

Internal documentation for evaluators

MISCE project

Mechatronics for Improving and Standardizing Competences in Engineering



Document: WP2 report

Preliminary selection of technical competences

SCOPE

The objective of this brief document is to present the analyzed competences in the Framework of MISCE project¹ for the evaluators of this project. In this sense, Table I enumerates the preliminary selection of technical competences and the skills defined.

These competencies and skills were included in the 'Online Evaluation Tool'² which allowed the professional to evaluate the level of acquisition of each competence and/or its corresponding skills.

¹ <https://uclm-mantis.github.io/misce/>

² <https://misce-frontend.vercel.app/>

Table I. Preliminary selection of technical competencies in engineering for its evaluation

Main competence ³	Related	ESCO	Subcompetences/practical skills
Control engineering			<ul style="list-style-type: none"> Understanding the static and dynamic responses of a system Proficiency in implementing/utilizing PID-type controllers Tuning various controller parameters Identifying unknown systems Enhancing the dynamic responses of controlled systems
Working with machinery and specialized equipment,			<ul style="list-style-type: none"> To identify the main functional components of equipment To understand the functional behavior of the machinery and equipment To design/modify different components of the system To know the security rules of the machinery To apply the proper maintenance of the machinery
Using instrumentation and equipment	precision and		<ul style="list-style-type: none"> To know the main parameters of the measurement instruments To know how to configure/setup the instruments To know how to calibrate the equipment To maintenance the precision instrumentation and equipment To be able to interpret the obtained measurement
Management skills			<ul style="list-style-type: none"> To manage the human resources communication To schedule the time planning of the production and the budget planning To ensure a proper communication channel between different roles To coordinate the available resources To manage the conflicts and solve the problems
Mechanical design			<ul style="list-style-type: none"> To know the main mechanical element of a device To be able to solve and understand the kinematics and dynamics behavior To know the material properties of the different functional elements of the machine

³ <https://esco.ec.europa.eu/>

	<ul style="list-style-type: none"> To know how to integrate the mechanical parts with other main system To design/modify different components of the system
Automation technology	<ul style="list-style-type: none"> To know the main electric/pneumatic and hydraulics elements To be able to design the functional behavior of the system To be able to understand the technical documentation of a project/product To program the functional behavior of the device To debug the final planned behavior of the system
Robotics	<ul style="list-style-type: none"> To know the different robotic architectures and their main features/applications To understand the main parameters of robotics system To understand the inverse kinematic and robot trajectories To be able to program the robot behavior To know security rules for a safety operation
Computer engineering	<ul style="list-style-type: none"> to know the main parameters of current computer architectures to be able to characterize and evaluate computer performance for a given application to understand optimization techniques of current computer architectures to understand the implications of application binary interface in software development to understand communication issues in computer architectures
Computer programming	<ul style="list-style-type: none"> to be able to use proper data structures to be able to develop programs to solve engineering problems to be able to characterize the performance of programs to be able to debug faulty programs to be able to optimize programs
Mechatronics	<ul style="list-style-type: none"> To develop an integral design of a mechatronics device To design the mechanical/electro-electronics part of the device To integrate and program the system behavior To design the calibration/maintenance procedures of the device To validate the final product/process
Database and network design and administration	<ul style="list-style-type: none"> To develop an integral design of databases and networks To design databases and networks To know how to ensure the security of databases and networks

		<ul style="list-style-type: none"> To know how to protect the critical data To validate the final databases and network architecture
Programmable controller	logic	<ul style="list-style-type: none"> To know the basics architecture of PLC To know how to manage Digital IO To know how to manage Analog IO To know how to implement the complete functional behavior of a system To integrate PLC into an industrial network
Mechanical systems		<ul style="list-style-type: none"> To understand the different energy conversion process to produce movement To know to design mechanical system To know the different movement transmissions To be able to analyze and optimize a mechanical device To know the force and torque involved in mechanical systems
CAD software		<ul style="list-style-type: none"> To properly select the CAD software according to their main features and the project requirements To be able to interpret technical drawings To have the basic knowledge necessary to recreate the geometry of machine elements and its modification To know how to efficiently use the CAD program to create parametric 2D and 3D technical drawings To know how to use CAD systems to design a simple device or mechatronic system according to the given specification