

02/05/2022

23/ECUM/CMAT-UIDB/00013/2020

Where to apply

Application Deadline: 16/05/2022 23:00 - Europe/London

Contact Details

Where to send your application.

COMPANY

Universidade do Minho

E-MAIL

candidaturas@cmat.uminho.pt

Hiring/Funding Organisation/Institute

ORGANISATION/COMPANY

Universidade do Minho

COUNTRY

Portugal

DEPARTMENT

Escola de Ciências

CITY

Braga

ORGANISATION TYPE

Higher Education Institute

STATE/PROVINCE

Braga

WEBSITE

POSTAL CODE

<https://www.uminho.pt>

4710-057

E-MAIL

sec@cmat.uminho.pt

STREET

Campus de Gualtar

PHONE

+ 351 253604367

ORGANISATION/COMPANY

Universidade do Minho

LOCATION

Portugal › Braga

RESEARCH FIELD

Mathematics

REFERENCE NUMBER

UIDB/00013/2020

RESEARCHER PROFILE

First Stage Researcher (R1)

APPLICATION DEADLINE

16/05/2022 23:00 - Europe/London

OFFER DESCRIPTION

ANNOUNCEMENT FOR THE AWARD OF A RESEARCH FELLOWSHIP

Research Fellowship; 6 vacancies

Reference 23/ECUM/CMAT-UIDB/00013/2020

A call for applications is now open for the attribution of six grants of research fellowship within the scope of the R&D project UIDB/00013/2020-Financiamento Base of the Centre of Mathematics, School of Science, University of Minho, financed by national funds through “Fundação para a Ciência e Tecnologia”, under the following conditions:

Scientific area: Mathematics

Recipient category: Students enrolled in a MSc (2nd cycle) course in the areas of Mathematics, Computer Science or Statistics.

Requirement for granting the fellowship: The applicants may apply without prior registration in the course for which the fellowship is open. The requirement to enrol in a degree course or non-academic degree course will be verified on the date of contracting the fellowship;

Only fellowships whose selected applicants present a valid proof of enrolment in a degree course or non-academic degree course will be contracted, according to the type of the fellowship, issued by the academic services of the Higher Education Institution, indicating, respectively, the academic year or its duration (start and term).

Candidates profile: The candidates must have a profile that fits the research activities foreseen in the research project(s) to which he/she is applying. The 11 (eleven) projects in this call are listed below and can be consulted on the CMAT portal at the url address <https://www.cmat.uminho.pt/BI-2022> where, in particular, the candidate profile of each project is described.

Applicants eligibility: Applicants must comply with the eligibility conditions laid down in article 9 of the Research Grants Regulation of the Portuguese Foundation for Science and Technology (2019).

Workplan and objectives to be achieved: It is intended that the fellowship researcher collaborate in the research activities of the CMAT, integrating one of the projects whose description and supervisors are indicated below. A detailed description of the projects, including the corresponding target audience, can be consulted on the CMAT portal (<http://www.cmat.uminho.pt/BI-2022>). The candidate must mention up to 3 (three) references of projects for which he is applying, in descending order of preference, chosen from among the following 11 (eleven) proposals:

[Project BI2022-A] Risk analysis in assessing surface water quality in a hydrographic basin.

Supervisors: Arminda Manuela Gonçalves, Irene Brito.

Work plan: In the context of the issue of monitoring the surface water quality of a hydrographic basin, an approach in the area of risk theory is proposed with the application of decision models and measures of risk and uncertainty. The main goal of this project is to analyse and classify water quality monitoring stations according to the pollution level. The aim is to establish new surface water quality classification processes and to compare them with the usual processes used by the National Directorate for Water Resources Management.

[Project BI2022-B] Multivariate Geostatistics: characterization of cross-covariance functions.

Supervisor: Raquel Menezes.

Work plan: Multivariate Geostatistics is concerned with modelling multiple spatially correlated variables. Currently, the importance of Geostatistics is justified by the technological development that allows the easy obtaining of large amounts of data with geographical reference. In this project we intend to analyse non-parametric estimation methods of cross-covariance functions, with a strong emphasis on the development of numerical studies. The application to real data, within the scope of collaboration with IPMA, and the preparation of a scientific article include the proposed objectives.

[Project BI2022-C] Clifford groups in quantum computing.

Supervisor: Pedro Patrício.

Work plan: Clifford groups were introduced, in the context of quantum error-correcting codes, by D.Gottesmann in 1998. In a quantum computer, some coding that is fault-tolerant is required, using quantum error-correcting codes. The no-cloning theorem could infer that classical codes would be unfeasible in this paradigm. However, the CSS construction, using

stabilizers, shows that it is possible to systematically construct quantum error-correcting codes using classical codes. It is intended to carry out a study of the state of the art of the subject, such as the impact of this approach in quantum computing using the Clifford group.

[Project BI2022-D] Implementation of Pre-Training Methods in Machine Learning.

Supervisors: Fernanda Costa, Luís Ferrás.

Work plan: Neural networks, also known as Artificial Neural Networks (NN), are a subset of Machine Learning (ML) and are at the heart of Deep Neural Networks (DNNs), which have many hidden layers that represent the network's abstraction capability. Their name and structure are inspired by the human brain because they mimic the way biological neurons signal to one another. However, training DNNs is still a difficult and tedious task. One possible solution is to use model parameters of tasks that have already been learned to initialize the model parameters of new tasks. In this way, the old knowledge helps the new models to successfully perform new tasks instead of training them from scratch. Thus, the goal of this work is to implement pre-training methods (such as layer-by-layer) and to test and develop new pre-training methods to solve ML problems with DNNs.

[Project BI2022-E] Partial classical propositional logic.

Supervisors: José Carlos Espírito Santo, Luís Pinto.

Work plan: Kochen and Specker developed in the 60's alternatives to the quantum logic of Birkhoff and von Neumann based on partial boolean algebras, recently revisited in studies of contextuality, a feature associated to advantage of quantum computation. This project proposes the study of partial boolean algebras and of the induced notion of validity, alongside with the study of the logical calculus introduced by Kochen and Specker to axiomatize this notion of validity. Additionally, the project proposes the study of transitive partial boolean algebras and their relation to orthomodular posets.

[Project BI2022-F] Modelling and numerical simulation of immunological memory in the context of autoimmunity.

Supervisors: Maria da Piedade Ramos, Ana Jacinta Soares.

Work plan: A mathematical model for describing the dynamics of cellular interactions leading to autoimmune disease was developed, using integro-differential equations. This model does not contemplate the effect of T cell memory which determines the chronic behavior of these diseases. We intend to include the effect of T cell memory in the existing model by introducing delay terms in the system of integro-differential equations. The focus of the project will be the development of numerical simulations for the delayed integro-differential system using adequate techniques for this purpose.

[Project BI2022-G] Longitudinal Models in Life and Health Sciences.

Supervisor: Inês Sousa.

Work plan: Statistical models for longitudinal data are suitable for analysing data from repeated measures over time on multiple individuals (persons or another individual unit). In the area of life and health sciences, it is common to have large databases for studying the temporal progression of a given marker (random variable). In this project we propose the study of these longitudinal models, applied to databases in this scientific area, comparing inferences obtained with those of other statistical models.

[Project BI2022-H] Topological models of concurrency.

Supervisor: Thomas Kahl.

Work plan: It has been discovered relatively recently that concepts and methods from algebraic topology can be useful in concurrency theory, the field of computer science that deals with systems of simultaneously executing processes with shared resources. This project will study the main topological models of concurrency, namely pre-ordered spaces, directed spaces, and higher-dimensional automata. It will be examined to what extent the categories of these models can be related by functors that preserve constructions modelling composition operations for concurrent systems.

[Project BI2022-I] Discrete dynamical systems using Python.

Supervisor: Davide Azevedo.

Work plan: The intention is to study nonlinear dynamical systems with one or two dimensions. Bifurcation phenomena will be studied, with emphasis on the duplication of period and how that can lead to chaos. Some examples, such as the tent and the logistic map, will be analysed. Python will be used as a support tool, particularly to make graphs of the iterates of functions and of the bifurcation diagrams.

[Project BI2022-J] Killing vectors on a Newman-Penrose tetrad.

Supervisor: Ana Cristina Ferreira.

Work plan: In General Relativity, a Killing vector is an infinitesimal version of a symmetry of spacetime. In general, the equations that allow us to determine such vectors are of hard resolution. In certain cases, this exercise may be made easier by applying Lie operators written in bases which are adapted to the geometry of spacetime. In particular, a new Lie operator adapted to a certain formalism, known as the Newman-Penrose tetrad, has been very effective in obtaining Killing fields. In this project, the student is expected to apply these methods in order to obtain Killing fields in some important models of spacetime.

[Project BI2022-K] Stability for discrete-time neural network models.

Supervisor: José Joaquim Oliveira.

Work plan: First, the student needs to do research work in order to identify the main neural network type-models and its global stability criteria. Second, the student needs to study the main techniques used in Y. Hong and W. Ma, Math. Biosci. Eng. 16(2019), to get the global stability criterion for a Hopfield neural network model. Making use of these techniques, it is

intended to obtain new global stability results for other types of discrete-time neural network model such as BAM (bidirectional associative memory), Cohen-Grossberg, or high-order Hopfield type models.

Applicable legislation and regulations: Research Fellowship Holder Statutes, approved by Law no. 40/2004 of August 18, in its current version published by Decree-Law no. 123/2019 of 28 August; Regulation of Scientific Research Fellowships of the University of Minho (RBIC), published in "Diário da República", 2nd serie, no. 119, through dispatch no. 6524/2020 of 22 June, ratified by ratification declaration no. 447/2021 of 22 June and Regulation of Research Studentships and Fellowships (RBI), no 950/2019 of 16 December, of the Foundation for Science and Technology.

Host/Contracting institution and scientific supervision: The workplan will be carried out in Centre of Mathematics of University of Minho, located in Campus de Gualtar or Campus de Azurém, under the scientific supervision of the member(s) of CMAT who proposed the research plan chosen by the candidate.

Fellowship duration: The grant will take place for a period of six months, with a provisional starting date on the October of 2022. The fellowship grant is not renewable.

Amount of the research grant: The value stipend (Monthly Maintenance Allowance) is € 875,98 per month, in accordance with the stipends values published by the Foundation for Science and Technology (FCT) in the country (Annex I – Monthly Stipends Values for the maintenance allowances of the FCT Regulation for Research Studentships and Fellowships) and Annex II of the Regulation of Scientific Research Fellowships of the University of Minho (RBIC), published in "Diário da República", 2nd serie, no. 119, through dispatch no. 6524/2020 of 22 June, ratified by ratification declaration no. 447/2021 of 22 June, according to the applicable regulation.

Payment is made until the 23rd of each month, through bank transfer to the fellowship holder's NIB indicated in the contracting process.

Other benefits: Reimbursement of Voluntary Social Security (Social Security contributions), corresponding to the 1st level of discounts and personal accident insurance.

Exclusivity regime: The grantee will perform the activities under exclusivity, as foreseen in article 5º of the Research Fellow Statutes and applicable regulations.

Selection panel: (identify the selection panel President and the effective and substitute members)

President: Fernando Augusto Pinto Miranda, Assistant Professor at the Department of Mathematics, member of CMAT, University of Minho

Effective member: Eurica Manuela Novo Lopes Henriques, Assistant Professor at the Department of Mathematics, member of CMAT, University of Trás-os-Montes e Alto Douro

Effective member: Maria de Lurdes Azevedo Teixeira, Assistant Professor at the Department of Mathematics, member of CMAT, University of Minho

Substitute member: Catarina Pina Avelino, Assistant Professor at the Department of Mathematics, member of CMAT, University of Trás-os-Montes e Alto Douro

Substitute member: Marta Susana Ribeiro Ferreira, Assistant Professor at the Department of Mathematics, member of CMAT, University of Minho

The first effective member will substitute the President of the selection panel in case of impediment, being nominate the first substitute member in the place of the first effective member.

Criteria and procedures for applications assessment and selection: The applications assessment will focus on the candidate's merit and an interview, applying the following evaluation criteria, valued on a scale of 1 to 5 values:

AM - Applicant Merit (70%)

A1 - Academic path (considering the classifications of academic degrees), with a weighting of 45%

A2 - Personal curriculum (considering professional and scientific background, and the adequacy to the selected project), with a weighting of 30%

A3 - Motivation letter, with a weighting of 25%

The Applicant Merit classification (AM) will be obtained by applying the following formula:

$$AM = 0,45 A1 + 0,30 A2 + 0,25 A3$$

Candidates whose AM classification is lower than 3.50 are excluded, and the remaining candidates go on to the interview phase.

INT - Interview (30%)

B1 - Communication, with a weighting of 50%

B2 - Attitude, with a weighting of 50%

The Interview classification (INT) will be obtained by applying the following formula:

$$INT = 0.50 B1 + 0.50 B2$$

FC - Final Classification

The Final Classification (FC) will be obtained by applying the following formula:

$$FC = 0.70 AM + 0.30 INT$$

Candidates with a FC lower than 3.50 are excluded.

The academic degrees and diplomas documents, or their respective recognition when awarded by foreign higher education institutions are not mandatory in the application phase, being replaced by a declaration of honour of the candidate with the contents of academic results. The documents of academic qualification or respective recognition will be required in the contracting phase and must attest facts that occurred on a date prior to the application. In situations of divergence between the information contained in the declaration and the

documentation submitted for contracting the grant, only the information contained in the latter will be considered. If the documents proving the ownership of the academic degree and diploma, or the respective recognition under the terms of Decree-Law No. 66/2018, of 16 August, do not correspond to the classifications awarded in the evaluation of the academic path, which can change the candidate's ranking, the fellowship won't be contracted.

Notes: Applicants with degrees obtained abroad must present proof of recognition of qualifications in Portugal and conversion of the final classification obtained in them to the Portuguese classification scale or declaration under the terms indicated in the previous point. Candidates who do not comply with one of these provisions, the selection panel will assign "0" in the grade of the graduation and/or master course. Candidates will be evaluated on the remaining parameters.

Disclosure of results: The provisional results of applications, based in the selection panel minutes, will be sent to the applicants by email until 90 working days from the applications deadline.

The provisional results of applications will contain information about the classification obtained by each candidate, as well as the project associated to the scholarship (in case of favourable result).

If case of unfavourable results, the candidates have a period of 10 working days to comment, if desired, in a prior hearing to interested parties, pursuant to articles 121 and 122 of the Code of Administrative Procedure (DL no. 4 - 7 January 2015).

Complaint and appeal procedures: The final results of the evaluation will be published through an alphabetically ordered list, posted in a visible and public place of the host unit, as well as by email to all applicants, enclosing for that purpose, the minutes of the jury deliberations.

The selected candidate must inform its willingness to accept the grant, in writing. In case of rejection, the fellowship will be awarded to the next candidate in the ordered list of applicants.

The final decision can be contested within 15 working days, by sending to the President of the jury the corresponding claim. Interested parties may also submit an optional hierarchical appeal, addressed to the Pro-Rector for Research and Projects, Professor Sandra Paiva.

Application deadline and submission: The call for applications is open from the date of publication in Euroaxess portal for a period of 10 working days.

Applications must be formalized, mandatorily, by sending an application letter accompanied by the following documents:

- Curriculum Vitae;
- Certificate of the academic degree or honour declaration (when applicable);
- Motivation Letter;
- Declaration by the candidate that he/she meets the conditions for the type of grant, in accordance with the application requirements;

- Any other documents that the candidate considers relevant to the evaluation of the Curriculum Vitae.

Applications must be sent by email to candidaturas@cmat.uminho.pt and bolsas@ecum.uminho.pt, indicating the reference 23/ECUM/CMAT-UIDB/00013/2020 in Subject. Applications submitted by other means will not be accepted.

Fellowship contractualization: The fellowship will be attributed by signing a fellowship contract between the University of Minho and the fellow, accordingly with the contract minute (annex IV of the Regulation of Research Fellowships of the University of Minho (RBIC), published in Diário da República, 2nd Série, no. 119, through dispatch no. 6524/2020 of 22-06-2020, ratified by ratification declaration no. 447/2021 of 22-06-2021, as indicated in 2.4 of the FCT document: "Rules for Granting and Management of Grants within the scope of R&D projects, including infrastructure projects, the multi-annual financing program for R&D units and other FCT financing instruments (Version 2021)".

The contract may only be concluded after all the documentation required is collected, which must take place within a maximum period of 6 months

Once all the documentation has been received, the contracting entity has a period of 60 working days to conclude the scholarship contract. Once received, the fellow must return the contract duly signed within 15 working days.

The activities under the fellowship contract can only began after proper authorization by the contracting entity.

Term and cancellation of fellowship contracts: Without prejudice to the other causes provided the fellowship regulations (FCT and University of Minho) and in the Statute of the Research Fellow, the fellowship ends with the completion of the work plan, as well as with the expiration date for which it was granted or renewed.

At the end of the fellowship, the grantee is obliged to present a Final Report of the work carried out, in accordance with the objectives and evaluation criteria defined with the scientific supervisor, within 30 days after the end of the scholarship.

The final report must be prepared in accordance with Annex I of the Scientific Research Fellowships Regulation of the University of Minho (RBIC), published in Diário da República, 2nd Série, no. 119, through dispatch no. 6524/2020 of 22 June, ratified by ratification declaration no. 447/2021 of 22June.

More Information

ADDITIONAL INFORMATION

Benefits

Please you can find the information in the Offer Description section

Eligibility criteria

Please you can find the information in the Offer Description section

Selection process

Please you can find the information in the Offer Description section

Web site for additional job details

<https://www.ecum.uminho.pt/pt/Investigacao/Paginas/Emprego-Cientifico.aspx>

REQUIREMENTS

Offer Requirements

Skills/Qualifications

Please you can find the information in the Offer Description section

Specific Requirements

Please you can find the information in the Offer Description section

Map Information



Job Work Location



Personal Assistance locations

WORK LOCATION(S)

6 position(s) available at
Universidade do Minho
Portugal
Braga
Braga
4710 - 057
Campus de Gualtar

EURAXESS offer ID: 779771

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