Expected Learning Results — Mapping Matrix (Learning Areas × Courses)

Learning Areas	Dublin Descriptors	Descriptor Details	Molecular Simulation	Advanced Materials Science	Chemical and Biochemical Reaction Engineering	Soft Materials and Drug Delivery	Ceramic Materials	Molecular Biology for Engineering	Experimental Laboratory of Nanotechnology and Biotechnology	Strategic and Critical Materials	Biomaterials, Artificial Organs and Prostheses	Impiego Industriale dell'Energia	Polymeric and Composite Materials	Sustainable Industrial Chemistry	Green Nanotechnologies, Natural and Bioinspired Materials	Metallic Materials and Fracture Mechanics	Materials and Systems for the Energy Transition	Materials Characterization and Data Analysis	Process Dynamics and Control	Process Design and Optimization	Nanomaterials for Nano&Bio technologies	Tecnologia delle energie rinnovabili	Enzyme Kinetics	Design for Sustainability of Products and Processes	Advanced Simulation for Nanotechnology and Biotechnology	Other Activities	Knowledge of a foreign language	Final Thesis
Fundamentals	Knowledge and understanding	fundamental atomic and molecular characteristics and process- structure-properties relationships	x	x	x	x	x	x	x				x	x	x	x		x			x		x		x			
		theories of the main physical and chemical phenomena in the area of materials and processes	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x		x		x			
		modeling of phenomena and structures	x	x	x	x	x						x	x	x	x	x						x		x			
	Applying knowledge and understanding	analysis of complex processes			x	x			x			x		x							x	x	x		x			x
		analysis of the materials behavior	x	x		x	x		x		x		x		x	x	x	x			x				x			x
		design of experimental campaigns, data analysis, data interpretation							x									x										x
		failure analysis					x			x			x			x												x
Industrial Technologies	Knowledge and understanding	selection and design of materials	x				x			x	x		x	x	x	x					x			x				x
		production and properties of materials					x			x	x		x	x	x	x	x				x	x		x				x
		process design and control			x									x					x	x								x
		process design and optimization			x									x					x	x								x
	Applying knowledge and understanding	selecting materials for specific applications				x				x	x		x		x	x	x							x				x
		devising and designing materials for specific applications	x			x				x	x		x		x	x	x				x	x		x				x
		characterizing materials		x		x		x					x		x			x			x							x
		devising and designing processes for specific applications			x									x					x	x								x
		optimizing and controlling processes			x									x					x	x								x
Nanotechnologies and Biotechnologies	Knowledge and understanding	modeling, simulation, design of nano- and biosystems	x		x										x						x				x			
		characterization techniques and analysis of nano- and biosystems	x						x						x			x			x				x			
		applications of nano- and biomaterials	x			x		x	x		x				x						x		x		x			
	Applying knowledge and understanding	designing nanosystems and biosystems	x												x						x				x			x
		simulating and understanding nanosystems and biosystems	x			x			x		x				x			x			x		x		x			x
Technologies for Sustainability	Knowledge and understanding	sustainability criteria and indicators								x		x		x	x		x		x	x		x		x				
		selection and design of materials with sustainability criteria								x			x		x		x							x				
		analysis and design of processes with sustainability criteria			x							x		x					x	x				x				
		life-cycle assessment																						x				
	Applying knowledge and understanding	analyzing the life cycle of materials, processes, products												x										x				x
		selecting, devising, designing materials and processes with sustainability criteria			x					x			x	x			x		x	x		x		x				x
Transversal Competences (quadro A4.c della SUA-CdS)	Judgment Autonomy	evaluation of the appropriateness of solutions for materials and processes in specific industrial environments	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x		x				x
		devising innovative materials, processes and approaches	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x				x	x		
	Communication skills	communicating the assumptions and context of specific analyses, experimentations, simulations in a precise, rigorous, clear way	x	x	x	x	x	x	x				x	x	x		x	x	x	x	x		x	x	x		x	
		communicating the results of specific analyses, experimentations, simulations in a precise, rigorous, clear way	x				x		x						x			x			x			x	x		x	
		communicating the conclusions of specific analyses, experimentations, simulations in a precise, rigorous, clear	x				x		x	x					x			x			x			x	x		x	
		communicating in English in a precise, rigorous, clear way	x	x	x	x	x		x	x	x		x	x	x	x	x	x	x	x				x	x		x	x
	Learning skills	analytic learning	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
		learning through problem solving	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
		flexible and adaptable learning	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x

Header groupings: 1st YEAR (Molecular Simulation … Polymeric and Composite Materials); 2nd YEAR (Sustainable Industrial Chemistry … Advanced Simulation for Nanotechnology and Biotechnology).