Architecture, Function and Dynamics in Life Sciences - ArchiFun

a European International Doctoral Programme,
co-financed by
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Guide for applicants

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HR EXCELLENCE IN RESEARCH

arQus European University Alliance

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ArchiFun International Doctoral Programme

ArchiFun DP at a glance

Architecture, Function and Dynamics in Life Sciences is an international, intersectoral and innovative Doctoral Programme, built within the Arqus University Alliance and coordinated by Université Claude Bernard Lyon 1 (UCBL).

It will train through research and secondments **23 Doctoral Fellows (DF)** in two calls, 12 DFs in 2024 and 11 DFs in 2025. The duration of each doctoral contract will be of 36 months, with the possibility of 6 months extension in case of maternity, paternity, adoption leave, pandemics or force majeur.

The DFs will be recruited in one of the following **5 implementing partner universities**:

- **UCBL** -> Lyon, France
- University of Granada (**UGR**) -> Granada, Spain
- University of Padova (**UniPD**) -> Padua, Italy
- Technical University Munich (**TUM**) -> Munich, Germany
- National Institute of Chemistry (**NIC**) -> Ljubljana, Slovenia

During the 36-months period, the recruited DFs will also have the opportunity to perform dedicated training courses and secondments (from 1 week up to 6 months) in one of the following **9 associated partners**, including academia, research infrastructures and small-medium enterprises:

- Vilnius University (**VU**) -> Vilnius, Lithuania
- Biophysical Unit of Institut Pasteur (**IP**) -> Paris, France
- Institute for Biocomputation and Physics of Complex Systems at the University of Zaragoza (**BIFI**) -> Zaragoza, Spain
- European Syncrothron Radiation Facility (**ESRF**) -> Grenoble, France
- Randall Centre at King's College London (**KCL**) -> London, UK
- NanoTemper Technologies (**NTT**) -> Munich, Germany
- FidaBio Technologies (**FidaBio**) -> Copenhagen, Danemark
- **NovAliX** -> Strasbourg, France
- **Pulsalys** -> Villeurbanne, France

ArchiFun DP will train 23 doctoral fellows in **6 research topics**:

1 Host-pathogen interactions;
2 Mechanisms of bacterial resistance and cancer onsets;
3 Neurodegenerative and autoimmune diseases;
4 Translational research in prevalent diseases;
5 Physiology and ecology;
6 Neurosciences and cognition.

These research topics are related to **Destination 5**: "Unlocking the full potential of new tools, technologies and digital solutions for a healthy society" of the **Horizon Europe** Work Programme.

They are also inscribed in the United Nations' **Sustainable Development Goals** "Quality Education", "Gender Equality", "Good Health and Well-being", "Climate Action".

For a more detailed description of the projects, see the annexes and the webpage:

https://cofund-archifun.univ-lyon1.fr/ThesisProjects.html

ArchiFun **core values** are rooted in the principles of the European Charter for Researchers and the Code of Conduct for the recruitment and selection of DF. The principles of the open, transparent and merit-based recruitment (**OTM-R**) will be followed at all stages.


Scientific and social ethics

Interdisciplinarity and intersectorality



Equality and inclusion

Creativity / out of the box thinking



Continuous improvement

Open science and F.A.I.R. principles

infograms from Adobe free stock

Call for Applicant

23 Doctoral fellows will be selected and enrolled in two calls: 12 DFs in 2024 and 11 DFs in 2025.
The call for application and instructions can also be found online at: https://cofund-archifun.univ-lyon1.fr/apply.html

call opens in April 2024 —> deadline June 1st —> shortlist June 28th —> -> interviews 1-11 July 2024*

Which documents to upload?

Before applying online, here it is a check list of documents to have ready and gathered in one unique PDF file:

- ✓ prepare a CV (max 2 pages) including skills, publications and the name and contact details of 2 previous supervisors;
- ✓ have ready the academic transcripts (with marks and ECTS) including bachelor's and master's grades; should you be finishing your master, include a certificate with the name of the units and grades that you have passed at the time of application;
- ✓ if applicable, scan a language proficiency in English (TOEFL or IELTS);
- ✓ prepare a motivation letter, including any international experience (max 1 page);
- ✓ prepare a project proposal (max 1 page) in line with the chosen research topics, you can contact the project supervisors for more details.

When the PDF file is ready, apply on line and send also the file by email to cofund-archifun@univ-lyon1.fr. Any candidate can apply to up to 2 projects, but should the candidate be shortlisted, they need to decide for only 1 oral.

The proposals submitted online before June 1st (9 AM, CEST) will be checked for eligibility by the Management Team (MT) and then sent to the members of the International Selection Committee (ISC).
The ISC will evaluate the applications and produce a shortlist of candidates to be auditioned.
Interviews will be carried out by ISC at the beginning of July 2024, the full calendar will be available online.

*approximative dates, see updates in the webpage

Selection procedure

At the end of the call, the MT will check the application for the eligibility criteria:

- **Academic criteria**: Applicants of any nationality must be in a position to complete a master's degree or an equivalent diploma before the beginning of the PhD position or have completed a master's degree or an equivalent diploma. Applicants already in possess of a PhD title are not eligible. Researchers who have successfully defended their doctoral thesis, but who have not yet formally been awarded the doctoral degree will not be eligible.
- **International criteria**: Applicants will need to comply with the MSCA mobility rule. Applicants must not have had their main residence or carried out their main activity (work, studies, ...) in the recruiting country for more than 12 months during the 3 years immediately prior to the deadline of the call. Compulsory national service, short stays such as holidays and time spent as part of a procedure for obtaining refugees status under the Geneva Convention (1951 Refugee Convention and the 1967 Protocol) are not taken into account.

Once the eligibility check is passed, the applications are sent to the ISC, who will evaluate the applicants in two stages:
first the application is scored for a maximum of 40 points (see table below), with a cut-off of 20/40.
An initial ranking is made following this table. Inclusiveness is one of the objectives of the project, therefore 3 extra points (bonus) per each category will be given to people with disabilities, underrepresented gender, or under the status of refugee.

Theme	Criteria	Subcriteria	Score
Education	Scientific excellence	Academic education and training Academic excellence (including prizes, bursaries, publications, etc) Dual degree/diiploma	up to 9 pts up to 7 up to 4
Ambition	Adequacy of the career plan and research project	Ambition both in relation to the ArchiFun project and broadly in relation to the applicant’s research interests	up to 10
Professional Experience	Research experience	Research environments within and outside the Higher Education Sector, including experience in other sectors and organisations	up to 10

Once this first evaluation has been completed, the shortlisted candidates will be notified by email and surface mail, and interviewed by the **ISC** *via* teleconferencing during the first week of July.
The calendar of the selection will be indicated in the mail and on the ArchiFun website.
The **second** stage is the **oral interview**, where the prospective candidates will present **in 15 minutes** their achievements and their research project, which they will have discussed with the future supervisors beforehand. This presentation will score up to 20 points (see table below). Up to 5 points can be taken off should the time limit not be respected. The ISC will then start a **20 min discussion** on the project and on the scientific preparation and background of the candidates. Their attitude towards the research plan, commitment and motivation in the following 3 years will also be evaluated. In total, this interview can score up to 60 points.

Theme	Criteria	Subcriteria	Score
Presentation	Scientific excellence	Pedagogical content	up to 7 points
		Intelligibility	up to 7
		Instructions compliance	up to 6
Question time part 1	Scientific excellence	Knowledge of the basics of the chosen research project	up to 10
		Knowledge of the scientific background	up to 10
Question time part 2	Adequacy of the career plan to the research project	Adequacy of the proposed secondments to the research project	up to 10
		Attitude towards the research plan, commitment and motivation	up to 10

The maximum total score between the first and second evaluation is 100 points (40 points in the first stage and 60 in the second).
Throughout the selection project, the Equality, Inclusion and Sustainability Opportunities Plan will be followed and specific attention will also be brought to candidates, who would like to start a career in research after having been active in a different domain/sector following a master degree.
All the rules of the European Charter for Researchers and of Code of Conduct for the Recruitment of Researchers (OJ L 75, 22.3.2005) will be followed.
Soon after the consensus meeting of the ISC, a final ranking will be made public and all the candidates will be notified by email and surface mail, with an evaluation summary report.

Applicants who have not been selected, despite having scored above the threashold, will be placed in a reserve list.
Following this notification, the successful applicants have **1 week** to decide whether **to accept the decision**; once this delay passed, the silence is a deny of the offer and the next candidate on the reserve list will be notified.
All the applicants have the right to request a **redress procedure**, should they believe there has been a shortcoming in the evaluation or a procedural flaw. In this case they have 10 days to fill in the redress procedure in the annexes. A redress request can only be based on procedural grounds, with clear evidence of the reasons for complaint that must be provided in the request. The redress procedure is not meant to call into question the judgement made by the expert evaluators.

What we offer

The **23 selected Doctoral Fellows** will be recruted in each one of the 5 implementing partners Universities (see page 4) and enrolled in one of the pertained Doctoral schools, starting in October 1st 2024 and October 1st 2025.
Successful candidates who accept the offer will be required to sign their employment contracts and start their fellowship on the above-stated dates. Therefore they will have to **comply to the local regulations** for visa and work permit before that day, preferably. The local HR deparments will help the DFs with tasks such as contract signing, opening bank accounts, accommodation arrangements, addressing visa-related concerns, managing travel funds for their project and secondments.
The doctoral fellowship consists of 36-months full time contract; the **competitive salary** includes National Health Insurance and Pension/Retirement Scheme, as well as a minimum of 24 working days of vacation. Each fellow is entitled of living and mobility allowance.
In case the DF has or aquires family obligations during the fellowships (such as maintaining persons linked to them by marriage or equivalent status or dependent children) a family allowance can be allocated, following the local rules and regulations.
All the projects and associated research will be funded by the respective research groups or scientific platforms, who are responsible for supervising the DFs.
The secondment/s foreseen in each project will be funded by

Arqus and ArchiFun DP, not the fellow.
Net salaries will be calculated upon recruitment phase by HR Unit, depending on the personal situation of each fellow and the national regulations on the date of the contract.

Detailed training programme

ArchiFun Doctoral Programme expects to train a new generation of researchers highly competitive and creative in interdisciplinary fields spanning from biochemistry to structural biology, from analytical to medicinal and supramolecular chemistry, from bioinformatics to biophysics, from biotechnology to biomedicine, from molecular to cellular and tissue biology up to systems and population biology, from basic to translational research.
ArchiFun DFs will be trained to become critical and autonomous intellectual risk takers, out-of-the-box thinkers and with a holistic approach to Life Sciences.
To this aim, each DF will be offered a **personal Career Development Plan** (CDP), with yearly updates, which will contain a selection of courses for an innovative, interdisciplinary and international training, divided in the following classes:

1. **scientific** training, on subjects linked to the research projects;
2. **soft skills** training
3. **horizontal transferable skills** training

Most of the courses listed in the table in the annexes are already available in each of the implementing partner universities and some of them are offered as MOOC, therefore the DFs can choose to attend them when suitable.
To enrich the CDP and at the same time open up career options, ArchiFun DP offers secondments and hands-on practical schools on specific methodologies and techniques. **Secondments** refer to temporary placements of researchers or research stays in other institutions, intended to enhance the DF's multidisciplinary training and foster collaboration. In line with the vision of ArchiFun DP, these secondments should be in a different country and/or in a different sector.
The CDP should include at least one international and one inter-sectoral type of secondments.
In order to build a broad offer of secondments, ArchiFun DP has gathered a wide range of **associated partners**. In particular, **VU** will offer its expertise in biophysics of lipids and biomaterials; **KCL** will offer transnational access to and expert training in high

resolution studies of macromolecular assemblies, cells and tissues by electron microscopy and super-resolution microscopy, including programming and image analysis; **BIFI** and **IP** will offer transnational access and expert training in calorimetry (ITC and DSC), microscale thermophoresis (MST), analytical ultracentrifugation (AUC), Mass photometry, thermodynamics and stability, as well as data analysis and statistics; dedicated **ESRF** staff will train the DFs in integrative structural and functional biology techniques through one specific hands-on school exclusively offered to each cohort of DFs. **NTT**, **NovAliX** and **FidaBio** will offer secondments in their R&D laboratories, as well as their support in the co-organization of thematic schools. **Pulsalys** will offer free access to its bootcamps on intellectual property and entrepreneurship.
ArchiFun DP includes as well the organization of **thematic events** (see the list in the annexes) and annual networking events in the form of a 2-days scientific meetings, where the DFs will present the progress on their projects, but also new open questions and issues. Finally, each DF will be assigned a **Doctoral Watch Panel** of 3 external experts. Their yearly mission is to ensure the smooth running of the research project, by individually (and separately) interviewing the DF and the supervisor(s). The Panel will also take care that the CDP is well adapted to a good progression of the DF training.

Data Processing

ArchiFun DP will process the personal data of the applicants to manage their application in accordance with the GDPR regulation (2016/679, in particular Art. 24, 30, 32, 40) and with the selection processes, legitimized by the consent that applicants give when applying to the call. None of the Implementing and Associated partners will transfer the data to third parties, except to the evaluating ISC members. Data will be kept for a maximum period of one year, except in the case of legal obligation.
If any candidate wishes to exercise their rights of access, rectification, opposition, deletion, limitation of processing or portability, they can contact the Data Protection Officer at each participant institution.
Since most of the communication among the partners will be done electronically, the EU Directive 2002/58/EC of the European Parliament, directly regulating privacy over electronic communication, will be followed.

Annexes

List of the research projects offered in the first call (deadline June 1st 2024)

UCBL (6 DF to be recruted, one in each doctoral school)

ED 340 - BMIC

Project 1: The Role of Interactions with Dendritic Cells in Sustaining NK Cell Functions in Tumor Conditions

Project 2: Elucidating the specific neuronal vulnerability in Friedreich ataxia preclinical models

Project 3: Peripheral determinants of viral encephalitis: towards predictive biomarkers and limited neurovirulence

Project 4: Study of the tropism of a new variant of TDP-43 (G376V-TDP-43) responsible for distal myopathy but not an ALS

ED 206 - Chimie

Project 1: Characterisation and *in vitro* validation of biopolymers for the treatment of iron overload

Project 2: Structural and functional investigation of a molecular regulator involved in bacterial silver resistance using NMR

Project 3: Vaccine design using synthetic outer membrane vesicles incorporating defined carbohydrate antigens and immunostimulants

ED 160 - EEA

Project 1: Contribute to the development and optimization of a signal processing and AI algorithm for microwave imaging in the early detection of breast cancer

ED 476 - NSCo

Project 1: SchizApathy: Unveiling the Neuro-Computational bases of Apathy in Schizophrenia

Project 2: PEPsy project

ED 52 - PHAST

Project 1: Investigation at the molecular level of the interaction of fluorescent probes with early protein aggregates

Project 2: Development of Laser-generated Surface Acoustic Wave Immuno-sensors

ED 341 - E2M2

Project 1:The hexokinase phosphorylation landscape: new regulation of an "old" enzyme

Project 2:Regulation and impact of post-transcriptional modifica-

tions of *Staphylococcus aureus* tRNAs

Project 3: Stress gradients and the emergence of treatment resistance in infection and cancer

University of Granada (2 DF in 2024)

Project 1: Efficacy of targeted nanoparticles coated with hybrid cell membranes against pancreatic cancer heterogeneity

Project 2: Explainable AI-powered multimodal data integration for healthcare

Project 3: Biomimetic Magnetic Hydrogels for Translational Research

Project 4: Unravelling amyloid aggregation with novel luminescent probes for super-resolution microscopy

Technical University Munich (3 DFs in 2024)

Project 1: Structural and functional characterization of the disease-linked inner mitochondrial membrane protein MPV17

Project 2: Molecular insights into the misfolding pathways of antibody light chain proteins

Project 3: Structure, interactions and dynamics of an RBM17 complex linked to alternative splicing regulation

National Institute of Chemistry

Project 1: Host-pathogen interactions in Plants: Characterization of NLPs, a new family of pore-forming proteins

List of training courses

Class of training	Specific courses	UCBL	UGR	UIPD	TUM	IIC
(a) scientific training	Train through research	■	■	■	■	■
	Planning and performing experiments of individual research projects	■	■	■	■	■
	Monthly high-end seminars on the 5 research topics	■	■	■	■	■
	Python and R programming	■	■		■	
	Data mining, machine learning & big data (in presence and MOOC)	■	■			
	Pathophysiology of mitochondria: From energy conservation to disease pathogenesis and therapy			■		
	Post-translation modifications of proteins: how to survive in a dense forest			■		
	A journey with the cytotoxic lymphocytes			■		
	Astrocytes at the centre of the brain of neurons			■		
	Neuromuscular plasticity			■		
	Magnetic resonance imaging of the brain	■		■		
	Refreshing memories of metabolic pathways			■		
	Neurodegenerative diseases: Epidemiology, genetics and pathogenesis of brain misfolding diseases	■		■		
	Genome editing to engineer in cells, organoids and mice disease-associated mutations		■			
	3D (bio)printing: fundamentals, techniques and scientific-technical requirements		■			
	Bioinks & hydrogel generation: techniques for generation & combination with cells		■			
	Physico-chemical and mechanical characterization of biomaterials		■			
	Introduction to image analysis in ImageJ		■	■		■
	Quantum Mechanical Basics of NMR-Spectroscopy (CH3034)				■	
	Advanced NMR (CH3040)				■	
	Introduction into the use of the NMR spectrometer (0878)				■	
	Biomolecular NMR spectroscopy (CH3184a)				■	
	Biological solid-state NMR (3383)				■	
	Structure and Function of Membrane Protein (4455)				■	
	Pregl Colloquium					■
(b) soft skills	Scientific writing 1 – basics	■	■	■	■	■
	Scientific writing 2 – advanced	■	■	■	■	■
	Science communication	■		■		■
	Scientific illustration	■	■	■	■	■
	Ethics and Research integrity	■	■	■	■	■
	Project management	■	■	■	■	■
	Stress management and work wellbeing	■		■		
	Team building and management	■	■	■	■	■
	Local language courses	■	■	■	■	■
(c) horizontal /transferable skills	Intellectual property and patenting	■	■	■	■	■
	Writing grant applications	■	■	■	■	■
	Workshop on outreach activities (MT180, macSUP)	■				
	Entrepreneurship and career development	■				■
	Workshop on open science	■	■	■	■	■
	Workshop in ISO regulation					■
	Gender equality in STEM			■		■
	Arqus Career week outside academia	■	■	■		
	Workshop on mentorship	■	■	■		
	Workshop on diversity and inclusiveness in Science	■	■	■		

List of thematic events

1) Sample quality control	This school will link the specific requirements of academia research with the technical and regulatory aspects of industrial research and development: accurate concentration determination (prediction of extinction coefficients and UV/Vis), homogeneity (dynamic light scattering), buffer optimisation (differential scanning fluorimetry), folding state (circular dichroism spectroscopy, native mass spectrometry) and oligomeric state with optional measurement of extinction coefficients (size exclusion chromatography coupled with multi-angle light scattering and mass photometry).
(2) Macromolecular Interactions	This school will provide training at isothermal titration calorimetry, differential scanning fluorimetry, liquid-state nuclear magnetic resonance (NMR as a titration method), vibrational spectroscopy (including FTIR), surface plasmon resonance, biolayer interferometry. Data analysis with concepts of thermodynamics (equilibria), kinetics (time courses) and structural (de)stabilisation by ligand binding will be addressed. This school will also be opened to the mechanical characterization of biomaterials and implementation of lab-on-a-chip.
(3) Integrative structural biology	This school will bring together the main technologies for gaining the most out of a given sample/project. The focus is on macromolecular crystallography (MX), small angle scattering (SAXS/SANS), liquid and solid-state NMR, cryoElectron microscopy and tomography (cryoEM, cryoET), super-resolution microscopy (FLIM, STED, AFM).
(4) Frontiers of modelling	This school will be first dedicated to NMR based structure elucidation (using CYANA software) including data collected from trainings #2 and #3. Then, 3D structure of protein/protein complexes will be calculated with the use of HADDOCK and including constraints originating from NMR or SAXS data. Finally, drug discovery and protein/ligand interactions will be studied by means of the ACEMD (Acellera Inc) software including the last developed algorithm based on force field machine learning. This school can be proposed both in face-to-face and distant learning.
(5) Biosensors	This practical school will give a general overview of the different types of biosensors. Through lectures particular examples based on immuno-chromatography, electrochemical, electrical or optical detection will be addressed. The different steps of sample preparation (cell lysis, extraction or pre-concentration) in the context of biosensors will also be presented to give the DFs the keys to understand the challenges associated with the development of biosensors dedicated to diagnosis, prognosis, therapeutic follow-up or environmental monitoring.
(6) **Management of intellectual property**	This full immersion of 10h in the management of Intellectual Property and on the basics of its regulation will give the doctoral fellows the keys to understand the innovation cycle and which are the phases and needs for patenting. **Pulsalys** will coordinate this workshop together with technology transfer managers of non-academic partners and will present practical case scenario and the public vs private approaches.
(7) Bioinformatics	Through the different programmed lectures, the aim is to give a general overview of the subject of Bioinformatics. It will also include examples of practical applications of **Computer Science** within the area of **Bioscience** and **Biomedicine** (neurosciences and complex diseases, genetics and epigenetics, molecular diagnosis, among many others). The lectures, delivered by speakers of great international relevance, have also a professional and business orientation. The Conference will close with a round table where the present and future of this area of interest can be discussed, as well as the training needs necessary to form a relevant profile. To complement the Conference, there will be online workshops related to the content, as well as a **"Datathon" competition in collaboration with the company Genyo**, who annually supports UGR in this event. The content and associated topics are open to the entire community, with the possibility of recognising **1 ECTS credit**.
(8) International School on Biological Crystallisation	The five-days school will provide lectures, posters and 1 full day of practical demonstrations related to the crystallisation of biological macromolecules, biominerals and biomimetic materials. The aim of ISBC is to introduce all participants into the fundamental knowledge about the behaviour of crystallising solutions and their applications for macromolecules, including large crystals for neutron diffraction, tiny crystals for XFEL and EM sample preparation/characterization. The school is included within the summer courses of UGR, recognized with **2 ECTS**. (http://www.isbcgranada.org/).
(9) BIOMAT	This summer school (https://www.modelingnature.org) is organized at UGR as a series of minicourses and seminars on current topics of mathematical modeling in developmental biology, biophysics, biomechanics, biomedicine and deep learning. It is aimed at researchers in training and the entire scientific community. The courses are taught intensively in one or two weeks during the month of June. BIOMAT has a long history of more than 15 years and is an international benchmark in this field. This school is recognized with **2 ECTS**.
(10) PREDITOX	This summer school organised by UCBL, aims at helping ecotoxicologists, regulators, managers, NGOs and other stakeholders to improve their skills in modeling and statistical inference for, among other things, a better analysis of their bioassay experimental data. Participants will be introduced to R programming, to basic statistics in R, to fitting distributions using the MOSAIC web platform, in particular its Species Sensitivity Distribution module. Participants will also be trained step-by-step to the use of Bayesian inference, in particular the R-package 'morse' which allows the users to automatize the use of Bayesian inference when dealing with survival and reproduction ecotoxicological bioassay data.

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