

## MSCA KEYWORDS

| Scientific panel | Level 1 keywords                            | Level 2 keywords   |
|------------------|---|--|
| Chemistry (CHE)  | C1-Inorganic Chemistry                      | Catalysis<br>Coordination chemistry<br>Inorganic and nuclear chemistry<br>NMP Non-Metallic Materials & basic processes<br>Organometallic chemistry<br>Radiation and nuclear chemistry  |
|                  | C2-Organic, Polymer and Molecular Chemistry | Carbohydrates<br>Combinatorial chemistry<br>Heterocyclic chemistry<br>Macromolecular chemistry<br>Molecular architecture and structure<br>Molecular biology<br>Molecular chemistry<br>Natural product synthesis<br>Organic chemistry<br>Organic reaction mechanism<br>Peptide chemistry<br>Polymer chemistry<br>Stereochemistry<br>Supramolecular chemistry<br>Synthetic Organic chemistry   |
|                  | C3-Physical and Analytical Chemistry        | Analytical chemistry<br>Chemical instrumentation<br>Chemical reactions: mechanisms, dynamics, kinetics and catalytic reactions<br>Chemistry of condensed matter<br>Chromatography<br>Colloid chemistry<br>Corrosion<br>Crystallography and X-ray diffraction<br>Electrochemistry, electrodialysis, microfluidics, sensors<br>Forensic chemistry<br>Heterogeneous catalysis<br>Homogeneous catalysis<br>Ionic liquids<br>Mass Spectrometry<br>Method development in chemistry<br>Microscopy<br>Molecular dynamics<br>Molecular electronics<br>Photocatalysis<br>Photochemistry<br>Physical chemistry<br>Physical chemistry of biological systems<br>Quantum Chemistry<br>Spectroscopic and spectrometric techniques<br>Structure and dynamics of disordered systems: soft matter (gels, colloids, liquid crystals, etc.), liquids, glasses, defects, etc.<br>Surface chemistry<br>Theoretical and computational chemistry<br>Trace Analysis |
|                  | C4-Applied and Industrial Chemistry         | Biochemistry<br>Biological chemistry<br>Biomaterials, biomaterials synthesis<br>Ceramics<br>Coating and films<br>Drinking water treatment<br>Electrochemistry, batteries and fuel cells<br>Environment chemistry<br>Enzymology<br>Food chemistry<br>Fuel cell technology<br>Graphene, 2D materials<br>Hydrogen<br>Intelligent materials, self-assembled materials<br>Materials for sensors<br>Medicinal chemistry<br>Nanochemistry<br>New materials: oxides, alloys, composite, organic-inorganic hybrid, nanoparticles<br>Pharmaceutical chemistry<br>Polymers and plastics<br>Porous Materials<br>Structural properties of materials<br>Surface modification<br>Thin films<br>Toxicology   |

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| <b>Economic Sciences (ECO)</b>                   | <b>E1-Economics</b>   | Behavioural economics<br>Big data<br>Development, economic growth<br>Econometrics, statistical methods<br>Economic geography<br>Economic history<br>Industrial economics<br>International trade<br>Labour economics<br>Macroeconomics<br>Public economics<br>Social economics<br>Urban and regional economics  |
|  | <b>E2-Economic Development</b>  | Competitiveness, innovation, research and development<br>Economics of innovation<br>Industrial clusters<br>Natural resources and environmental economics   |
|  | <b>E3-Management</b>  | Business governance<br>Entrepreneurship<br>Human resource management<br>Innovation management<br>Marketing strategy<br>New industrial value chains<br>Organization studies: theory & strategy, industrial organization<br>Startups   |
|  | <b>E4-Finance</b>   | Accounting<br>Banking, corporate finance, accounting<br>Finance, banking, insurance<br>Financial & Investment management<br>Financial markets, asset prices, international finance<br>Venture capital  |
| <b>Information Science and Engineering (ENG)</b> | <b>G1-Computer science and informatics</b>  | Algorithms, distributed, parallel and network algorithms, algorithmic game theory<br>Artificial intelligence, intelligent systems, multi agent systems<br>Augmented Reality<br>Bioinformatics, biocomputing, and DNA and molecular computation<br>Cloud computing<br>Cognitive science<br>Complexity and cryptography, electronic security, privacy, biometrics<br>Computer architecture, pervasive computing, ubiquitous computing<br>Computer games<br>Computer graphics, computer vision, multi media, computer games<br>Computer hardware and architecture<br>Data mining<br>E-Commerce<br>E-learning, user modelling, collaborative systems<br>Embedded systems<br>Human computer interaction and interface, visualization and natural language processing<br>Intelligent robotics, cybernetics<br>Internet and semantic web, database systems and libraries<br>Internet of Things<br>Machine learning, statistical data processing and applications using signal processing (e.g. speech, image, video)<br>Multimedia<br>Networks (communication networks, sensor networks, networks of robots, etc.)<br>Numerical analysis, simulation, optimisation, modelling tools<br>Ontologies, neural networks, genetic programming, fuzzy logic<br>Quantum Technologies (e.g. computing and communication)<br>Scientific computing and data processing<br>Software engineering, operating systems, computer languages<br>Theoretical computer science, formal methods<br>Virtual Reality |
|  | <b>G2-Systems and Communication Engineering: Electrical, electronic, communication, optical and systems engineering</b> | Control engineering<br>Diagnostic and implantable devices, environmental monitoring<br>Electrical and electronic engineering: semiconductors, components, systems<br>Electronics, photonics<br>Human computer interaction<br>Nanotechnology, nano-materials, nano engineering<br>Signal processing<br>Simulation engineering and modelling<br>Systems engineering, sensorics, actronics, automation<br>Wireless communications, communication, high frequency, mobile technology   |

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|  | <b>G3-Products and Processes<br/>Engineering: Product design, process design and control, construction methods, civil engineering, energy processes, material engineering</b> | Aerospace engineering<br>Architecture, smart buildings, smart cities, urban engineering<br>Chemical engineering, technical chemistry<br>Civil engineering<br>Civil engineering, maritime/hydraulic engineering, geotechnics, waste treatment<br>Computational engineering and computer aided design<br>Energy collection, conversion and storage, renewable energy<br>Energy systems, smart energy, smart grids, wireless energy transfer<br>Environmental engineering and geotechnics<br>Fluid mechanics, hydraulic-, turbo-, and piston engines<br>Industrial bioengineering<br>Industrial design (product design, ergonomics, man-machine interfaces, etc.)<br>Lightweight construction, textile technology<br>Maritime Engineering<br>Materials engineering<br>Mechanical and manufacturing engineering (shaping, mounting, joining, separation)<br>Production technology, process engineering<br>Sustainable design (for recycling, for environment, eco-design)<br>Transport engineering, intelligent transport systems |
| <b>Environmental and Geosciences (ENV)</b> | <b>V1-Environment and society</b>   | Circular economy<br>Environmental health<br>Environmental regulations and climate negotiations<br>Environmental risk measurement<br>Mobility and transportation<br>Renewable energy sources<br>Spatial and regional planning<br>Sustainable development and nature protection<br>Urbanization and urban planning, cities  |
|  | <b>V2-Earth system science</b>  | Air and water pollution control<br>Atmospheric chemistry, atmospheric composition, air pollution<br>Biogeochemistry, biogeochemical cycles, environmental chemistry<br>Climatology and climate change<br>Coastal Engineering<br>Cryosphere, dynamics of snow and ice cover, sea ice, permafrost and ice sheets<br>Earth observations from space/remote sensing<br>ENV Environmental Hazard Analysis<br>Environment, Pollution & Climate<br>Environmental chemistry<br>Geochemistry and geophysics<br>Geology, tectonics, volcanology<br>Hydrology<br>Meteorology, atmospheric physics and dynamics<br>Mineralogy, petrology, igneous petrology, metamorphic petrology<br>Natural resources exploration and exploitation<br>Paleoclimatology, paleoecology<br>Physical geography<br>Sedimentology, soil science, palaeontology, earth evolution<br>Terrestrial ecology, land cover change  |
|  | <b>V3-Evolutionary, population and environmental biology</b>  | Animal behaviour<br>Biodiversity, comparative biology<br>Biodiversity, conservation biology, conservation genetics<br>Biogeography, macro-ecology<br>Ecology<br>Environmental toxicology at the population and ecosystems level<br>Freshwater biology<br>Marine biology<br>Population biology, population dynamics, population genetics<br>Species interactions (e.g. food-webs, symbiosis, parasitism, mutualism, bio-invasion)<br>Systems evolution, biological adaptation, phylogenetics, systematics  |
|  | <b>V4-Applied Life Sciences and Non-Medical Biotechnology</b>   | Agricultural waste<br>Agriculture / Forestry / Rural Development<br>Agriculture related to animal husbandry, dairying, livestock raising<br>Agriculture related to crop production, applied plant biology<br>Agriculture related to crop production, soil biology and cultivation, applied plant biology<br>Agroindustry<br>Applied biotechnology (non-medical), bioreactors, applied microbiology<br>Aquaculture, fisheries<br>Biohazards, biological containment, biosafety, biosecurity<br>Biomimetics<br>Environmental biotechnology, bioremediation, biodegradation  |

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|                     |  | Forestry, biomass production (e.g. for biofuels)  |
| Life Sciences (LIF) | <b>L1-Molecular and Structural Biology</b>                       | Biophysics (e.g. transport mechanisms, bioenergetics, fluorescence)<br>Carbohydrate synthesis, modification and turnover<br>DNA synthesis, modification, repair, recombination, degradation<br>Lipid synthesis, modification and turnover<br>Metabolism<br>Molecular biology and interactions<br>Protein synthesis, modification and turnover<br>RNA synthesis, processing, modification and degradation<br>Structural biology  |
|                     | <b>L2-Genetics, Genomics, Bioinformatics and Systems Biology</b> | Applied genetic engineering, transgenic organisms, recombinant proteins, biosensors<br>Bioinformatics<br>Biological systems analysis, modelling and simulation<br>Biostatistics<br>Computational biology<br>Epigenetics and gene regulation<br>Genetic engineering<br>Genetic epidemiology<br>Genomics, comparative genomics, functional genomics<br>Metabolomics<br>Molecular genetics, reverse genetics and RNAi<br>Pharmacogenomics<br>Plant genetics<br>Proteomics<br>Quantitative genetics<br>Systems biology<br>Transcriptomics |
|                     | <b>L3-Cellular and Developmental Biology</b>                     | Animal-related development, development genetics, pattern formation and embryology<br>Cell biology and molecular transport mechanisms<br>Cell differentiation, physiology and dynamics<br>Cell signalling and cellular interactions<br>Development, developmental genetics, pattern formation and embryology in plants<br>Developmental biology<br>Morphology and functional imaging of cells<br>Organelle biology<br>Signal transduction<br>Stem cell biology  |
|                     | <b>L4-Physiology, Pathophysiology and Endocrinology</b>          | Ageing<br>Cancer and its biological basis<br>Cardiovascular diseases<br>Comparative physiology and pathophysiology<br>Endocrinology<br>Metabolism, biological basis of metabolism related disorders<br>Organ physiology and pathophysiology<br>Rare diseases<br>Technologies involving the manipulation of cells, tissues, organs or the whole organism (assisted reproduction)   |
|                     | <b>L5-Neurosciences and neural disorders</b>                     | Behavioural neuroscience (e.g. sleep, consciousness, handedness)<br>Developmental neurobiology<br>Mechanisms of pain<br>Molecular and cellular neuroscience<br>Neuroanatomy and neurophysiology<br>Neuroimaging and computational neuroscience<br>Neurological disorders (e.g. Alzheimer's disease, Huntington's disease, Parkinson's disease)<br>Poisoning<br>Psychiatric disorders<br>Sensory systems (e.g. visual system, auditory system)   |
|                     | <b>L6-Immunity and infection</b>                                 | Adaptive immunity<br>Anticancer therapy<br>Bacteriology<br>Biological basis of immunity related disorders (e.g. autoimmunity)<br>Immunogenetics<br>Immunological memory and tolerance<br>Immunosignalling<br>Innate immunity and inflammation<br>Microbiology<br>Parasitology<br>Phagocytosis and cellular immunity<br>Prevention and treatment of infection by pathogens (e.g. vaccination, antibiotics, fungicide)<br>Veterinary medicine and infectious diseases in animals<br>Virology  |

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|                          | <b>L7-Diagnostic tools, therapies and public health</b> | Biophotonics, Imaging, image and data processing<br>Bioremediation, diagnostic biotechnologies (DNA chips and biosensing devices) in environmental management<br>Drug development, clinical phases<br>Environment and health risks, occupational medicine<br>Gene therapy, cell therapy, regenerative medicine<br>Health services, health care research<br>Medical engineering and technology<br>Personalised medicine<br>Pharmacology, pharmacogenomics, drug discovery and design, drug therapy<br>Public health and epidemiology<br>Radiation therapy<br>Radiology, nuclear medicine and medical imaging<br>Surgery<br>Tissue engineering<br>Vaccines   |
| <b>Mathematics (MAT)</b> | <b>M1-Mathematics</b>                                   | Algebraic and complex geometry<br>Algorithms and complexity<br>Discrete mathematics and combinatorics<br>Geometry<br>Logic and foundations<br>Number theory<br>Operator algebras and functional analysis<br>Probability<br>Theoretical aspects of partial differential equations<br>Topology   |
|                          | <b>M2-Applied Mathematics</b>                           | Application of mathematics in sciences<br>Mathematical aspects of Computer Science<br>Mathematical physics<br>Numerical analysis and scientific computing<br>Scientific computing, simulation and modelling tools<br>Statistics  |
| <b>Physics (PHY)</b>     | <b>P1-Particle and Nuclear Physics</b>                  | Fundamental interactions and fields<br>Nuclear physics<br>Observational astronomy: cosmic rays, neutrinos, and other particles<br>Particle physics<br>Particles and fields physics   |
|                          | <b>P2-Atomic and molecular physics, optics</b>          | Atomic, molecular physics<br>Chemical physics<br>Lasers, ultra-short lasers and laser physics<br>Metrology and measurement<br>Nonlinear optics<br>Optics (including laser optics and quantum optics)<br>Optics, non-linear optics and nano-optics<br>Photonics<br>Quantum optics and quantum information<br>Statistical physics (gases)<br>Ultra-cold atoms and molecules<br>Wave Interaction and Propagation  |
|                          | <b>P3-Condensed matter physics</b>                      | Condensed matter physics (including formerly solid state physics, superconductivity)<br>Electronic properties of materials, surfaces, interfaces, nanostructures, etc<br>Fluid dynamics<br>Gas and plasma physics<br>Magnetism and strongly correlated systems<br>Mechanical and acoustical properties of condensed matter, Lattice dynamics<br>Mesoscopic physics<br>Nanophysics: nanoelectronics, nanophotonics, nanomagnetism, nanoelectromechanics, etc.<br>Phase transitions, phase equilibria<br>Semiconductors and insulators: material growth, physical properties<br>Soft condensed matter<br>Spintronics<br>Statistical physics (condensed matter)<br>Structure of solids and liquids<br>Superconductivity<br>Superfluids<br>Surface Physics<br>Thermal properties of condensed matter<br>Transport properties of condensed matter |
|                          | <b>P4-Astrophysics, Cosmology, Space science</b>        | Astrobiology<br>Astrochemistry<br>Clusters of galaxies and large scale structures<br>Cosmology<br>Dark matter, dark energy<br>Exoplanets<br>Formation and evolution of galaxies  |

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|                            |  | Formation of stars and planets<br>Gravitational astronomy<br>High energy and particles astronomy - X-rays, cosmic rays, gamma rays, neutrinos<br>Instrumentation - telescopes, detectors and techniques<br>Interstellar medium<br>Nuclear astrophysics<br>Observational astronomy: radio<br>Relativistic astrophysics<br>Solar and interplanetary physics<br>Solar physics<br>Space weather<br>Stellar systems: multiple stars, clusters, and associations  |
|                            | <b>P5-Applied physics</b>                    | Acoustics<br>Communication Systems<br>Computational modelling<br>Geophysics<br>Lasers and laser optics<br>Macroscopic quantum phenomena: superconductivity, superfluidity, etc.<br>Medical physics<br>Optical engineering, photonics, lasers<br>Optoelectronics<br>Photonic integration, photonic integrated circuits<br>Photovoltaics<br>Plasmonics and metamaterials<br>Solid state materials<br>Statistical physics: phase transitions, noise and fluctuations, models of complex systems, etc.  |
| <b>Social Sciences and</b> | <b>S1-Sociology, social anthropology</b>     | Ageing, work, social policies<br>Demography<br>Ethnography<br>Globalisation<br>Globalisation, migration, interethnic relations<br>Households, family and fertility<br>Integration of refugees and migrants<br>Kinship, cultural dimensions of classification and cognition, identity<br>Myth, ritual, symbolic representations, religious studies<br>Rural development studies<br>Social and behavioural science<br>Social Inclusion<br>Social policies, work and welfare<br>Social structure, inequalities, social mobility, interethnic relations<br>Sociology<br>Transformation of societies, democratization, social movements<br>Urban studies, regional studies<br>Women and gender studies<br>Youth policy |
|                            | <b>S2-Political science</b>                  | Collective Awareness<br>EU International Relations and Diplomacy Studies<br>EU research policy /Research policies in the EU<br>Geopolitics<br>Human and social geography<br>Migration<br>Non-discrimination<br>Peace and conflict studies<br>Political economy, institutional economics, law and economics<br>Political systems and institutions, governance<br>Political theory<br>Public administration<br>Violence, conflict and conflict resolution   |
|                            | <b>S3-Law</b>                                | Civil law, commercial law<br>Criminal law<br>Data protection<br>Global and transnational governance, international law, human rights<br>Health law rights<br>Intellectual property rights<br>International private law<br>Law<br>Legal studies, constitutions, comparative law<br>Legal systems, constitutions, foundations of law<br>Private, public and social law  |
|                            | <b>S4-Communication</b>                      | Communication networks, media, information society<br>Crisis management<br>Digital Social Innovation<br>Media and socio-cultural communication<br>Social Media<br>Social studies of science and technology  |
|                            | <b>S5-Cognition, psychology, linguistics</b> | Cognition (e.g. learning, memory, emotions, speech)<br>Developmental psychology<br>Ergonomic and Human factors<br>Evolution of mind and cognitive functions, animal communication   |

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|                  |   | Fatigue and stress observation, analysis and coping<br>Formal, cognitive, functional and computational linguistics<br>Human life-span development<br>Neuropsychology and cognitive psychology<br>Psycholinguistics and neurolinguistics: acquisition and knowledge of language, language pathologies<br><br>Social psychology<br>Typological, historical and comparative linguistics<br>Use of language: pragmatics, sociolinguistics, discourse analysis, second language teaching and learning, lexicography, terminology  |
|                  | <b>S6-Philosophy</b>  | Epistemology, logic, philosophy of science<br>Ethics and morality, bioethics<br>History of philosophy<br>Philosophy<br>Philosophy of mind, epistemology and logic<br>Philosophy, Ethics and Religion   |
|                  | <b>S7-Education</b>   | Education<br>Educational psychology<br>Life long learning<br>Pedagogy  |
|                  | <b>S8-Literature, arts, music, cultural and comparative studies</b> | Arts (arts, history of arts, performing arts, music)<br>Classics, ancient Greek and Latin literature and art<br>Comparative literature<br>Cultural memory, intangible cultural heritage<br>Cultural studies, cultural diversity<br>Design<br>Fashion design<br>General literature studies<br>History of art and architecture<br>History of literature<br>Libraries and archives<br>Library science<br>Literary theory and comparative literature, literary styles<br>Museums and exhibitions<br>Music and musicology, history of music<br>Studies on Film, Radio and Television<br>Textual philology, palaeography and epigraphy   |
|                  | <b>S9-Archaeology, history and memory</b>                           | Ancient history<br>Archaeology<br>Archaeology, archaeometry, landscape archaeology<br>Collective memories, identities, lieux de mémoire, oral history<br>Colonial and post-colonial history, global and transnational history, entangled histories<br>Cultural heritage, cultural memory<br>Cultural history, history of collective identities and memories<br>Diplomats<br>Egyptology<br>Gender history<br>Historiography, theory and methods of history<br>History of archaeology<br>History of ideas, intellectual history, history of science, techniques and technologies<br>Medieval history<br>Military history<br>Modern and contemporary history<br>Numismatics, epigraphy<br>Prehistory and protohistory<br>Social, economic, cultural and political history |