POLITEHNICA University of Bucharest (**UPB**)
Faculty of Engineering and Management of Technological Systems (**IMST**)
Study Programme: Industrial Engineering (**IE**)
Form of study: Licence (Bachelor)

COURSE SPECIFICATION

Course title:	Robotics	***Semester:***	6
Course code:	UPB.06.S.06.O.003	***Credits (ECTS):***	4

Course structure	Lecture	Seminar	Laboratory	Project	Total hours
Number of hours per week	2		2		4
Number of hours per semester	28		28		56

Lecturer	Lecture	Seminar / Laboratory / Project
Name, academic degree	Prof. phd. eng. Adrian NICOLESCU	Lecturer. phd. eng. Cezara AVRAM
Contact (email, location)	afnicolescu@yahoo.com MSP Dept., room CE 006 / CO 004	cezara.avram@yahoo.com MSP Dept., room CE 006 / CO 004

Course description:

Understanding fundamentals of Robotics and backgrounds of industrial robots and their specific applications. Specific approach on industrial robot (IR) & peripheral equipment's (PE) design and operation, industrial robot specific implementing into manufacturing systems as well as robotic manufacturing systems design and operation. Background for diploma works in Industrial Engineering specialization.

Seminar / Laboratory / Project description:

Assisted and aplicative study of constructive and functional characteristic of IR / PE; understanding the IR's operation specificity; analysis of end-effectors and automated tool changing system design and necessary adaptors for different real scale applications; teach-in programming of IR; for different IR types and robotized manufacturing applications.

Intended learning outcomes:

C5. Design of production systems: Understanding and correct using of specific terminology from Robotics field of activity. Knowing specific design and operation of IR / PE available on the market. Correctly setup of end effectors for different robotic manufacturing operations.
Design the general assembly of robotized manufacturing cell / lines / systems for different manufacturing processes types.
C6. Control of the production processes and systems: Understanding the specificity of robotized application operation for different manufacturing processes: (pick and place, palletizing, assembly, injection molding, painting, arc welding and spot welding, robotic machining, robotized non-conventional machining etc). IR teach in programming of articulated arm IR for specific operation in pick and place, palletizing, assembly, arc welding and spot welding, robotic machining, robotized non-conventional machining etc. IR's direct PC control and programming of SCARA and gantry IR for wafer manipulation and utraonic control.

C3. Utilization of software applications and informational technologies to solve specific industrial engineering tasks: Using of software products and specific technical resources (product manuals, electronic catalogs, data sheets, data bases and CAD file bases) for specific activities in the field of IR's and robotic FMC / FML / FMS's design and operation.

Assessment method:	% of the final grade	Minimal requirements for award of credits
Written exam	20%	50% of total quote for exam (complete presentation for at least two subjects, or minimum 50% presentation for all three subjects of written exam)
Report / project	-	-
Homework	20%	100% remittance of all homework (2 electronic files), final home works presentation and sustaining, 50% of quote for each homework evaluation
Laboratory	25%	100% presence on laboratory activities, remittance of each laboratory works hard copies / electronic files, presence on final laboratory evaluation, 50% of total quote for final laboratory evaluation
Other - written test in week 8/9	35%	Presence on written test, 50% of total quote for test

References:

1. "Robotic Visions to 2020 and beyound - The Strategic Research Agenda for Robotics in Europe, 07 / 2009", EUROP - European Robotics Technology Platform, Publisher EUROP, Diamant Building Bd. A Reyers 80, 1030, Brussels, Belgium, 07 / 2009
2. Nicolescu, A., „Roboti Industriali – Vol.1 Subsisteme si ansambluri componente. Structura axelor comandate numeric ale RI", 321 pag., 233 fig. si tabele, ISBN 973 – 30 – 1244 – 0, Editura Didactica si Pedagogica RA, 2005, Bucuresti
3. Nicolescu, A., Stanciu, M.D., Popescu D.- „Conceptia si exploatarea robotilor industriali - Vol.1 Tendinte actuale in conceptia si exploatarea RI. Precizia de lucru si precizia volumetrica. Componente organologice specifice. Tehnici si metode de studiu al comportarii elastice si performantelor robotilor industriali" ISBN 973-718-007-0, Ed. Printech, 2004, Bucuresti
4. Nicolescu A., Marinescu D., Ivan M., Avram C., - Conceptia si exploatarea sistemelor de productie robotizate – Vol. I Sistem robotic modular pentru cultivare controlată şi procesare integrată a ciupercilor alimentare şi terapeutice, 300 pag. Ed. Politehnica Press, 2011, ISBN 978 – 606 – 515 – 339 – 4 (general), ISBN 978 – 606 – 515 – 340 – 0 (vol I)
5. Nicolescu A., Dobrescu T., Ivan M., Avram C., Brad S., Doroftei I., Grigorescu S. – „Roboti industriali, tehnologii si sisteme de productie robotizate", 190 pag., Ed Academiei Oamenilor de Stiinta din Romania, 2011, ISBN 978 – 606 – 8371 – 48 – 1

Prerequisites:	***Co-requisites*** ***(courses to be taken in parallel as a condition for enrolment):***
Technical Drawing, Tolerances Design Mechanics of Materials 1, 2 Computer Aided Design 1 (AutoCAD) Computer Aided Design 2 (Catia V5) Machine elements Mechanical Systems Design Manufacturing Processes 1	None.
Additional relevant information:	
Mandatory requested: - very good skills for AutoCAD (2D drafting) and CATIA V5 (part design, assembly and DMU Kinematics) operation; - assisted documents processing in Microsoft Office (Word, Excel, PowerPoint).	

Date: 30.08.2016
Professor PhD Eng., Adrian Florin NICOLESCU