



Irish Research Council For Science, Engineering And Technology: Research Disciplines for the IRCSET EMPOWER and IRCSET INSPIRE Postdoctoral Fellowship Schemes

This document details the research disciplines which are suitable for applications to IRCSET's Postdoctoral Fellowship Schemes. As part of the online application system, applicants are required to select a **primary discipline** and a **sub-discipline** for their proposed research programme, from a list provided by IRCSET. It is of vital importance that the proposed research programme is aligned with the correct primary and sub-discipline, and this document will help applicants with the selection process.

Primary Disciplines

Applicants are required to select a primary discipline from the following defined list. If your research is interdisciplinary within two or more primary disciplines, please choose the primary discipline that the research is most closely associated with. You will also be able to add a free text 'other discipline' of your choice.

Biological Sciences A
Biological Sciences B
Chemistry
Computer Science
Earth and Environmental Sciences
Engineering
Mathematics
Physics

Sub-disciplines

Within each primary discipline is a list of defined sub-disciplines. These are listed in the tables on the following pages. Please choose **one** sub-discipline that most closely matches the area of your proposed research programme. The application form will also ask you to provide more detailed information on the proposal, such as relevant keywords. If your research is interdisciplinary within two or more sub-disciplines, please choose the sub-discipline that the research is most closely associated with.



Biological Sciences A	
Sub-discipline	Typical Research Areas
Agricultural Biotechnology	including but not limited to: Agricultural Biotechnology Diagnostics (incl. Biosensors); Agricultural Marine Biotechnology; Agricultural Molecular Engineering of Nucleic Acids and Proteins; Genetically Modified Technology; Livestock Cloning; Marker Assisted Selection; Biomass Feedstock Production Technologies; Biopharming.
Biology (Theoretical, Mathematical, Thermal, Cryobiology, Biological Rhythm)	including but not limited to: theoretical biology; mathematical biology; thermal biology; cryobiology; biological rhythm.
Environmental Biotechnology	including but not limited to: Biodiscovery; Biological Control; Bioremediation; Environmental Biotechnology Diagnostics (incl. Biosensors); Environmental Marine Biotechnology; Environmental Molecular Engineering of Nucleic Acids and Proteins.
Evolutionary Biology	including but not limited to: Animal Systematics and Taxonomy; Biogeography and Phylogeography; Biological Adaptation; Ethology and Sociobiology; Evolution of Developmental Systems; Evolutionary Impacts of Climate Change; Host-Parasite Interactions; Life Histories; Phylogeny and Comparative Analysis; Plant Systematics and Taxonomy; Speciation and Extinction.
Marine Biology, Freshwater Biology.	including but not limited to: marine biology, freshwater biology.
Microbiology, Mycology and Virology	including but not limited to: Bacteriology; Infectious Agents; Microbial Ecology; Virology; Mycology.
Microbial Genetics	including but not limited to: Microbial Genetics.
Plant Sciences, Botany	including but not limited to: Phycology (incl. Marine Grasses); Plant Cell and Molecular Biology; Plant Developmental and Reproductive Biology; Plant Pathology; Plant Physiology; Botany.
Zoology, Ornithology, Entomology, Behavioural Sciences Biology	including but not limited to: Animal Behaviour; Animal Cell and Molecular Biology; Animal Developmental and Reproductive Biology; Animal Immunology; Animal Neurobiology; Animal Physiological Ecology; Animal Structure and Function; Invertebrate Biology; Vertebrate Biology.

Biological Sciences B	
Sub-discipline	Typical Research Areas
Biochemical Research Methods	including but not limited to: Biochemical Research Methods
Biochemistry and Molecular Biology	including but not limited to: Analytical Biochemistry; Bioinformatics (Bioinformatics Software to be Computer Science); Enzymes; Protein Trafficking; Proteomics and Intermolecular Interactions; Receptors and Membrane Biology; Signal Transduction; Structural Biology (incl. Macromolecular Modelling); Synthetic Biology; Systems Biology.
Cell Biology	including but not limited to: Cell Development, Proliferation and Death; Cell Metabolism; Cell Neurochemistry; Cellular Interactions (incl. Adhesion, Matrix, Cell Wall).
Developmental Biology	including but not limited to: Developmental Biology
Genetics and Heredity	including but not limited to: Anthropological Genetics; Cell and Nuclear Division; Developmental Genetics; Epigenetics (incl. Genome Methylation and Epigenomics); Gene Expression (incl. Microarray and other genome-wide approaches); Genetic Immunology; Genome Structure and Regulation; Genomics; Molecular Evolution; Neurogenetics; Population, Ecological and Evolutionary Genetics; Quantitative Genetics (incl. Disease and Trait Mapping Genetics).
Industrial Biotechnology	including but not limited to: Biocatalysis and Enzyme Technology; Bioprocessing, Bioproduction and Bioproducts; Fermentation; Industrial Biotechnology Diagnostics; Industrial Microbiology (incl. Biofeedstocks); Industrial Molecular Engineering of Nucleic Acids and Proteins.
Medical Biotechnology	including but not limited to: Gene and Molecular Therapy; Medical Biotechnology Diagnostics; Medical Molecular Engineering of Nucleic Acids and Proteins; Regenerative Medicine (incl. Stem Cells and Tissue Engineering).
Reproductive Biology	including but not limited to: Reproductive Biology

Chemistry	
Sub-discipline	Typical Research Areas
Analytical Chemistry	including but not limited to: Analytical Spectrometry; Electroanalytical Chemistry; Flow Analysis; Immunological and Bioassay Methods; Instrumental Methods; Quality Assurance, Chemometrics, Traceability and Metrological Chemistry; Sensor Technology; Separation Science.
Colloid and Nanochemistry	including but not limited to: Colloid and Surface Chemistry; Nanochemistry; Molecular and Organic Electronics; Nanotoxicology (chemical aspects)
Electrochemistry	including but not limited to: Dry Cells; Batteries; Fuel cells; Corrosion metals; Electrolysis.
Inorganic, Organometallic and Nuclear Chemistry	including but not limited to: Bioinorganic Chemistry; f-Block Chemistry; Inorganic Green Chemistry; Main Group Metal Chemistry; Non-metal Chemistry; Solid State Chemistry; Transition Metal Chemistry; Inorganic Chemistry; Organometallic Chemistry, Supramolecular Chemistry (inorganic and organometallic aspects); Nuclear Chemistry.
Macromolecular and Materials Chemistry	including but not limited to: Chemical Characterisation of Materials; Supramolecular Chemistry (materials chemistry aspects); Optical Properties of Materials; Physical Chemistry of Materials; Polymerisation Mechanisms; Synthesis of Materials; Theory and Design of Materials; Molecular and Organic Electronics.
Medicinal and Biomolecular Chemistry	including but not limited to: Biologically Active Molecules; Biomolecular Modelling and Design; Characterisation of Biological Macromolecules; Cheminformatics and Quantitative Structure-Activity Relationships; Molecular Medicine; Proteins and Peptides.
Organic Chemistry	including but not limited to: Free Radical Chemistry; Natural Products Chemistry; Organic Chemical Synthesis; Organic Green Chemistry; Physical Organic Chemistry.
Physical Chemistry	including but not limited to: Catalysis and Mechanisms of Reactions; Chemical Thermodynamics and Energetics; Solution Chemistry; Structural Chemistry and Spectroscopy; Transport Properties and Non-equilibrium Processes.
Theoretical and Computational Chemistry	including but not limited to: Quantum Chemistry; Radiation and Matter; Reaction Kinetics and Dynamics; Statistical Mechanics in Chemistry.

Computer Science	
Sub-discipline	Typical Research Areas
Artificial Intelligence and Image Processing	including but not limited to: Adaptive Agents and Intelligent Robotics; Artificial Life; Computer Graphics; Computer Vision; Expert Systems, Image Processing; Natural Language Processing; Neural, Evolutionary and Fuzzy Computation; Pattern Recognition and Data Mining; Simulation and Modelling; Virtual Reality and Related Simulation.
Computation Theory and Mathematics	including but not limited to: Analysis of Algorithms and Complexity; Applied Discrete Mathematics; Computational Logic and Formal Languages; Mathematical Software; Numerical Computation.
Computer Software	including but not limited to: Bioinformatics Software; Computer System Architecture; Computer System Security; Concurrent Programming; Multimedia Programming; Open Software; Operating Systems; Programming Languages; Software Engineering.
Data Format	including but not limited to: Coding and Information Theory; Data Encryption; Data Structures; Markup Languages.
Distributed Computing	including but not limited to: Distributed and Grid Systems; Mobile Technologies; Networking and Communications; Ubiquitous Computing; Web Technologies.
Information Systems	including but not limited to: Computer-Human Interaction; Conceptual Modelling; Database Management; Decision Support and Group Support Systems; Global Information Systems; Information Engineering and Theory; Information Systems Development Methodologies; Information Systems Management; Information Systems Organisation; Information Systems Theory; Interorganisational Information Systems and Web Services.

Earth and Environmental Sciences	
Sub-discipline	Typical Research Areas
Biodiversity Conservation	including but not limited to: Conservation and Biodiversity.
Climatic Research	including but not limited to: Ecological Impacts of Climate Change; Ecosystem Function; Invasive Species Ecology.
Ecology	including but not limited to: Behavioural Ecology; Community Ecology; Ecological Physiology; Freshwater Ecology; Marine and Estuarine Ecology (incl. Marine Ichthyology); Palaeoecology; Population Ecology; Terrestrial Ecology.
Environmental Sciences	including but not limited to: Environmental Impact Assessment; Environmental Management; Environmental Monitoring; Environmental Rehabilitation; Natural Resource Management; Wildlife and Habitat Management.
Geochemistry and Geophysics	including but not limited to: Exploration Geochemistry; Inorganic Geochemistry; Isotope Geochemistry; Organic Geochemistry; Electrical and Electromagnetic Methods in Geophysics; Geodynamics; Geophysical Fluid Dynamics; Geothermics and Radiometrics; Gravimetrics; Magnetism and Palaeomagnetism; Seismology and Seismic Exploration.
Geology	including but not limited to: Basin Analysis; Extraterrestrial Geology; Geochronology; Igneous and Metamorphic Petrology; Marine Geoscience; Ore Deposit Petrology; Petroleum and Coal Geology; Sedimentology; Stratigraphy (incl. Biostratigraphy and Sequence Stratigraphy); Structural Geology; Tectonics.
Meteorology and Atmospheric Sciences	including but not limited to: Atmospheric Aerosols; Atmospheric Dynamics; Atmospheric Radiation; Climate Change Processes; Climatology (excl. Climate Change Processes); Cloud Physics; Meteorology; Tropospheric and Stratospheric Physics.
Mineralogy	including but not limited to: Mineralogy and Crystallography.
Oceanography, Hydrology, Water Resources	including but not limited to: Biological Oceanography; Chemical Oceanography; Physical Oceanography, Hydrology: Surfacewater Hydrology, Water Resources.
Palaeontology	including but not limited to: Palaeontology; Palynology
Physical Geography and Environmental Geoscience	including but not limited to: Geomorphology and Regolith and Landscape Evolution; Glaciology; Hydrogeology; Natural Hazards; Palaeoclimatology; Quaternary Environments; Surface Processes.
Volcanology	including but not limited to: Volcanology.

Engineering	
Sub-discipline	Typical Research Areas
Chemical engineering	including but not limited to: Chemical engineering (plants, products); Chemical process engineering.
Civil Engineering	including but not limited to: Civil engineering; Architecture engineering; Construction engineering, Municipal and structural engineering; Transport engineering.
Electrical engineering, Electronic engineering, Information engineering	including but not limited to: Electrical and electronic engineering; Robotics and automatic control; Automation and control systems; Communication engineering and systems; telecommunications; Computer hardware and architecture;
Environmental Engineering	including, but not limited to: Environmental and geological engineering, geotechnics; Petroleum engineering (fuel, oils); Energy and fuels; Remote sensing; Mining and mineral processing; Marine engineering, sea vessels; Ocean engineering.
Food and Beverage Engineering	including but not limited to: Food Engineering; Beverage Engineering.
Materials Engineering	including but limited to: Materials engineering; Ceramics; Coating and films; Composites (including laminates, reinforced plastics, cermets, combined natural and synthetic fibre fabrics; filled composites); Paper and wood; textiles, including synthetic dyes, colours, fibres; Nanoscale materials (engineering aspects only).
Mechanical Engineering	including but not limited to: Mechanical engineering; Applied mechanics; Thermodynamics; Aerospace engineering; Nuclear related engineering; (nuclear physics to be Physics); Audio engineering, reliability analysis.
Medical and Biomedical Engineering	including but not limited to: Medical engineering; Medical laboratory technology (including laboratory samples analysis; diagnostic technologies).

Mathematics	
Sub-discipline	Typical Research Areas
Applied Mathematics	including but not limited to: Approximation Theory and Asymptotic Methods; Biological Mathematics; Calculus of Variations, Systems Theory and Control Theory; Dynamical Systems in Applications; Financial Mathematics; Operations Research; Theoretical and Applied Mechanics; Numerical Analysis; Numerical Solution of Differential and Integral Equations; Optimisation.
Pure Mathematics	including, but not limited to: Algebraic and Differential Geometry; Category Theory, K Theory, Homological Algebra; Combinatorics and Discrete Mathematics; Group Theory and Generalisations; Lie Groups, Harmonic and Fourier Analysis; Mathematical Logic, Set Theory, Lattices and Universal Algebra; Operator Algebras and Functional Analysis; Ordinary Differential Equations; Difference Equations and Dynamical Systems; Partial Differential Equations; Real and Complex Functions (incl. Several Variables); Topology.
Statistics and Probability	including but not limited to: Applied Statistics; Biostatistics; Forensic Statistics; Probability Theory; Statistical Theory; Stochastic Analysis and Modelling.

Physics	
Sub-discipline	Typical Research Areas
Acoustics	including but not limited to: Acoustics and Acoustical Devices; Waves.
Astronomy and Space Science	including but not limited to: Astrobiology; Astronomical and Space Instrumentation; Cosmology and Extragalactic Astronomy; Galactic Astronomy; General Relativity and Gravitational Waves; High Energy Astrophysics; Cosmic Rays; Mesospheric, Ionospheric and Magnetospheric Physics; Planetary Science; Space and Solar Physics; Stellar Astronomy and Planetary Systems.
Atomic, Molecular and Chemical Physics	including but not limited to: Magnetic Resonances; Moessbauer effect; Atomic and Molecular Physics; Chemical Physics.
Biophysics	including but not limited to: Biological Physics; Medical Physics.
Condensed Matter Physics	including but not limited to: Condensed Matter Characterisation Technique Development; Condensed Matter Imaging; Condensed Matter Modelling and Density Functional Theory; Electronic and Magnetic Properties of Condensed Matter; Superconductivity; Soft Condensed Matter; Surfaces and Structural Properties of Condensed Matter.
Fluids and Plasma Physics	including but not limited to: Surface Physics; Plasma Physics; Fusion Plasmas; Electrical Discharges; Fluid Physics.
Nuclear Physics	including but not limited to: Nuclear Physics
Optics	including but not limited to: Laser Optics; Quantum Optics; Classical and Physical Optics; Lasers and Quantum Electronics; Nonlinear Optics and Spectroscopy; Photonics, Optoelectronics and Optical Communications.
Particles and Fields Physics	including but not limited to: Particle Physics; Degenerate Quantum Gases and Atom Optics; Field Theory and String Theory.
Theoretical Physics	including but not limited to: Mathematical Aspects of Classical Mechanics, Quantum Mechanics and Quantum Information Theory; Mathematical Aspects of General Relativity; Mathematical Aspects of Quantum and Conformal Field Theory, Quantum Gravity and String Theory; Statistical Mechanics, Physical Combinatorics and Mathematical Aspects of Condensed Matter; Electrostatics and Electrodynamics; Thermodynamics and Statistical Physics.