of Bucharest

Faculty of Industrial Engineering & Robotics

Study programme: Industrial Engineering

Form of study: Bachelor

### COURSE SPECIFICATION

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

<b>Course structure</b>	<b>Lecture</b>	<b>Seminar</b>	<b>Laboratory</b>	<b>Project</b>	<b>Total hours</b>
<b>No. of hours/ week</b>	<b>2</b>	-	<b>1</b>	<b>1</b>	<b>4</b>
<b>No. of hours/ semester</b>	<b>28</b>	-	<b>14</b>	<b>14</b>	<b>56</b>

<b>Lecturer</b>	<b>Lecture</b>	<b>Seminar</b>	<b>Laboratory</b>	<b>Project</b>
<b>Name, academic degree</b>	<b>Miron ZAPCIU, Professor</b>	-	<b>Andra PENA, Lecturer</b>	<b>Andra PENA, Lecturer</b>
<b>Contact (E-mail, location)</b>	<a href="mailto:miron.zapciu@upb.ro">miron.zapciu@upb.ro</a> CB109	-	<a href="mailto:andra.pena@upb.ro">andra.pena@upb.ro</a> CO-03	<a href="mailto:andra.pena@upb.ro">andra.pena@upb.ro</a> CO-03

#### **Course description (max: 200 words)**

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.

#### **Laboratory description (max. 200 words)**

Making kinematic calculations, machine tool selection, precision adjustment and verification.

Practical programming and control of workpiece.

#### **Project description (max. 200 words)**

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

Assessment methods	Percentage of the final grade	Minimal requirements for award of credits
Written exam	40	50% of the test grid - correctly solved
Report/ Project	20	Project completed
Homework	20	
Laboratory	20	All laboratory work completed

#### References

- [1] Zapciu M. – Course notes.
- [2] Zapciu M. *Modelare-Simulare-Proiectare in domeniul masinilor-unelte si sistemelor de masini*; cap. 3&4. Printech Edition, 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., Predinca, N., Zapciu, M., Constantin, G., Sandu, C., Tanase, I., Hreanu, O. *MAȘINI-UNELTE. 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 sl

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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Professor Miron ZAPCIU