

International Doctorate School of Sciences and Tecnology

List of PhD programmes which students from Erasmus Plus International Credit Mobility partner institutions can apply to for a mobility period at USC as part of their doctorate studies at their home university.

Please consult **Campus Terra** for further areas of Science and Engineering.

For procedures see footnote [1](#):

SCIENCE

Mathematics

- Topology and analysis in displacement spaces.
- Difference equations with involutions.
- Asymptotic behavior of differential equations.
- Topological methods in nonlinear analysis.
- Existence theorems for differential equations.
- Topological Data Analysis
- Persistent Homology
- Homology, homotopy, categorical invariants in groups and non-associative algebras and computer methods

Environmental and Natural Resources

- Specialization in soil quality: analytical methods and conservation techniques by applying organic amendments.
- Dune endemisms and climate change: ecophysiology, gene expression and ecological niche.
- Antibiotics for human consumption in agricultural areas treated with sewage sludge and control strategies using bioadsorbents: levels, adsorption, mobility and transport.
- Recovery of polluted soils.

Chemical Science and Technology

- Peptides and supramolecular chemistry.

Biodiversity and Preservation of the Natural Environment

- Method and development of techniques for the study of biodiversity.
- Terrestrial animal biodiversity.
- Plant biodiversity.
- Biodiversity of the marine environment.
- Biodiversity of continental aquatic ecosystems.
- Conservation.

Materials Science

- Ceramics and industrial materials.
- Study of nanostructured materials using theoretical models and computer simulation techniques.
- Theoretical, experimental and computational study of soft materials and characterization of their physical-chemical and structural properties (simple liquids, complex charged fluids ...).
- Physics of solid and liquid surfaces. Physical properties, friction and wear.
- Design and characterization of nanostructured materials and nanocomposites for biomedical, catalytic and electro-optical applications.
- Supramolecular self-assembled systems: Obtaining, characterization, properties and applications.
- Correlated electronic systems: superconductivity and spintronics.

Marine Science, Technology and Management

- Impact on biodiversity
- Evaluation of the impact of the exploitation of resources
- Biodiversity and ecology
- Diagnosis and response of coastal ecosystems to climate change

Statistics and Operations Research

- Statistics
- Operational research and game theory

Renewable Energy and Energy Sustainability

- Offshore wave and wind power.
- Solar energy and accumulation systems.
- Distributed energy and sustainable energy applications.
- Characterization and valorisation of biofuels and bio-mass biolubricants.
- Sustainable energy management of agroforestry systems.
- Environmental physics: modeling and study of the dynamics of geophysical systems: atmosphere, ocean, soil-vegetation and ground and surface water.

Nuclear and Particles Physics

- Structure, dynamics and nuclear reactions. R & D of detectors and instrumentation for nuclear physics
- Theory and phenomenology of fundamental interactions at high energies. Detection and analysis of plasma of quarks and gluons
- High energy astrophysics (neutrinos, gamma rays and cosmic rays)
- Non-perturbative methods and integrability in field theory
String theory, quantum gravity and supersymmetry
- Quark physics, CP violation and development of silicon pixel detectors in particle accelerators
- Development of grid computing techniques
- Development of radiation detectors for technological and medical scientific applications

Laser, Photonics and Vision

- Laser and vision technologies
- Laser and photonics

ENGINEERING

Information Technology Research

Related with A.I.

- Machine Learning for classification and regression.
- Explainable Artificial Intelligence.
- Persuasive Interactive Human-centric Systems.
- Natural Language Generation and Argumentation Technologies.
- Fuzzy Systems Modeling.
- Soft computing and generation of natural language.
- “data-to-text” systems
- Explicable Artificial Intelligence
- Representation of approximate knowledge and reasoning
- Computer vision and machine learning.
- Biomedical terminologies and ontologies, clinical archetypes, dictionary-based annotation, natural language processing and data mining

Related with High Performance Computing:

- Efficient processing 3D point clouds obtained from LiDAR and photogrammetry. Prof. Francisco Fernández Rivera.
- Monitoring and optimizing parallel computing codes. Prof. Francisco Fernández Rivera.

Chemical and Environmental Engineering

- Core-flooding tests for Enhanced Oil Recovery with Surfactant Ionic Liquids
- New porous materials for selective separation of industrial pollutants in gas and liquid effluents
- Potential integration of Life Cycle Assessment (LCA) and Risk Assessment (RA) approaches for dairy products within the framework of the PROTECT Project (<http://www.usc.es/biogroup/protect>)”
- Influence of nanoparticles in the reduction of interfacial tension of mixtures with ionic liquids

Fluid Thermodynamics Engineering

- Thermophysical and tribological properties of lubricants

Mathematical Modelling and Numerical Simulation in Engineering and Applied Science

- Mathematical analysis and numerical resolution of partial differential equations (EDP) and ordinary differential equations (EDO).
- Modeling, analysis and numerical simulation of problems in applied sciences and engineering.
- Modeling, analysis and numerical simulation of industrial and business problems.

ⁱ Students should follow the procedure indicated in the Calls for applications for 2019-2022, to be published Autumn 2019 onwards, taking into account:

- The PhD Learning Agreement must contain a description of your PhD research so far and thesis plan
- It is **not** necessary to request an acceptance letter from the academic coordinators
- In any contact with USC PhD programme coordinators, please make it clear that you are applying for Erasmus Plus International Credit Mobility (KA107), and give the name of your home university
- ONLY the above areas are available; applications for other programmes will be rejected.
- USC External Relations Service will send acceptance-invitation letters to candidates applying through the correct channel for any of the above programmes provided the candidate complies with Erasmus+ eligibility criteria at their home University and fulfils USC selection requirements
- More information in English on each PhD programme can be found at: <http://www.usc.es/doutoramentos/en>