Research Centre for Mathematics and Applications

Research Initiation Scholarship – 1 vacancy

(BII 2)

5 of november of 2021

A call for tenders is open for one Research Initiation Scholarship within the scope of the project CIMA 2020-2023 Multiannual Financing, Ref.ª UIDB/04674/2020, financed by national funds through FCT/MCTES a, under the following conditions:

Scientific area: Mathematics; Dynamical Systems

Admission requirements: 1st Cycle Students and Academic experience in Mathematics.

According to FCT Research Grants Regulation No. 950/2019 of December 16, 2019, article 5, - **BII** (Initiation to Research Grants) cannot be awarded to those who have already benefited from research grants directly or indirectly funded by FCT, awarded under the Research Fellowship Statute.

Work plan: The study of non-linear dynamical systems is a current topic and to which much attention has been devoted by the scientific community, with applications to control systems for mechanical, climatic, electronic, robotic, computational, economic chaotic systems, among many others. The modeling of these systems is carried out by formulating nonlinear difference equations.

In this work we intend to carry out a systematic study of the behavior of iterations of unimodal maps originating from plane plane applications such as the Lozi application

L_(a,b) (x,y)=(1-a|x|+y,bx),

and Hénon's application

H_(a,b) (x,y)=(1-ax^2+y,bx),

where and are real constants, understanding the behavior, by iteration, of singular or critical points to characterize the types of bifurcations, limit sets, attractors and topological invariants.

The techniques to be used for this study include symbolic dynamics, kneading theory and Markov partition construction.

At the end of the work there will be a scientific report in preprint format, a presentation in a public session, organized by the granting institution and a working visit to the Advanced Robotics and Intelligent Factories (ROBiTECH) laboratory of the Polytechnic of Leiria.

Tasks:

- Bibliographic search, literature review (2 weeks)
- Establishment of symbolic dynamics methods and techniques (2 weeks)
- Experiments and simulations - Mathematica, Python, others (1 month)
- Formalization of results and writing of report/preprint (1 month)
- Presentation in formal seminar.

Applicable legislation and regulations: The granting of the Research Scholarship will be carried out upon the signing of a contract between the University of Évora and the scholarship holder, as set in the template https://www.fct.pt/apoios/Minuta_Contrato_Bolsa.docx , pursuant to the Research Scholarship Statute (Law No. 40/2004 of August 18 and Decree-Law No. 123/2019 of August 28) and in accordance with the legislation and Regulation of Research Grants of the Foundation for Science and Technology, IP in force, regulation nº950/2019 of December 16, 2019: https://www.fct.pt/apoios/bolsas/regulamento.phtml.pt and other applicable rules.

Place of work: The work will be developed at research unit CIMA of the University of Évora, under the scientific guidance of the Prof. Doctors Diogo Baptista, Alexandra Baptista, Carlos Ramos.

Duration of the scholarship: The scholarship will have a duration of 3 months, starting on January of 2022. The scholarship contract may be renewed up to until the end of the funding project's budget allocation.

Amount of monthly maintenance allowance: The amount of the scholarship corresponds to €446,12, according to the table of scholarships awarded directly by FCT, I.P. in Portugal (http://fct.pt/apoios/bolsas/valores), payments being made monthly, by check or bank transfer.

Selection methods: The selection methods to be used will be the following: CV: 40%; Motivation Letter: 40%; Academic experience in Mathematics: 20%

Composition of the Selection Jury: President: Feliz Minhós (CIMA-UEVORA); Effective Members: Vladimir Bushenkov (CIMA-UEVORA); Carlos Ramos (CIMA-UEVORA); Substitutes: Clara Grácio (CIMA-UEVORA); Fernando Carapau (CIMA-UEVORA).

Advertising/notification of results: The final results of the evaluation will be publicized, through an ordered list alphabetically posted in a visible and public place of Mathematics Department of University of Évora, being the candidate approved notified through email.

To ensure the right of prior hearing of interested parties, the Final Classification project will be announced by any written means to all interested parties.

After communicating the provisional list of the results of the evaluation, candidates have a period of 10 working days to express their opinion in a preliminary hearing of interested parties.

Application deadline and submission of applications: The tender is open from 5 to 30 november of 2021 and the results of the selection will be published by 10 december.

Applications must be formalized, obligatorily, by sending an application letter with the following documents:

- Curriculum vitae
- Certificate of Qualifications
- Letter of interest
- Letter of recommendation

For the purposes of application, the evidence may be replaced by a declaration of honor signed by the candidate, but the failure to demonstrate that evidence, in the contracting phase, possession of the required degree on the deadline for application or the non-presentation of proof of enrollment in the study cycle or non-degree course, for scholarships with this component, imply the cancellation of the candidate's application.

Academic degrees obtained in foreign countries require registration by a Portuguese Institution in accordance with Decree-Law no. 66/2018, of August 16 and Ordinance No. 33/2019, of January 25th.

The presentation of the certificate is mandatory for the signing of the contract. More information can be obtained at: https://www.dges.gov.pt/pt/pagina/recognition?plid=374

Applications must be sent by email to:

Prof. Feliz Manuel Barrão Minhós
Departamento de Matemática da Universidade de Évora
e-mail : dircima@uevora.pt

GOVERNO DE PORTUGAL

FCT Fundação para a Ciência e a Tecnologia
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