

### **Call for the selection of 3 research contracts**

The University of Pisa announces public selection procedures for the award of 3 research contracts in accordance with Article 22 of Law 240/2010 as set out in Annex A) to this call, in which the information sheets indicating the reference structure, the description of the research project, the specific responsibility within the project and the functions to be performed, as well as the scientific disciplinary area and information on the interview, are provided.

**Deadline for submitting the application:** 16<sup>th</sup> march 2026 at 1.00 p.m.

**Contract duration:** 24 months

**All-inclusive annual administrative gross amount:** € 54.910,08

#### **Admission requirements:**

- A PhD or medical specialisation degree.

Students enrolled in the third year of a PhD programme or in the final year of a postgraduate medical specialisation programme are also eligible to apply, provided they obtain their degree within six months from the publication date of the selection notice. Failure to meet this requirement candidates will lose the right to be awarded the research contract.

#### **Documents to be attached:**

The application must include:

- a) A research development project related to the research project specified for the selection in Annex A);
- b) A comprehensive scientific-professional curriculum containing all the necessary elements for assessing prior research activities and any relevant work experiences, in connection with the content of the research project under consideration (specifically indicating: date/duration, place of completion, etc.);
- c) For individuals with a foreign doctoral degree, an equivalence decree or determination; if the candidate already holds one, a copy of the foreign doctoral degree or a suitable certification issued by the foreign institution, confirming the components, duration, and activities of the doctoral programme undertaken to achieve the doctoral degree;
- d) Additional documents that the candidate deems useful for the selection purposes;
- e) Publications that the candidate considers relevant for the selection, considering the maximum number set for the selection, as indicated in Annex A), with a list signed by the candidate;
- f) Photocopies of the tax code and a current valid identification document.

**Candidates must submit the publications they intend to present exclusively in PDF format through the dedicated section of the online procedure.**

**Each publication shall not exceed 30 megabytes.**

**Publications not enclosed with the application will not be considered by the Selection Board. Lists with links to texts are not allowed as a replacement for publications.**

#### **Applications**

Applications must be submitted online only, using the following link: <https://pica.cineca.it/unipi/>

or shall be invalid. An e-mail inbox is required to login and complete the application.

Candidates can login into PICA platform using the digital identifier SPID (Sistema Pubblico d'Identità Digitale - Public Digital Identity System), selecting the University of Pisa among the available Institutions.

If candidates have no SPID, they can request it according to the procedures set forth on the website [www.spid.gov.it](http://www.spid.gov.it).

Candidates can also login with the credentials issued directly by PICA platform (please note: in order to apply online, the system requires an e-mail inbox for self-registration), with their LOGINMIUR, REPRISE or REFEREES account.

Applicants should provide all the required data and upload all documents in PDF format.

The system allows saving an application draft within the application deadline, recording the online application's date and sending a receipt with an automatic reply. After the deadline, the system will not allow login nor application submission.

Each application will be assigned a unique identification number to be referred to in all subsequent communications, along with the selection code provided by the application form.

Under penalty of exclusion, the application shall be valid only if including all the required data, the copy of a valid ID and:

- if submitted without accessing with digital identifier SPID, the applicant's signature is compulsorily required;
- If submitted by accessing with digital identifier SPID, the application will be automatically processed by the system and the applicant's signature is not required.

Applicants undertake to promptly communicate in writing any variations of what declared in the application form.

The communication shall be edited in PDF format, signed and forwarded to the Rector of the University of Pisa by the Italian certified e-mail system address ( P.E.C. Posta Elettronica Certificata): [protocollo@pec.unipi.it](mailto:protocollo@pec.unipi.it) or emailed to [concorsi\\_contratti@unipi.it](mailto:concorsi_contratti@unipi.it) , within the application's submission deadline.

An applicant's valid identification document shall be annexed.

For further information on application submission, please refer to [concorsi\\_contratti@unipi.it](mailto:concorsi_contratti@unipi.it).

For technical problems support only, please click on the bottom link available at <https://pica.cineca.it/unipi>.

### **Selection procedure:**

For the selection under Annex A) the Director of the Department appoints a Selection Board consisting of the head of the research project and two other members.

Candidates are assessed comparatively on the basis of the following elements:

- a) Quality, originality and innovativeness of the research development project, with reference to the research project under consideration;
- b) Relevance and significance of the research activities previously carried out, as well as any work experience, in relation to the contents of the research project subject to the selection, in addition to documented qualifications (such as, for example, grade point average, postgraduate diplomas, any contracts, scholarships, conference presentations, and other documented qualifications);
- c) Quality, originality and innovativeness of the attached publications, as well as their relevance to the research project under consideration;
- d) An interview aimed at assessing the knowledge of the basic subjects of the scientific disciplinary sector to which the subject of the research project belongs, the suitability for carrying out the research activity under the contract and for the implementation of the research project, as well as the evaluation of knowledge of the English language and/or other languages relevant to the research (as reported in the Annex A). During the interview, the Selection Board also assesses the knowledge of the Italian language for foreign candidates.

The Selection Board has 100 points available for the comparative evaluation of the candidates: 60 points can be allocated for the criteria mentioned above under a), b) and c), and 40 points for the interview.

The Selection Board may stipulate a minimum score below which eligibility cannot be awarded.

Candidates are summoned for the interview on the day and time specified in the Annex A) for the procedure.

Failure to attend an interview by a candidate is considered an explicit indication of their intention to withdraw from the selection process.

Applicants for this selection are required to consult the University website at <https://bandi.unipi.it/public/Bandi?type=COR> (on the selection procedure page) during the two days preceding the date set for the interview.

On the University website (<https://bandi.unipi.it/public/Bandi?type=COR>), in the section dedicated to the procedure, the following will be published:

- Assessment scores for criteria a), b) and c);
- The list of candidates admitted to the interview;
- Practical instructions for carrying out the interview and/or any details should the interview be rescheduled;
- The procedure approval decree and the merit ranking that takes into account the scores achieved by the candidates.

The prospective doctoral or postgraduate student may only enter into a contract after obtaining a doctoral or postgraduate medical degree. In the event that the PhD candidate or postgraduate student fails to obtain the degree within six months from the publication date of the selection notice, they will lose the right to be awarded the research contract.

Please note that the English version is given as a matter of courtesy, for the only purpose of information. It cannot be legally used in the event of a dispute or a claim arising from the interpretation of this translation and concerning the contents, a possible uncertainty, contradiction, or discrepancy. Should this occur, the Italian version of the call should prevail as the only valid. For full Italian text see: <https://bandi.unipi.it/public/Bandi?type=COR> (on the selection procedure page).

**Selection code - CDR\_inginf2026\_4\_1**

**Department of Engineering Information**

**GSD 09/IBIO-01 "Bioengineering"**

**SSD IBIO-01/A "Bioengineering"**

**Progetto FIS-2023-02508 "EPSILON"**

**CUP I53C25001890001**

**Research Project:**

**FIS-2023-02508 "EPSILON: Endogenous Pseudo-Stochastic Intelligence: unveiling the pivotal role of non-deterministic Oscillations in complex biological Networks" (D.D. prot. n. R.0001567 del 22/10/2025)**

EPSILON represents a transformative endeavor in the realm of biomedical signal processing, departing from conventional methodologies for characterizing dynamical systems. In the non-trivial case of complex deterministic systems driven by dynamical noise, the system output at time  $t_n$  can be described as  $x_n = T(x_{n-1}, x_{n-2}, \dots, x_0) + \varepsilon_n$ , where the stochastic components  $\varepsilon_n$  recursively combine with a deterministic map  $T$  in the phase space. By modeling such components as a sequence of random variables  $\varepsilon_n$  defined on a probability space, quantifying their statistical properties, such as power, in the absence of specific knowledge or assumptions about  $T$  poses significant challenges.

EPSILON introduces a new framework for closed-form estimation of dynamical noise statistics, independent of knowledge about the specific  $T$  function. The framework also enables the characterization of stochastic vectorial components driving multi-dimensional dynamical systems for any  $T$  map functions. Through the estimation of covariance matrices and directional indices of causal information transfer, EPSILON aims to elucidate the intricate dynamics of coupled, unknown complex systems. In turn, the characterisation of dynamical noise statistics will allow novel avenues in signal denoising.

The primary focus of EPSILON is the characterization of physiological dynamics and associated biological noise. By revealing intrinsic stochastic fluctuations that causally modulate neural and cardiovascular dynamics, we seek to identify new biodynamics sustaining physiological and pathophysiological states. Leveraging existing research in computational physiology and neuroscience, we aim to re-evaluate previous findings in light of newfound insights into noise distribution across different brain regions and cardiovascular districts. What was once an unwanted variable is now a measurable quantity, yielding a wealth of "noisy" but informative data and opportunities for the scientific and technical communities. In many pseudo-stochastic system equations, EPSILON will then emerge as the component of paramount interest, paving the way for novel conceptualizations of neurophysiological functions.

**Specific responsibilities within the project and functions to be performed:**

Analysis of Stochastic Properties in Dynamical Models of Real-World Phenomena.

The selected researcher will study the stochastic properties of dynamical systems that may also exhibit chaotic behaviour, such as classical Lyapunov exponents for hyperbolic systems and the decay of correlations. In particular, their research will focus on models of real-world phenomena (e.g., neurophysiological systems) to understand how these classical quantifiers aid in classifying such models.

**Maximum number of publications that candidates may submit, including the doctoral thesis, if submitted: 3**

**Language skills:**

English language

**Date, time and mode of the interview:**

**26<sup>th</sup> march 2026 at 9 am in telematic mode**

Selection code - CDR\_inginf2026\_4\_2

Department of Engineering Information

GSD 09/IBIO-01 "Bioengineering"

SSD IBIO-01/A "Bioengineering"

Progetto FIS-2023-02508 "EPSILON"

CUP I53C25001890001

Research Project:

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**Specific responsibilities within the project and functions to be performed:**

Investigation of dynamical systems and the analysis of physiological time series as typical orbits of complex systems.

The selected researcher will study the properties of physiological time series considered as typical orbits of a dynamical system with non-predictable behaviour. In particular, the researcher will study classical notions in the theory of stochastic processes, such as recurrence properties and extreme value statistics.

**Maximum number of publications that candidates may submit, including the doctoral thesis, if submitted: 3**

**Language skills:**

English language

**Date, time and mode of the interview:**

26<sup>th</sup> march 2026 at 10 am in telematic mode

Selection code - CDR\_inginf2026\_4\_3

Department of Engineering Information

GSD 09/IBIO-01 "Bioengineering"

SSD IBIO-01/A "Bioengineering"

Progetto FIS-2023-02508 "EPSILON"

CUP I53C25001890001

Research Project:

**FIS-2023-02508 "EPSILON: Endogenous Pseudo-Stochastic IntelLigence: unveiling the pivotal role of non-deterministic Oscillations in complex biological Networks" (D.D. prot. n. R.0001567 del 22/10/2025)**

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**Specific responsibilities within the project and functions to be performed:**

Noise Estimation and Denoising in biological and physiological systems.

The research activity will be directed towards biological noise estimation i) at the level of single cell, including neural spiking signals from neurons and calcium signaling from glia cells, ii) at the level of single physiological systems, including heartbeat dynamics from cardiovascular dynamics, single-channel electroencephalography (EEG) signals, single-channel functional NIRS, and single-channel functional Magnetic Resonance Imaging (fMRI) series, iii) multivariate signals derived from brain activity, including EEG, fMRI and brain-body series. A further holistic evaluation will include biosignals commonly processed in a Network Physiology framework, including ECG, respiration, electrodermal activity, blood pressure, and others. Applications will include the study of healthy and pathological subjects in various states, including resting states, distinct sleep stages, and emotional states, among others. Data from patients with psychiatric, neurological, and/or cardiovascular disorders will be investigated as well.

**Maximum number of publications that candidates may submit, including the doctoral thesis, if submitted: 6**

**Language skills:**

English language

**Date, time and mode of the interview:**

**26<sup>th</sup> march 2026 at 11 am in telematic mode**