



# GIOVANI @RICERCASCIENTIFICA

## ANNEX 1

### Social Sciences and Humanities

#### **SH1** Individuals, Institutions and Markets: Economics, finance and management

- SH1\_1 Macroeconomics
- SH1\_2 Development, economic growth
- SH1\_3 Microeconomics, behavioural economics
- SH1\_4 Marketing
- SH1\_5 Political economy, institutional economics, law and economics
- SH1\_6 Econometrics, statistical methods
- SH1\_7 Financial markets, asset prices, international finance
- SH1\_8 Banking, corporate finance, accounting
- SH1\_9 Competitiveness, innovation, research and development
- SH1\_10 Organization studies: theory & strategy, industrial organization
- SH1\_11 Labour economics, income distribution and poverty
- SH1\_12 Public economics
- SH1\_13 International trade
- SH1\_14 History of economic thought and quantitative economic history

#### **SH2** Institutions, Values, Beliefs and Behaviour: Sociology, social anthropology, political science, law, communication, social studies of science and technology

- SH2\_1 Social structure, inequalities, social mobility, interethnic relations
- SH2\_2 Social policies, work and welfare
- SH2\_3 Kinship, cultural dimensions of classification and cognition, identity, gender
- SH2\_4 Myth, ritual, symbolic representations, religious studies
- SH2\_5 Democratization, social movements
- SH2\_6 Violence, conflict and conflict resolution



- SH2\_7 Political systems and institutions, governance
- SH2\_8 Legal studies, constitutions, comparative law, human rights
- SH2\_9 Global and transnational governance, international studies
- SH2\_10 Communication networks, media, information society
- SH2\_11 Social studies of science and technology

### **SH3** Environment, Space and Population: Environmental studies, geography, demography, migration, regional and urban studies

- SH3\_1 Environment, resources and sustainability
- SH3\_2 Environmental change and society
- SH3\_3 Environmental regulations and climate negotiations
- SH3\_4 Social and industrial ecology
- SH3\_5 Population dynamics, aging, health and society
- SH3\_6 Households, family and fertility
- SH3\_7 Migration
- SH3\_8 Mobility, tourism, transportation and logistics
- SH3\_9 Spatial development and architecture, land use, regional planning
- SH3\_10 Urban studies, regional studies
- SH3\_11 Social geography, infrastructure,
- SH3\_12 Geo-information and spatial data analysis

### **SH4** The Human Mind and Its Complexity: Cognitive science, psychology, linguistics, education

- SH4\_1 Evolution of mind and cognitive functions, animal communication
- SH4\_2 Human life-span development
- SH4\_3 Neuropsychology
- SH4\_4 Cognitive and experimental psychology: perception, action, and higher cognitive processes
- SH4\_5 Social and clinical psychology
- SH4\_6 Linguistics: formal, cognitive, functional and computational linguistics
- SH4\_7 Linguistics: typological, historical and comparative linguistics
- SH4\_8 Psycholinguistics and neurolinguistics: acquisition and knowledge of language, language pathologies
- SH4\_9 Use of language: pragmatics, sociolinguistics, discourse analysis, second language teaching and learning, lexicography, terminology
- SH4\_10 Philosophy of mind, epistemology and logic
- SH4\_11 Education: systems and institutions, teaching and learning Environmental studies, geography, demography, migration, regional and urban studies



## **SH5** Cultures and Cultural Production: Literature and philosophy, visual and performing arts, music, cultural and comparative studies

- SH5\_1 Classics, ancient Greek and Latin literature and art
- SH5\_2 History of literature
- SH5\_3 Literary theory and comparative literature, literary styles
- SH5\_4 Textual philology, palaeography and epigraphy
- SH5\_5 Visual arts, performing arts, design
- SH5\_6 Philosophy, history of philosophy
- SH5\_7 Museums and exhibitions
- SH5\_8 Music and musicology, history of music
- SH5\_9 History of art and architecture
- SH5\_10 Cultural studies, cultural diversity
- SH5\_11 Cultural heritage, cultural memory

## **SH6** The Study of the Human Past: Archaeology, history and memory

- SH6\_1 Archaeology, archaeometry, landscape archaeology
- SH6\_2 Prehistory and protohistory
- SH6\_3 Ancient history
- SH6\_4 Medieval history
- SH6\_5 Early modern history
- SH6\_6 Modern and contemporary history
- SH6\_7 Colonial and post-colonial history, global and transnational history, entangled histories
- SH6\_8 Social and economic history
- SH6\_9 Gender history
- SH6\_10 History of ideas, intellectual history, history of sciences and techniques
- SH6\_11 Cultural history, history of collective identities and memories
- SH6\_12 Historiography, theory and methods of history



## Physical Sciences and Engineering

**PE1** Mathematics:  
All areas of mathematics, pure and applied,  
plus mathematical foundations of computer science,  
mathematical physics and statistics

- PE1\_1 Logic and foundations
- PE1\_2 Algebra
- PE1\_3 Number theory
- PE1\_4 Algebraic and complex geometry
- PE1\_5 Geometry
- PE1\_6 Topology
- PE1\_7 Lie groups, Lie algebras
- PE1\_8 Analysis
- PE1\_9 Operator algebras and functional analysis
- PE1\_10 ODE and dynamical systems
- PE1\_11 Theoretical aspects of partial differential equations
- PE1\_12 Mathematical physics
- PE1\_13 Probability
- PE1\_14 Statistics
- PE1\_15 Discrete mathematics and combinatorics
- PE1\_16 Mathematical aspects of computer science
- PE1\_17 Numerical analysis
- PE1\_18 Scientific computing and data processing
- PE1\_19 Control theory and optimization
- PE1\_20 Application of mathematics in sciences
- PE1\_21 Application of mathematics in industry and society

**PE2** Fundamental Constituents of Matter:  
Particle, nuclear, plasma, atomic, molecular, gas,  
and optical physics

- PE2\_1 Fundamental interactions and fields
- PE2\_2 Particle physics
- PE2\_3 Nuclear physics
- PE2\_4 Nuclear astrophysics
- PE2\_5 Gas and plasma physics
- PE2\_6 Electromagnetism
- PE2\_7 Atomic, molecular physics



- PE2\_8 Ultra-cold atoms and molecules
- PE2\_9 Optics, non-linear optics and nano-optics
- PE2\_10 Quantum optics and quantum information
- PE2\_11 Lasers, ultra-short lasers and laser physics
- PE2\_12 Acoustics
- PE2\_13 Relativity
- PE2\_14 Thermodynamics
- PE2\_15 Non-linear physics
- PE2\_16 General physics
- PE2\_17 Metrology and measurement
- PE2\_18 Statistical physics (gases)

### **PE3** Condensed Matter Physics: Structure, electronic properties, fluids, nanosciences, biophysics

- PE3\_1 Structure of solids and liquids
- PE3\_2 Mechanical and acoustical properties of condensed matter, Lattice dynamics
- PE3\_3 Transport properties of condensed matter
- PE3\_4 Electronic properties of materials, surfaces, interfaces, nanostructures...
- PE3\_5 Semiconductors and insulators: material growth, physical properties
- PE3\_6 Macroscopic quantum phenomena: superconductivity, superfluidity...
- PE3\_7 Spintronics
- PE3\_8 Magnetism and strongly correlated systems
- PE3\_9 Condensed matter - beam interactions (photons, electrons...)
- PE3\_10 Nanophysics: nanoelectronics, nanophotonics, nanomagnetism, nanoelectromechanics...
- PE3\_11 Mesoscopic physics
- PE3\_12 Molecular electronics
- PE3\_13 Structure and dynamics of disordered systems: soft matter (gels, colloids, liquid crystals...), glasses, defects...
- PE3\_14 Fluid dynamics (physics)
- PE3\_15 Statistical physics: phase transitions, noise and fluctuations, models of complex systems...
- PE3\_16 Physics of biological systems



## **PE4** Physical and Analytical Chemical Sciences: Analytical chemistry, chemical theory, physical chemistry/chemical physics

- PE4\_1 Physical chemistry
- PE4\_2 Spectroscopic and spectrometric techniques
- PE4\_3 Molecular architecture and Structure
- PE4\_4 Surface science and nanostructures
- PE4\_5 Analytical chemistry
- PE4\_6 Chemical physics
- PE4\_7 Chemical instrumentation
- PE4\_8 Electrochemistry, electrodialysis, microfluidics, sensors
- PE4\_9 Method development in chemistry
- PE4\_10 Heterogeneous catalysis
- PE4\_11 Physical chemistry of biological systems
- PE4\_12 Chemical reactions: mechanisms, dynamics, kinetics and catalytic reactions
- PE4\_13 Theoretical and computational chemistry
- PE4\_14 Radiation and Nuclear chemistry
- PE4\_15 Photochemistry
- PE4\_16 Corrosion
- PE4\_17 Characterization methods of materials
- PE4\_18 Environment chemistry

## **PE5** Synthetic Chemistry and Materials: Materials synthesis, structure-properties relations, functional and advanced materials, molecular architecture, organic chemistry

- PE5\_1 Structural properties of materials
- PE5\_2 Solid state materials
- PE5\_3 Surface modification
- PE5\_4 Thin films
- PE5\_5 Ionic liquids
- PE5\_6 New materials: oxides, alloys, composite, organic-inorganic hybrid, nanoparticles
- PE5\_7 Biomaterials synthesis
- PE5\_8 Intelligent materials - self assembled materials
- PE5\_9 Coordination chemistry
- PE5\_10 Colloid chemistry
- PE5\_11 Biological chemistry



- PE5\_12 Chemistry of condensed matter
- PE5\_13 Homogeneous catalysis
- PE5\_14 Macromolecular chemistry
- PE5\_15 Polymer chemistry
- PE5\_16 Supramolecular chemistry
- PE5\_17 Organic chemistry
- PE5\_18 Molecular chemistry
- PE5\_19 Combinatorial chemistry

## **PE6** Computer Science and Informatics: Informatics and information systems, computer science, scientific computing, intelligent systems

- PE6\_1 Computer architecture, pervasive computing, ubiquitous computing
- PE6\_2 Computer systems, parallel/distributed systems, sensor networks, embedded systems, cyber-physical systems
- PE6\_3 Software engineering, operating systems, computer languages
- PE6\_4 Theoretical computer science, formal methods, and quantum computing
- PE6\_5 Cryptology, security, privacy, quantum crypto
- PE6\_6 Algorithms, distributed, parallel and network algorithms, algorithmic game theory
- PE6\_7 Artificial intelligence, intelligent systems, multi agent systems
- PE6\_8 Computer graphics, computer vision, multi media, computer games
- PE6\_9 Human computer interaction and interface, visualization and natural language processing
- PE6\_10 Web and information systems, database systems, information retrieval and digital libraries, data fusion
- PE6\_11 Machine learning, statistical data processing and applications using signal processing (e.g. speech, image, video)
- PE6\_12 Scientific computing, simulation and modelling tools
- PE6\_13 Bioinformatics, biocomputing, and DNA and molecular computation

## **PE7** Systems and Communication Engineering: Electronic, communication, optical and systems engineering

- PE7\_1 Control engineering
- PE7\_2 Electrical and electronic engineering: semiconductors, components, systems
- PE7\_3 Simulation engineering and modelling
- PE7\_4 Systems engineering, sensorics, actorics, automation
- PE7\_5 Micro-and nanoelectronics, optoelectronics
- PE7\_6 Communication technology, high-frequency technology



- PE7\_7 Signal processing
- PE7\_8 Networks (communication networks, sensor networks, networks of robots...)
- PE7\_9 Man-machine-interfaces
- PE7\_10 Robotics

**PE8** Products and Processes Engineering:  
Product design, process design and control,  
construction methods, civil engineering,  
energy systems, material engineering

- PE8\_1 Aerospace engineering
- PE8\_2 Chemical engineering, technical chemistry
- PE8\_3 Civil engineering, maritime/hydraulic engineering, geotechnics, waste treatment
- PE8\_4 Computational engineering
- PE8\_5 Fluid mechanics, hydraulic-, turbo-, and piston engines
- PE8\_6 Energy systems (production, distribution, application)
- PE8\_7 Micro (system) engineering
- PE8\_8 Mechanical and manufacturing engineering (shaping, mounting, joining, separation)
- PE8\_9 Materials engineering (biomaterials, metals, ceramics, polymers, composites...)
- PE8\_10 Production technology, process engineering
- PE8\_11 Industrial design (product design, ergonomics, man-machine interfaces...)
- PE8\_12 Sustainable design (for recycling, for environment, eco-design)
- PE8\_13 Lightweight construction, textile technology
- PE8\_14 Industrial bioengineering
- PE8\_15 Industrial biofuel production
- PE8\_16 Architectural engineering

**PE9** Universe Sciences:  
Astro-physics/chemistry/biology; solar system;  
stellar, galactic and extragalactic astronomy,  
planetary systems, cosmology, space science,  
instrumentation

- PE9\_1 Solar and interplanetary physics
- PE9\_2 Planetary systems sciences
- PE9\_3 Interstellar medium
- PE9\_4 Formation of stars and planets
- PE9\_5 Astrobiology
- PE9\_6 Stars and stellar systems





- PE9\_7 The Galaxy
- PE9\_8 Formation and evolution of galaxies
- PE9\_9 Clusters of galaxies and large scale structures
- PE9\_10 High energy and particles astronomy - X-rays, cosmic rays, gamma rays, neutrinos
- PE9\_11 Relativistic astrophysics
- PE9\_12 Dark matter, dark energy
- PE9\_13 Gravitational astronomy
- PE9\_14 Cosmology
- PE9\_15 Space Sciences
- PE9\_16 Very large data bases: archiving, handling and analysis
- PE9\_17 Instrumentation - telescopes, detectors and techniques

**PE10 Earth System Science:**  
Physical geography, geology, geophysics,  
atmospheric sciences, oceanography, climatology,  
ecology, global environmental change, biogeochemical  
cycles, natural resources management

- PE10\_1 Atmospheric chemistry, atmospheric composition, air pollution
- PE10\_2 Meteorology, atmospheric physics and dynamics
- PE10\_3 Climatology and climate change
- PE10\_4 Terrestrial ecology, land cover change
- PE10\_5 Geology, tectonics, volcanology
- PE10\_6 Paleoclimatology, paleoecology
- PE10\_7 Physics of earth's interior, seismology, volcanology
- PE10\_8 Oceanography (physical, chemical, biological, geological)
- PE10\_9 Biogeochemistry, biogeochemical cycles, environmental chemistry
- PE10\_10 Mineralogy, petrology, igneous petrology, metamorphic petrology
- PE10\_11 Geochemistry, crystal chemistry, isotope geochemistry, thermodynamics
- PE10\_12 Sedimentology, soil science, palaeontology, earth evolution
- PE10\_13 Physical geography
- PE10\_14 Earth observations from space/remote sensing
- PE10\_15 Geomagnetism, paleomagnetism
- PE10\_16 Ozone, upper atmosphere, ionosphere
- PE10\_17 Hydrology, water and soil pollution
- PE10\_18 Cryosphere, dynamics of snow and ice cover, sea ice, permafrosts and ice sheets



## Life Sciences

### **LS1** Molecular and Structural Biology and Biochemistry: Molecular synthesis, modification and interaction, biochemistry, biophysics, structural biology, metabolism, signal transduction

- LS1\_1 Molecular interactions
- LS1\_2 General biochemistry and metabolism
- LS1\_3 DNA synthesis, modification, repair, recombination and degradation
- LS1\_4 RNA synthesis, processing, modification and degradation
- LS1\_5 Protein synthesis, modification and turnover
- LS1\_6 Lipid synthesis, modification and turnover
- LS1\_7 Carbohydrate synthesis, modification and turnover
- LS1\_8 Biophysics (e.g. transport mechanisms, bioenergetics, fluorescence)
- LS1\_9 Structural biology (crystallography and EM)
- LS1\_10 Structural biology (NMR)
- LS1\_11 Biochemistry and molecular mechanisms of signal transduction

### **LS2** Genetics, Genomics, Bioinformatics and Systems Biology: Molecular and population genetics, genomics, transcriptomics, proteomics, metabolomics, bioinformatics, computational biology, biostatistics, biological modelling and simulation, systems biology, genetic epidemiology

- LS2\_1 Genomics, comparative genomics, functional genomics
- LS2\_2 Transcriptomics
- LS2\_3 Proteomics
- LS2\_4 Metabolomics
- LS2\_5 Glycomics
- LS2\_6 Molecular genetics, reverse genetics and RNAi
- LS2\_7 Quantitative genetics
- LS2\_8 Epigenetics and gene regulation
- LS2\_9 Genetic epidemiology
- LS2\_10 Bioinformatics
- LS2\_11 Computational biology
- LS2\_12 Biostatistics
- LS2\_13 Systems biology
- LS2\_14 Biological systems analysis, modelling and simulation



**LS3** Cellular and Developmental Biology:  
Cell biology, cell physiology, signal transduction,  
organogenesis, developmental genetics,  
pattern formation in plants and animals,  
stem cell biology

- LS3\_1 Morphology and functional imaging of cells
- LS3\_2 Cell biology and molecular transport mechanisms
- LS3\_3 Cell cycle and division
- LS3\_4 Apoptosis
- LS3\_5 Cell differentiation, physiology and dynamics
- LS3\_6 Organelle biology
- LS3\_7 Cell signalling and cellular interactions
- LS3\_8 Signal transduction
- LS3\_9 Development, developmental genetics, pattern formation and embryology in animals
- LS3\_10 Development, developmental genetics, pattern formation and embryology in plants
- LS3\_11 Cell genetics
- LS3\_12 Stem cell biology

**LS4** Physiology, Pathophysiology and Endocrinology:  
Organ physiology, pathophysiology, endocrinology,  
metabolism, ageing, tumorigenesis, cardiovascular  
disease, metabolic syndrome

- LS4\_1 Organ physiology and pathophysiology
- LS4\_2 Comparative physiology and pathophysiology
- LS4\_3 Endocrinology
- LS4\_4 Ageing
- LS4\_5 Metabolism, biological basis of metabolism related disorders
- LS4\_6 Cancer and its biological basis
- LS4\_7 Cardiovascular diseases
- LS4\_8 Non-communicable diseases (except for neural/psychiatric, immunity-related, metabolism-related disorders, cancer and cardiovascular diseases)



## **LS5** Neurosciences and Neural Disorders: Neurobiology, neuroanatomy, neurophysiology, neurochemistry, neuropharmacology, neuroimaging, systems neuroscience, neurological and psychiatric disorders

- LS5\_1 Neuroanatomy and neurophysiology
- LS5\_2 Molecular and cellular neuroscience
- LS5\_3 Neurochemistry and neuropharmacology
- LS5\_4 Sensory systems (e.g. visual system, auditory system)
- LS5\_5 Mechanisms of pain
- LS5\_6 Developmental neurobiology
- LS5\_7 Cognition (e.g. learning, memory, emotions, speech)
- LS5\_8 Behavioural neuroscience (e.g. sleep, consciousness, handedness)
- LS5\_9 Systems neuroscience
- LS5\_10 Neuroimaging and computational neuroscience
- LS5\_11 Neurological disorders (e.g. Alzheimer's disease, Huntington's disease, Parkinson's disease)
- LS5\_12 Psychiatric disorders (e.g. schizophrenia, autism, Tourette's syndrome, obsessive compulsive disorder, depression, bipolar disorder, attention deficit hyperactivity disorder)

## **LS6** Immunity and Infection: The immune system and related disorders, infectious agents and diseases, prevention and treatment of infection

- LS6\_1 Innate immunity and inflammation
- LS6\_2 Adaptive immunity
- LS6\_3 Phagocytosis and cellular immunity
- LS6\_4 Immunosignalling
- LS6\_5 Immunological memory and tolerance
- LS6\_6 Immunogenetics
- LS6\_7 Microbiology
- LS6\_8 Virology
- LS6\_9 Bacteriology
- LS6\_10 Parasitology
- LS6\_11 Prevention and treatment of infection by pathogens (e.g. vaccination, antibiotics, fungicide)
- LS6\_12 Biological basis of immunity related disorders (e.g. autoimmunity)
- LS6\_13 Veterinary medicine and infectious diseases in animals



## **LS7** Diagnostic Tools, Therapies and Public Health: Aetiology, diagnosis and treatment of disease, public health, epidemiology, pharmacology, clinical medicine, regenerative medicine, medical ethics

- LS7\_1 Medical engineering and technology
- LS7\_2 Diagnostic tools (e.g. genetic, imaging)
- LS7\_3 Pharmacology, pharmacogenomics, drug discovery and design, drug therapy
- LS7\_4 Analgesia and Surgery
- LS7\_5 Toxicology
- LS7\_6 Gene therapy, cell therapy, regenerative medicine
- LS7\_7 Radiation therapy
- LS7\_8 Health services, health care research metabolism-related disorders, cancer and cardiovascular diseases)
- LS7\_9 Public health and epidemiology
- LS7\_10 Environment and health risks, occupational medicine
- LS7\_11 Medical ethics

## **LS8** Evolutionary, Population and Environmental Biology: Evolution, ecology, animal behaviour, population biology, biodiversity, biogeography, marine biology, eco-toxicology, microbial ecology

- LS8\_1 Ecology (theoretical and experimental; population, species and community level)
- LS8\_2 Population biology, population dynamics, population genetics
- LS8\_3 Systems evolution, biological adaptation, phylogenetics, systematics, comparative biology
- LS8\_4 Biodiversity, conservation biology, conservation genetics, invasion biology
- LS8\_5 Evolutionary biology: evolutionary ecology and genetics, co-evolution
- LS8\_6 Biogeography, macro-ecology
- LS8\_7 Animal behaviour
- LS8\_8 Environmental and marine biology
- LS8\_9 Environmental toxicology at the population and ecosystems level
- LS8\_10 Microbial ecology and evolution
- LS8\_11 Species interactions (e.g. food-webs, symbiosis, parasitism, mutualism)



**LS9** Applied life Sciences and Non-Medical Biotechnology: Agricultural, animal, fishery, forestry and food sciences; biotechnology, genetic engineering, synthetic and chemical biology, industrial biosciences; environmental biotechnology and remediation

- LS9\_1 Applied genetic engineering, transgenic organisms, recombinant proteins, biosensors
- LS9\_2 Synthetic biology, chemical biology and new bio-engineering concepts
- LS9\_3 Agriculture related to animal husbandry, dairying, livestock raising
- LS9\_4 Aquaculture, fisheries
- LS9\_5 Agriculture related to crop production, soil biology and cultivation, applied plant biology
- LS9\_6 Food sciences
- LS9\_7 Forestry, biomass production (e.g. for biofuels)
- LS9\_8 Environmental biotechnology, bioremediation, biodegradation
- LS9\_9 Applied biotechnology (non-medical), bioreactors, applied microbiology
- LS9\_10 Biomimetics
- LS9\_11 Biohazards, biological containment, biosafety, biosecurity

*Pistoia, 7 September 2020*