

# Structure of Scientific technical areas and panels of the State Agency for Research

## SOCIAL SCIENCES AND HUMANITIES

### 1. CSO / Social Sciences

The area of Social Sciences includes research that addresses objects and scientific objectives with epistemological approach and methodologies characteristic of Social sciences. These investigations are related to the disciplines of Sociology, Demography, Social work and Social services, Social anthropology, Political science and administration, Public policies, Journalism, Audiovisual communication and advertising, Library science and documentation, Human Geography, Regional geographical analysis, Urban Geography and Feminist, women's and gender studies.

#### **Subareas**

COM / Communication

CPO / Political science

FEM / Feminist, women's and gender studies

GEO / Geography

SOC / Sociology and social anthropology

### 2. DER / Law

The area of Law includes all sectors of the legal system and its scientific disciplines, both traditionally included under the sections Public Law and Private Law (administrative law, civil law, constitutional law, labor and social security law, ecclesiastical law of the State, financial and tax law, private international law, public international law and international relations, commercial law, criminal law, procedural law, Roman law, philosophy of law, history of law), and those of more recent appearance, showing a strong connection with the previous ones (environmental law, autonomous law, European Union law, trade law international law, sports law, computer law, immigration law, military law, penitentiary law, trade union law, etc.), in addition to related, complementary and auxiliary (comparative law, legal medicine or sociology of law) when the legal aspect is relevant.

It also includes border, cross-cutting and emerging disciplines when they propose interdisciplinary research or at the frontiers of knowledge related to Law. The studies can be local, autonomous, national, international or comparative, with a strictly legal approach (involving one or several legal disciplines) or interdisciplinary (crossing the traditional boundaries between disciplines of different areas, as it happens with the economic analysis of the Law, the application of the perspective of gender or the bioethics, for example).

### **3. ECO / Economy**

This area covers the theoretical and methodological research essential for the design of tools and models of economic and social phenomena. It includes game theory, decision theory, methods of experimental economics, econometrics, survey design and methodology, prediction algorithms and computational economics. It also includes theoretical and empirical research in the different areas of economic analysis. Research aimed at a better understanding of the processes and institutions of the Spanish, European and the rest of the world economies, research in the fields of business economics and business studies, including accounting areas and marketing, as well as studies on strategy, organization, personnel, technology and innovation of companies will be very welcome. Finally, research in all areas of finance, valuation of financial assets and derivatives, financial intermediation, risk management and portfolio analysis are also matters of the area.

#### **Subareas**

EYA / Economy and its applications

EYF / Business and finance

MAE / Methods of economic analysis

### **4. MLP / Mind, language and thought**

This area includes research on languages and language at their different levels and methodological and technical developments, from theoretical linguistics, variation and linguistic change, descriptive and quantitative studies on modern and ancient natural languages, computational and experimental linguistics, to applied linguistics, psycholinguistics and studies on language acquisition and production, language teaching and digital humanities. It also includes linguistically oriented translation and interpreting and diachronic research integrating digital humanities projects for all the aforementioned fields.

On the other hand, it includes research focused on the ontological, epistemological and normative problems in the different spheres of human thought and action, and in different spaces of society and culture, from science to art, attending to the variety of methodologies and theoretical proposals of the different traditions and philosophical schools.

It deals with questions related to the ultimate structure of reality, to the knowledge in its different forms and applications, to the value and meaning of human existence; being directed towards an understanding of experience and cultural practices from a reflective and critical perspective.

#### **Subareas**

FIL / Philosophy

LYL / Linguistics and languages

## **5. FLA / Culture: philology, literature and art**

This area includes research on literature, literature theory and comparative literature, fine arts, performing arts, architecture, visual studies, musicology and the history of art of all periods, and their relationship with culture, the history and the society in which they are involved; critical editions of texts and documents, their conservation, reconstruction and fixation; philological, paleographic and interpretive works on classical languages and cultures of the Mediterranean and the Near East; the conservation dissemination and patrimonial management of artistic manifestations, museums and museography, from all methodological perspectives. The area includes studies of popular culture in its different aspects and artistic and literary manifestations. Projects on digital humanities for all the mentioned areas are also taken into account.

### **Subareas**

ART / Art, fine arts, museums

LFL / Literature, philology, languages and ancient cultures and cultural studies

## **6. PHA / Studies of the past: history and archeology**

The area covers the study of all the historical stages of humanity (prehistory, ancient history, medieval history, modern history, contemporary history) to the present world, in all their methodological approaches and thematic diversity (politics, society, economy, culture, religion, etc.), including their cultural achievements and heritage.

It also includes the analysis of all these periods through archaeology, ethnoarchaeology, archaeometry, geospatial and information technologies. It also encompasses historiographical sciences and techniques, the history of gender, the history of America, studies about historical and postcolonial memory. The area integrates digital humanities projects for the mentioned topics.

### **Subareas**

ARQ / Archaeology

HIS / History

## **7. EDU / Education Sciences**

The purpose of research in education is to generate new knowledge about educational systems and Institutions, teaching-learning processes and their organization and context. Among its objectives are the generation of knowledge based on the description, the understanding and explanation of learning that take place at different stages of life in both formal and non-formal contexts. Research in education can be theoretical and empirical including the development of strategies and methods that help teaching and learning, specific didactics, teacher training, socio-political and technological contexts, institutional actions, guidelines and practices of tutorial action.

## **8. PSI / Psychology**

The area includes projects on the learning processes, cognitive, emotional, motivational, personality, interpersonal and social in the human being, as well as the methods for their measurement and intervention.

The fundamental objective is to understand the role, individual or collective of these processes, as well as the psychological, contextual and biological bases and their development from childhood to old age.

It covers the study of psychological intervention strategies in different areas of human activity such as diagnosis, treatment and prevention of mental disorders, health, family, work, education, environmental behavior, physical activity and sports, organizations, conflict situations and psychosocial risks, legal psychology or political psychology.

The area includes the investigation of basic and experimental psychology (learning, memory, perception, attention, language, thought, intelligence, motivation, emotion, social cognition); the biological bases of behavior and the mind (psychobiology, neuropsychology, cognitive and affective neuroscience, physiological psychology, psychopharmacology and ethology); personality psychology, clinical and health psychology, where psychopathological processes and mental and behavioral disorders are addressed, as well as the development of psychodiagnostic instruments and methods of psychotherapeutic intervention; social psychology, which deals with the study of social interaction amongst individuals and groups in different social contexts, including the study of attitudes, norms, prejudices, conflict, discrimination and social influence, collective behavior, violence, pro-social behavior, as well as the context of the work, the organizational behavior, and the development of human resources; of evolutionary psychology and development, which address processes of behavioral and / or cognitive change throughout the life cycle, and research in the field of educational psychology and finally the methodologies of behavioral sciences and psychometrics, which are transversal to all these areas of psychology.

## **MATHEMATICAL, PHYSICAL, CHEMICAL AND ENGINEERING SCIENCES**

### **9. MTM / Mathematical Sciences**

The area of Mathematics corresponds to the field of research that covers the development of mathematics itself, as its application and transfer to other areas. This scope includes: algebra and number theory, mathematical analysis, statistics and operational research, geometry and topology and applied mathematics.

### **10. FIS / Physical Sciences**

The area covers, both fundamental and applied aspects of physics, addressing aspects of the structure of matter and the optical, mechanical, acoustic, electronic and transport properties; molecular and optical atomic physics; quantum physics, quantum information and computation; statistical physics, complex systems and non-linear phenomena; fluids; nanoscience and nanotechnology; optics and photonics; medical physics and biophysics. Applied aspects of physics will be addressed, including those at the border with other disciplines. It also includes theoretical and experimental research of the fundamental particles of matter, subatomic and nuclear physics. It supports the scientific exploitation of experiments carried out in large international facilities and nuclear fusion research (CERN, ApPEC and

NuPECC). It also includes, among others, space research and instrumentation development for space missions, Global Navigation Satellite Systems and Earth observation satellites, and experimentation on the International Space Station, stratospheric balloons and free fall towers. Studies of the celestial bodies and the Universe, as well as the technological developments necessary for their observation are also included. These investigations, theoretical or observational, can adopt a mechanical, physical, chemical, astrobiological or astrogeological point of view, and can be directed to the Sun, the Solar System, exoplanets, stars, interstellar matter, galaxies, galaxy clusters and Cosmology.

All technologies involved in contemporary astronomical observation from Earth, space research and the development of instrumentation for space missions are considered, as well as the development and application of computational techniques and modeling of astronomical data, experiments on the International Space Station, stratospheric balloons.

#### **Subareas**

AYA / Astronomy and astrophysics

ESP / Space research

FPN / Particle and nuclear physics

FYA / Physics and its applications

### **11. PIN / Industrial production, civil engineering and engineering for society**

This area encompasses research lines, both fundamental and applied, in the field of design and industrial production and Mechanical, Naval and Aeronautical, Electrical, Electronic and Automatic engineering, including analytical, numerical and experimental methods. It also includes research in the field of Biomedical Engineering in relation to the application of the principles and methods of engineering for the solution of problems in biology and medicine, methods of assessment, diagnosis and rehabilitation, sensor development, processing of images, telemedicine and robotics.

The area also includes research in the field of Civil Engineering and Architecture, planning, design, construction, conservation and control of civil infrastructures, as well as the topics related to architectural constructions, urban planning and land management.

#### **Subareas**

IBI / Biomedical Engineering

ICA / Civil engineering and architecture

IEA / Electrical, electronic and automatic engineering

INA / Mechanical, naval and aeronautical engineering

### **12. ICT / Information and communication technologies**

The area covers technologies for the development of electronic and photonic devices and systems in a general way, which can be applied in multiple fields, characterized by their technological development, as well as technologies oriented to the handling and transfer of information, typically using electromagnetic signals through cables and wireless means, and electronic and optical devices for their management, transmission, reception and routing. It also includes micro and nanoelectronic processes and integration of new functional materials, technologies, simulation and modeling for electronic components, heterogeneous integration of microsystems, micro / nano sensors and actuators, lab-on-a-chip, power and photovoltaic devices, devices for high frequency (THz), printed and organic electronics, optical, photonic,

plasmonic and optical fiber-based devices and sensors, 3D integration technologies, circuits and systems. The area includes research on methods and procedures for the processing of signals (audio, video, biological, communications ...) and the treatment of information contained therein, physical layer technologies: transmission media, analog electronic circuits and digital for communications, systems radiant, radiofrequency subsystems, optical communications technologies and network technologies: communications protocols, Internet architectures, traffic engineering, network software definition, security and network management.

The area also includes research related to the fundamentals of computing, including the design and analysis of sequential, parallel or distributed algorithms, computer theory, formal methods or programming languages. Software engineering and databases, including requirements engineering, software modeling and design, software testing, software systems architecture or service-oriented systems as well as projects on computer architecture, high-performance computing, distributed systems, computer networks, both local and non-local, and system security are welcome. It also includes intelligent systems, computer learning, shape recognition and natural language processing. Finally, multimedia systems, graphic computing, computational geometry, virtual reality, augmented reality or image processing are taking part of this field.

#### **Subareas**

INF / Computer science and information technology

MNF / Microelectronics, nanotechnology and photonics

TCO / Communication technologies

### **13. EYT / Energy and transport**

This area includes research aiming to generate the knowledge and technologies necessary to ensure an efficient and environmentally friendly energy supply, as well as the generation of new knowledge allowing the development of innovative techniques for the design and management of transport systems, both public and private, urban and interurban, passenger and freight, in any of their possible modes: automotive, rail, air and maritime.

It covers projects related to the development and implementation of renewable energies including projects related to solar energy in any of their forms and wind energy, related both to the development of new components and the development of storage, management and integration technologies in conventional networks. It also includes projects related to marine energy and projects whose research is aimed at improving the efficiency of the operation of the different transport systems, reducing their costs and the environmental and social impacts associated with their activity.

Projects of a transversal nature are also included with other management areas such as chemical technologies, materials, engineering or architecture, among others, from approaches not only conceptual, but aimed at energy use.

#### **Subareas**

ENE / Energy

TRA / Transport

#### **14. CTQ / Chemical Sciences and Technologies**

The area covers fundamental or oriented research, from the molecular to the macroscopic level, the aspects of the composition of the structure, preparation and properties of the natural and synthetic substances or samples containing them, the interactions and transformations that they experience, their mechanisms, the instrumentation for their analysis and the experimental and / or theoretical methodology required for their studies.

It also includes research aimed at describing the physical, chemical and biological phenomena involved in the processes of production, manufacture and separation, and the search for improvements in the conception or operation of the physical, chemical or biochemical operations that make up the industrial processes. It also includes the investigation of new alternative processes and technologies and environmental processes aimed at reducing pollution at source or mitigate their effects, including the study from the laboratory level to scaling at the pilot plant level, developing and sizing reactors and separation equipment's, applying the simulation and optimization of processes as well as the development of control systems.

##### **Subareas**

IQM / Chemical Engineering

QMC / Chemistry

#### **15. MAT / Materials science and technology**

The area includes all the research related to the design, preparation, characterization and application of materials. The central theme is the relationship between structure (at any length scale) and properties. Being a markedly interdisciplinary field, it is usually involved in projects that address both theoretical and experimental elements of physics and chemistry, presenting on numerous occasions aspects related to biology and engineering. The objectives pursued are both of a fundamental nature, focused on the generation of new knowledge, as well as applied, aimed at obtaining new materials that could improve the quality of people's life.

The sub-areas include, as a whole, practically all the activity that takes place in our country in materials science and technology, considering that certain areas, such as materials for biomedicine or for energy and environment, present common characteristics with sub-areas dedicated to functional and structural materials. A large part of the research in nanoscience and nanotechnology is currently carried out in the area of materials.

##### **Subareas**

MBM / Materials for biomedicine

MEN / Materials for energy and the environment

MES / Structural materials

MFU / Materials with electrical, magnetic, optical or thermal functionality

## **LIFE SCIENCES**

### **16. CTM / Environmental Sciences and Technologies**

The area encompasses research related to the ecological and evolutionary processes that have generated enormous wealth in biodiversity at all levels of organization, from genes, populations and species to communities and ecosystems and their interactions with human activity, as well as in the development of technologies oriented to the management, conservation and restoration of degraded habitats or species in danger of extinction, the valuation of ecosystem services and the capacity to adapt to global change.

It also includes research aimed at the study and development of processes for the evaluation and treatment of air, water and soil pollutants and the evaluation of their impact on different ecosystems, as well as the treatment of waste, the use of natural resources and the sustainable management of water resources.

It also covers the basic and technological aspects related to marine systems, both in the abiotic and biotic components and interactions with terrestrial and atmospheric systems, including the development of tools and observation platforms, as well as the research instruments in ocean management and geological and geophysical aspects of the marine environment. Also of interest are the research related to the study of anthropogenic pressures on the ocean and the associated impacts, including the effect of pollutants and processes that operate on a global scale, such as, for example, global warming, the increase in the level of the sea, eutrophication or ocean acidification.

Knowledge of the sea requires different scales of observation, from the molecular level to the consideration of ocean basins involving many scientific disciplines through pluri- or interdisciplinary approaches. A significant fraction of the projects focused on ocean research require the use of oceanographic vessels, which confers a degree of uniqueness to the subarea MAR. All marine research projects that require the use of these infrastructures are channeled through this subarea, with the exception of projects developed in polar areas.

Polar Research Subarea (CTM-PLR). Polar research is characterized by the geography where it is developed and because it is carried out in extreme conditions, which requires the contribution of complex, expensive and specific means (oceanographic vessels and polar bases). Scientific research in Antarctica is developed under its own special and restrictive legislation, in relation to the protection of the environment. Polar research in general has a very marked international component, which is exacerbated in Arctic research due to the absence of Spanish infrastructure in this area. Although the research projects don't include practically all the scientific subjects, in general the disciplines that are included: Geodesy, Geology, Geodynamics, Geophysics, Astronomy and Astrophysics, Oceanography, Glaciology and Cryosphere, Volcanology, Geochemistry, Atmospheric-ocean interaction, Spatial techniques of earth observation; Modeling; Biology; Ecology; Limnology; Microbiology; Faunal studies and natural products; biogeochemical cycles; speciation processes and mechanisms; Biodiversity; Edaphology; Atmospheric physics and climate, Human and Social sciences include

aspects of humanities, such as polar law, anthropology of northern populations, sociology and psychology among others.

The sub-area of Earth and Water Sciences (CTM-CTA) integrates research on the various aspects of the earth system, including its history, current status and possible future evolution. It involves a wide range of consolidated topics such as Geochemistry, Mineralogy, Petrology, internal geodynamic, Sedimentology, Stratigraphy, Paleontology, Geophysics, surveying, Geodynamics, Geomorphology, Climatology, Physical geography, Limnology, soils, Hydrology and glacial disciplines. The CTA sub-area encourages interdisciplinary approaches that respond to scientific and technological challenges in current and future socio-economic and environmental situations. Among these are included: (1) the observation and characterization of the ground system to all temporal and spatial scales, with emphasis on processes associated with global change, (2) the assessment and sustainable management of water resources, surface and underground, including the characterization of ecological and hydrogeological processes and those that alter the quality of water and the good condition of aquatic ecosystems; as well as the actions / treatments for its recovery (3) the exploration and sustainable exploitation of aquatic, mineral and energy resources, and the use of geological formations as resource, waste and CO<sub>2</sub> stores; (4) knowledge of climate change from the perspective of earth sciences, integrating the reconstruction of climate analogues in the past, the characterization of environmental and hydrological climate forcing response, assessment of the expected geo-environmental impacts, and design of mitigation and adaptation strategies; and (5) evaluation and prevention of natural hazards with geological implications in its origin, development or impact, such as earthquakes, volcanoes, landslides, subsidence, floods, drought or alterations of the coast as well as the evolution of these risks in the context of global change.

#### **Subareas**

BDV / Biodiversity

CTA / Earth and water sciences

CYA / Climate and atmosphere

MAR / Science and Marine technologies

POL / Polar research

TMA / Environmental technologies

### **17. CAA / Agricultural sciences and agro-alimentary**

Different international organizations indicate that around 50% of the surface of the Earth is dedicated to agriculture, 37% corresponds to forest mass, 12% are marginal land and 1% represents urban areas. With the growth of the world population, the challenge for humanity is to ensure a healthy and safe diet through innovative and competitive agriculture and animal production, within a changing global and climate scenario. Research in agricultural sciences and food processing, addressing fundamental and directed research, aims to contribute to the sustainability and circular economy of agrarian and natural systems. The subarea of "Agriculture and Forestry" includes studies of horticultural, herbaceous, woody crops, forest production systems and agrarian economy. Research activities in this sub-area include studies

on the management and interactions between soil-water-plant-atmosphere systems in relation to crop production and quality, effects of biotic and abiotic stress on crops, biological control of pests and diseases, genetic improvement of plants and conservation of phylogenetic resources, physiology, nutrition and plant biochemistry, plant biotechnology, molecular biology of plants of interest in agriculture and model systems. The subarea "Livestock and Aquaculture" covers aspects of fundamental and applied research in species of domestic animals and of productive use, but also, in certain cases, in wildlife.

The methodological approach is multidisciplinary, with a strong role of animal experimentation. It covers research related to the health, production, nutrition, reproduction and genetics of animal species of interest for livestock, aquaculture and wildlife, although pharmacological, toxicological, internal medicine and surgery studies as well as other related topics are also contemplated. The products of the two previous sub-areas give rise to a wide variety of foods, being the subarea of "Food Science and Technology" the one that deals with the investigations related to the obtaining and conservation of food, as well as to the physical, chemical evaluation and functional thereof and / or its components. Globally, the quality, traceability and authenticity of food are addressed, as well as food safety. This sub-area also covers research on the nutrition, metabolism and functionality of food components, and more specifically, their effects on human health.

#### **Subareas**

ALI / Food science and technology

AYF / Agriculture and forestry

GYA / Livestock and aquaculture

### **18. BIO / Biosciences and biotechnology**

The area covers research on the molecular and structural bases of biological functions and their interrelations, from the molecular level to the organism, in any living being. It includes basic studies of molecular and cellular biology, genetics, biochemistry, microbiology, virology, physiology, neurobiology and development, immunology and computational, structural and systems biology, with the exception of those whose main objective is directly related to pathologies and / or pretends improve human health or food processing. It also includes research oriented to the development of biotechnological products, and may have fields of origin or application also in other areas (for example, those related to biosensors, biomarkers, biocomputing, nanobiotechnology, biotransformations, proteins of industrial interest or vaccines). This area includes both basic research in the field and those pursuing transfer actions. Interdisciplinary and / or border projects are also valued.

#### **Subareas**

BIF / Integrative biology and physiology

BMC / Molecular and cellular biology

BTC / Biotechnology

## **19. BME / Biomedicine**

This is a transversal research program in the health area. It covers the study of the etiopathogenic mechanisms of most of the relevant pathologies in society, including diseases of the nervous system, cardiovascular, gastrointestinal, metabolic, tumor, inflammatory and infectious. The program places special emphasis on the characterization of the cellular, molecular and genetic bases involved in the genesis and development of different diseases, as well as in the advances diagnostics and pharmacology, and in new therapies. Unlike other clinical research programs in the health area, which do not necessarily pursue a better understanding of the mechanisms that cause the disease, the program has a clear molecular, cellular and pathophysiological axis, being priority the search and identification of molecular mechanisms underlying diseases. The transversal nature lies in the multidisciplinary approach, which includes the development of a variety of technologies, such as "omics", and their application to the study of pathology.

### **Subareas**

CAN / Cancer

DPT / Diagnostic, prognostic and therapeutic tools

ESN / Nervous system diseases

FOS / Physiopathology of organs and systems

IIT / Immunity, infection and new therapies