Óbuda University	
Bánki Donát Faculty of Mechanical and Safety Engineering	Insitute of Mechatronics and Vehicle Engineering

Subject title and code:	*Industrial Robot programming and simulation ,* *BMXRPY7BNE*				**Credits:**	*5*
Full-time study	4	*ac.*	1	*semester* *year*		

The course is available at:	mechatronical engineering

Supervised by:	István Nagy	**Instructors:**	Bence Varga, István Nagy

Prerequisite (neptun code):	**Control Engineering (**BMXIR14BNE**)}, Industrial Robot Kinematics and Dynamics (**BMXRR25BNE**)**

Weekly number of lessons						
Lecture: 1	Group seminar: 0		Lab:	2	Consultation:	see, institute WEB-link

Way of assessment:	Midterm (Written) mark

Online consultation *(in case it's required):   ... (BBB link)*

Educational goal:	*To acquire basic knowledge of programming industrial robots and manipulators, both theoretical and practical. Theoretical knowledge will be taught in lectures, while practical knowledge will be taught on a 3D robot simulation system. The robot simulation environment will be based on ABB (or, depending on time, FANUC) systems. In addition, real robot programming tasks will be carried out for MITSUBISHI (humanoid robot arm) and YAMAHA (SCARA robot arm) robot arms*

Schedule

Education week	Topics
1.	
2.	**Recall:** Robotics basics: coordinate systems, uniform markings, position of a point in space; HTM, DH, Direct kinematic system; Inverse kinematic system calculations.
3.	
4.	**Introduction**: familiarization with programming basics, repetition of basic coordinate systems. Construction of robot controller(s) (PLC+own controller) and the path of a robot program from writing to execution (interpreter, translator, ...).
5.	
6.	Description of On-Line and Off-Line programming methods and their characteristics. IT basic structures related to robot programming (macros, recursions, functions, subprograms, ..);
7.	
8.	**Levels of robot programs** (machine code, objects, .., high-level program) and tools for robot programming (3D simulation system, PC, training panel).
9.	
10.	**Velocity diagrams**, Modes of motion control: low-level control (at the level of motors, servos, sensors); high level control (levels of SWs). Control flowcharts and their implementation. Open system robot controllers, embedded robot controllers.
11.	Rector's Holiday
12.	TP from theory
13.	
14.	Retake TP from theory

Mid-semester requirements

Test		Assignment to be submitted		Lab measurement	
amount	dates	amount	deadlines	amount	dates

1	see schedule	0		0	

According to the Study and Examination regulations of Óbuda University attendance of group seminars and lab exercises are mandatory.

Other requirements for participation in sessions not covered by the regulations and restrictions on substitutions:

The presentations are **mandatory**, 30% absence allowed, see TVSZ

Test		Assignment to be submitted		Lab measurement	
maximum points available	minimum score required to pass /test	maximum points available	minimum score required to pass / assignment	maximum points available	minimum score required to pass /lab
100points	50points	…points	…points	…points	…points

Total number of points achievable in semester: 100points				
Grading thresholds	**satisfactory** 50 % and above	**average** 65 % and above	**good** 75 % and above	**excellent** 90 % and above
Other evaluation criteria:				
Receive a signature denied entry:	- over 30% absence; - insufficient retake TP results			
Required references:	J.N. Pires: *Industrial Robots Programming: Building Applications for the Factories of Future, Springer, 2007* more*: http://siva.bgk.uni-obuda.hu/jegyzetek/Mechatronikai_alapismeretek/IpRobProgrSzim/*			
Recommended references:	see, moodle			
Quality assurance methods of the subject:				

Things, that are not included, can be found within the regulations of Óbuda University.