

4.0 credits	30.0 h + 15.0 h	2q
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Teacher(s) :	Samin Jean-Claude ;
Language :	Français
Place of the course	Louvain-la-Neuve
Prerequisites :	<p>Optional prerequisite MECA 2755: Industrial automation. The first course of the four-monthly period is devoted to an upgrade of the students not having followed this prerequisite.</p> <p>Support : lecture notes and copies of the slides used during the lectures.</p> <p>NB.: the matter being the subject of the examination understands all that was said or shown during the lectures orally, on screen or using other media, and thus does not limit itself exclusively to the text of the & dquo;support of course& dquo;.</p>
Main themes :	<p>Robotics and automation changed production processes during the closing years of the last century. This course thus aims at describing the main features of robots : - technico-economical justification of robotization - classification of robots - robot components and devices : actuators, transmissions, sensors, end effectors and control - robot programming and task planning - kinematics of robot manipulators and path generation - industrial computer vision.</p>
Aims :	<p>- Describe the various technical features of industrial robotics used for production. - Analyse the various components (mechanical structures, actuators, transmissions, sensors, ...) involved in industrial robots. - Show the potential - and limitations - of a robot manipulators in practical use.</p> <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Evaluation methods :	<p>Oral examination.</p> <p>NB.: the matter being the subject of the examination understands all that was said or shown during the lectures orally, on screen or using other media, and thus does not limit itself exclusively to the text of the & dquo;support of course& dquo;.</p>
Teaching methods :	Lecturing, with support on transparencies (PowerPoint).
Content :	<p>Introduction - History and technico-economical motivations - Definition, classification and performances. Mechanical components : actuators, transmissions, reducers. Robot programming and control schemes (computed torque method). Geometrical and kinematic models : homogeneous transformations, Denavit - Hartenberg parameters, Jacobian matrix, singularities. Direct and inverse kinematical models of serial robot manipulator Modeling of parallel robots Trajectory planning methods. Review of external sensors, includig vision systems (hardware and software aspects). The lectures are illustrated by two laboratories. The first consists in teaching an industrial robot (PUMA). The second one aims at the off iline programming (by computer simulation) of a robotized assembly cell.</p>
Bibliography :	<p>Recommended readings : - B. Gorla et M. Renaud, Mod& grave;les des Robots Manipulateurs : Application & grave; leur Commande, Cepadues & acute;ditions, 1984. - E. Dombre et W. Khalil, Mod& acute;lisation, Identification et Commande des Robots, Trait& acute; des Nouvelles Technologies : S& acute;rie Robotique, Hermes, deuxi& grave;me & acute;dition, 1999. - K.S. Fu, R.C. Gonzalez and C.S.G. Lee : robotics : Control, Sensing, Vision and Intelligence, McGraw-Hill, 1987.</p>
Other infos :	<p>Optional prerequisite MECA 2755: Industrial automation. The first course of the four-monthly period is devoted to an upgrade of the students not having followed this prerequisite.</p> <p>& bsp;</p> <p>Support : lecture notes and copies of the slides used during the lectures.</p>

<p>Cycle and year of study :</p>	<p>> Master [120] in Mechanical Engineering > Master [120] in Mathematical Engineering > Master [120] in Electro-mechanical Engineering</p>
<p>Faculty or entity in charge:</p>	<p>MECA</p>