CIMA - RESEARCH CENTER IN MATHEMATICS AND APPLICATIONS

CIMA/BII1/2023 - Research Initiation Scholarship – 1 Vacancy

4 of January of 2024

A call for tenders is open for one Research Initiation Scholarship, Ref.: CIMA/BII1/2023, within the scope of the project com reference **UIDB/04674/2020,** Multiannual Financing 2020-2023 of CIMA financed by national funds through FCT/MCTES, under the following conditions:

Scientific area: Mathematics

Admission requirements: Students of 1st Cycle in Mathematics and of the 1st Cycle in Mathematics Applied to Economics and Management offered by the University of Évora

As set forth FCT Research Scholarship Regulation No. 950/2019 of December 16, 2019, article 5th, candidates for "**Research Initiation Scholarship**" cannot be awarded to anyone who has already benefited from research grants directly or indirectly financed by FCT, awarded under the terms of the Statute of Research Fellows.

Work plan:

We consider a simple model formed by two iterated applications of the interval, m and r.
Each interval application implements a difference equation, where the time variable is discrete. The r application, called the regulatory application, controls the behaviour of the m application. The system determined by the equation induced by m is called the metabolic system, the system determined by the application r is called the regulatory system. Both are characterised by a finite set of parameters.
An optimisation problem is naturally established for the pair (m,r). For given parameters, we define a maximising function, which depends on the orbit of the metabolic system during a given time interval. The problem is to obtain the maximisation of this function, depending on the initial conditions of the metabolic system.
We discuss other developments for which the system is disturbed by an external system.
Applications to decision-making problems in complex environments will be considered, in finance with possible discretisations of the Black-Scholes equation.

Timetable

1 Literature review. First and second order non-linear difference equations.
(2 weeks)
2. Study of a regulatory system with the logistic equation.

(1 month)
3. study of decision models.

(2 weeks)
4.Writing a final article.
(1 month)

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 former.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://files.diariodarepublica.pt/2s/2019/12/241000000/0009100105.pdf and other applicable rules.

Place of work: The work will be developed at CIMA of the University of Évora, under the scientific guidance of the Professors Carlos Ramos e Luís Bandeira.

Duration of the scholarship(s): The scholarship will have a duration of 3 months, starting on February of 2024. The scholarship contract may be renewed up to the end of the funding project's budget allocation .

Amount of monthly maintenance allowance: The amount of the scholarship corresponds to €541,12, according to the table of scholarships awarded directly by FCT, I.P. in Portugal (https://www.fct.pt/wp-content/uploads/2023/02/Tabela-de-Valores-SMM_2023.pdf), payments being made monthly, by check or bank transfer.

Selection methods: The selection methods to be used will be the following, with the respective valuation :

- Curriculum evaluation : 40%;
- Motivation Letter Evaluation - 40%;
- Academic experience in the area of Mathematics – 20%.

Composition of the Selection Jury:

President: Professor Fernando Manuel Lucas Carapau
1st Vogal – Professor Luís Manuel Zorro Bandeira
2nd Vogal – Professor Carlos Correia Ramos
1st Alternate– Professor Maria Manuela Melo Oliveira
2nd Alternate – Professor Paulo de Jesus Infante dos Santos

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 the Mathematics Department, 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 <u>16 of January to 9th of February of 2024</u> and the results of the selection will be published by <u>16th of February of 2024</u>.

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

- Curriculum vitae;
- Qualification certificate
- 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, with the reference CIMA/**BII1**/2023, to:

Prof. Feliz Manuel Barrão Minhós
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e-mail : dircima@uevora.pt