

Job Offer

Job Summary

Title, Job Position	Post-doctoral fellowship in mathematics applied to biology
Research Field	Applied mathematics
Employer	Sorbonne Université Institut des sciences du calcul et des données
Location	Paris, France
Application Deadline	November 10 th , 2020
Salary	Depending on experience
Type of Contract	Temporary (fixed term) 24 months
Job Status	Full-time
Envisaged Starting Date	From January 1 st , 2021

Hiring Organization

Organization

Sorbonne Université was created on January 1st, 2018 from the merger of Paris-Sorbonne and Pierre and Marie Curie (UPMC) universities. Sorbonne University is a multidisciplinary and research-intensive university with world-famous origins. Continuing the humanist tradition of the Sorbonne, it is devoted to meeting the scientific challenges of the 21st century and spreading the knowledge created in its laboratories by its research teams and transmitted to its students and to society as a whole. Sorbonne University's three faculties in humanities, medicine and science each with the wide-ranging autonomy necessary to conduct its ambitious programs in both research and education. The University's 53,500 students, 3,400 professor-researchers and 3,600 administrative and technical staff members who help it run every day contribute to a University that is diverse, creative, innovative, and with a global outlook.

Organization Type

Higher Education Institute

Department

The institute of computing and data sciences (ISCD (<http://iscd.sorbonne-universite.fr/>)) is dedicated to exploring and developing the potential of computational and data-driven research and training across science, humanities and medicine at Sorbonne Université. Our research teams use the power of algorithms and visualization to solve problems in biology, chemistry, mathematics, computer science, medicine, and the digital humanities. Our history of supporting collaboration goes back more than 10 years when the institute was created to support areas where methods and means of approaching challenges spilled over the disciplines. and were profoundly transforming research.

Offer Description

Description

The post-doctoral fellow will be hired by ISCD in the junior project-team FORMAL (From ObseRving to Modelling oceAn Life), whose goal is to study life dynamics in the global ocean at various scales of time and space. He/she will be assigned the task to improve and analyse models of marine life proposed in the literature.

Trophic interactions in the global ocean are complex. Models in the vein of the classic Lotka-Volterra equations need to take into account a great number of components to grasp the reality of the phenomena at stake. To circumvent this issue, novel structured models of ecosystems have emerged over the past decade, notably the size-based models (or size-spectrum models) which represent body size *via* a trait allowed to vary continuously.

Different modelling hypotheses lead to different equations. Mostly they pertain to the class of the Mc Kendrick-von Foerster equation. Other modelling approaches seem to favor an equation that resembles the Smoluchowski coagulation equation but with an original feeding kernel that leads to very different behaviours.

The study of those behaviours, both analytically and numerically, of the steady-state solutions and their responses to perturbations are the main topics of the post-doctoral position. The comparison of models though the use of real datasets available in the framework of the project-team FORMAL will be explored in a second step. Depending upon the researcher's own experience and interest, other possibilities of development of marine ecosystems modelling could be explored. Notably, the research project might be partly developed in contact with Sorbonne Université marine stations in Roscoff and Villefranche.

Faculty sponsor

Benoît PERTHAME, benoit.perthame@sorbonne-universite.fr

Benoît SARELS, benoit.sarels@sorbonne-universite.fr

Appointment term

Two-year appointment starting as soon as possible with the possibility of a further extension based on performance and the needs of the team-project.

Keywords: *predator-prey dynamics, integral equations, transport equations, numerical simulations*

As part of your duties, you may be required to provide internal training related to your business expertise.

Required Education Level

Applicants must hold a recent Ph. D. in applied mathematics or a closely related field (climatology, oceanology, physics, computer science, statistics).

Skills / Qualifications

- Expertise in ordinary differential equations and partial differential equations.
- Experience collaborating effectively with a team of scientists of diverse backgrounds.
- Demonstrated ability in code writing and numerical simulations.
- Applicants should be hard working, analytical and have excellent writing and communication skills necessary to author technical and scientific reports, publications and deliver scientific presentations, seminars, meetings and/or teaching lectures

Specific Requirements

- Applicants are expected to be proficient in at least one programming language.
- Applicants are furthermore expected to commit to the good practices of open science.

Required Languages

English or french.

Work Location**Institute**

Institut des sciences du calcul et des données (ISCD), Equipe-projet FORMAL

Country

France

Location

Sorbonne Université
Campus Pierre et Marie Curie
4, place Jussieu
Paris

How to apply ?

Required Application Materials

1. Cover letter with current and future research interests
2. Most recent curriculum vitae
3. Copy of first author publications
4. Names and contact for three referees

How to submit

Interested candidates should

- contact for additional information about the offer:
Benoît Perthame and Benoît Sarels
- submit the required application materials to:
Pascal Frey (iscd@sorbonne-universite.fr), Benoît Perthame and Benoît Sarels with the title "ISCD FORMAL Fellowship Application".

Selection Procedure

Selection process

The Institute's selection process is based on an email submission.

Candidates are evaluated by faculty reviewers in their own academic fields and from other disciplines. Reviewers will evaluate candidates according to their academic accomplishments and their potential for research.

The selection process is organized in four stages :

1. Eligibility check: candidate's compliance with the requirements of the offer will be checked on the basis of the information provided by the applicant.
2. Evaluation of CV: applicant's CV and research proposals will be evaluated and ranked according to their merit.
3. Interviews of candidates: **short listed** candidates will be invited for an interview conducted by the selection committee.
4. Final decision: the selected candidate will be proposed the position. A reserve list of candidates may be identified in case of withdrawal of the selected candidate.

Please note that priority in individual applicant selection will be given to first-time fellows.

References :

- [1] Datta et al. 2010, A jump-growth model for predator-prey dynamics: derivation and application to marine ecosystems, *Bulletin of Mathematical Biology* 72: 1361-1382.
- [2] Blanchard et al. 2017, From bacteria to whales: using functional size spectra to model marine ecosystems, *Trends in Ecology & Evolution* Vol. 32/3.
- [3] Perthame 2007, Transport equations in biology, *Birkhäuser Verlag*.