



## 2023 Recruitment Job Sheet

Assistant professor

ENTPE

(Graduate school of Civil, Environmental and Urban Engineering)

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| <b>Job Title:</b>      | Assistant professor in multi-physical behavior of bio-sourced and/or geo-sourced materials   |
| <b>Discipline(s):</b>  | Civil Engineering, Mechanics, Energetics   |
| <b>Specialty(ies):</b> | Multi-physical behavior of bio-sourced and/or geo-sourced materials  |
| <b>Laboratory:</b>     | Laboratoire de Tribologie et Dynamique des Systèmes (LTDS, UMR5513 CNRS)   |
| <b>Location:</b>       | ENTPE, 69120 Vaulx-en-Velin  |
| <b>Contact(s) :</b>    | ENTPE : <ul style="list-style-type: none"><li>- Luc Delattre, Directeur de la recherche et de la formation doctorale, <a href="mailto:luc.delattre@entpe.fr">luc.delattre@entpe.fr</a> ; Tél. : 04 72 04 70 90</li><li>- Antoine Le Blanc, Directeur de la formation initiale, <a href="mailto:antoine.leblanc@entpe.fr">antoine.leblanc@entpe.fr</a> ; Tél. : 04 72 04 71 05</li></ul> LTDS : <ul style="list-style-type: none"><li>- J.-L.Loubet, Directeur de l'UMR LTDS, <a href="mailto:jean-luc.loubet@ec-lyon.fr">jean-luc.loubet@ec-lyon.fr</a></li><li>- C. Lamarque, Responsable LTDS-ENTPE, <a href="mailto:lamarque@entpe.fr">lamarque@entpe.fr</a></li><li>- Cédric Sauzéat, responsable groupe GCD/OID, <a href="mailto:cedric.sauzeat@entpe.fr">cedric.sauzeat@entpe.fr</a></li></ul> |

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### 1-Context and issues

A higher education and research institution constituted as a public scientific, cultural and professional establishment (EPSCP) under the supervision of the Ministry of Ecological Transition, the École nationale des travaux publics de l'État (ENTPE) is involved, in training and research, in all the professional fields of urban development and management of urbanized areas:

- Buildings and infrastructures ;
- Land use planning, urban policies, and urbanism;
- Transport systems and mobility;
- Soil, water and anthropized hydrosystems: control of environmental impacts and preservation of hydrosystems.

In an increasingly competitive context, the major challenge for the ENTPE today is to position the school even more strongly and to gain recognition for its work in the academic and socio-economic spheres, both nationally and internationally. With this in mind, the ENTPE has established a new strategic project that affirms its desire to make the school a pilot and exemplary institution in the field of ecological and solidarity-based transition.

The school currently trains approximately 700 engineering students, most of whom are recruited from the post-graduate preparatory classes for the grandes écoles. It also offers a range of master's degrees and specialized masters, as well as continuing professional education programs. It will open a Bachelor's degree program in "Ecological Transition and Territories" in September 2023, with the first year under student status and the other two years under apprentice status, with a target enrollment of 50 students per year. The school is part of the Lyon Saint-Etienne site dynamic and works closely with the three other public engineering schools on the site: Insa Lyon, Ecole Centre de Lyon and Mines Saint-Etienne.

The ENTPE is the supervisor of five research laboratories, four of which are affiliated with the CNRS and one with the Gustave Eiffel University. On its site, the School employs and hosts 80 researchers, 60 of whom are permanent. About 100 theses are in preparation.

The management of training is organized within the Initial Training Department (DFI), which relies on the skills of the laboratory staff to implement the training programs offered in the institution.

In this context, the ENTPE is looking for a teacher-researcher, to ensure a research mission at 50% of his time in the Laboratory of Tribology and Systems Dynamics, on the site of the ENTPE (LTDS UMR 5513 CNRS) and teaching (50% of his time) in the training courses offered by the school.

### **Description of the laboratory themes**

The Laboratory of Tribology and Systems Dynamics, Joint Research Unit 5513 of the CNRS, gathers researchers belonging to 3 institutions: the Ecole Centrale de Lyon, the Ecole Nationale des Ingénieurs de St. Etienne, which has become an internal school of Centrale Lyon, and the ENTPE. Within the LTDS, at the ENTPE, research is developed in engineering sciences, applied to civil engineering and building, which combines approaches to physics (rheology, heat, acoustics, light), mechanics (materials, structures, dynamics), and perception (comfort, discomfort, intelligibility).

The research activities carried out are essentially in line with the themes developed in the three following teams:

- Geo-materials and Sustainable Construction": The research developed concerns on the one hand the natural or anthropic geomaterials (soils, raw and biosourced materials, concrete, bituminous materials, composite materials, etc.) for their use in structures. The complex solicitations and multi-physical couplings (thermo/hydro/chemical/hygro/electro-mechanical couplings) are taken into account as well as the scientific problems related to the energy efficiency in the building. They also concern civil engineering structures (roads, tunnels, embankments, dykes, earthen structures, masonry structures, etc.) with the aim of understanding specific pathologies, rehabilitating them or defining innovative and sustainable construction methods and proposing advanced dimensioning tools.
- Dynamics of Complex Systems": Research focuses on model reductions in linear and non-linear dynamics, developed within a framework of mechanics, applied mathematics and physical sciences for engineering.
- Bioengineering & Perception, Mechanics of Materials and Processes": The aim is to develop knowledge on the physics and perception of buildings and their environment, particularly in the fields of acoustics, light, heat and air quality.

## **2-Missions**

### **Position**

The teacher-researcher will be assigned to the "Geo-materials and Sustainable Construction" team of the LTDS laboratory on the ENTPE site. His/her research activity is part of the scientific program of this unit. His teaching activity is part of the collective and contractualized commitment that his laboratory and the DFI define each year. All of his/her activity is placed under the responsibility of the director of his/her research unit at the ENTPE.

### **Training activity**

The person recruited will be involved in all the training courses offered by the ENTPE, in particular and as a priority in the post-baccalaureate Bachelor's degree course "Ecological Transition and Territories" which is due to open in September 2023 (levels L1 to L3), but also in the initial engineering training at the ENTPE, in the masters courses in which the establishment is involved and in the continuing education courses that it implements.

The teaching mission consists of contributing to the pedagogical engineering of the various training courses offered by the ENTPE, participating in the steering and management of the teaching, providing courses, supervising practical and tutorial work, supervising projects and internships, as well as academic tutoring of students, in particular work-study students, in direct contact with the company's apprenticeship supervisor. The teacher-researcher must be able to teach in English and at a distance (or in a hybrid format).

The targeted training areas are the following: fundamental core science courses (analysis, energetics, energy transfers, etc.) or courses in the professional field of buildings (energy performance of buildings, building physics, envelope design, sustainable construction, etc.) or courses in the professional field of civil engineering (civil engineering materials, soil mechanics, structures, etc.), with the objective of addressing the challenges of the ecological transition.

#### Research

The person recruited will have to deploy a research production activity in the theme of the multi-physical behavior of bio-sourced and/or geo-sourced materials, as well as structures based on these materials, intended for use in buildings, within the "Geo-materials and Sustainable Construction" team of the UMR LTDS, and will aim in particular:

- The understanding and study of multi-physical behavior, including mechanical, hydric, thermal, chemical, coupled or not, at the scale of materials and structures,
- The development of laboratory and/or in-situ experiments for the study of these materials
- The development of models to reproduce the phenomena observed on a small scale or to simulate the behavior on a large scale, as well as their numerical implementation
- The development of new materials, or new solutions, integrating bio-sourced products or recycled products, with a low carbon footprint.

From the socio-economic point of view, this research will allow to identify, develop, characterize and validate the use of innovative materials for buildings, from their design to their operation, based on their environmental footprint throughout their life cycle.

#### 3-Expected profile

- The candidate must hold a PhD in Civil Engineering, Mechanics, Energetics
- The candidate must justify his/her interest, dispositions and experience for teaching and pedagogical support of students; he/she must be able to cover a wide spectrum of courses in (building physics and energy) in order to meet the evolving needs of the training.
- He (she) will have to justify of scientific publications in journals and communications in conferences or the writing of books recognized internationally in his (her) disciplines and field of research
- He (she) must have a good knowledge of the socio-economic world and a vision of the needs for skills in the field of bio-sourced, geo-sourced and low environmental impact materials;
- He (she) must be fluent in written and spoken English.

The following elements will also be appreciated by the recruitment panel:

- Have experience abroad or the ability to mobilize a national and international network;
- Have research experience at the end of the thesis;
- Have a good knowledge of their scientific field, of the issues, actors and associated networks, both in their discipline and in related disciplines;
- Demonstrate knowledge and skills in the use of numerical modeling tools and experimental means for energy transfers in buildings;
- Demonstrate the ability to work in a team and multidisciplinary collaboration.
- Have a CNU qualification.

#### 4-Application procedures

Interested parties are to send applications by e-mail to [recrutement-enseignants-chercheurs2023@entpe.fr](mailto:recrutement-enseignants-chercheurs2023@entpe.fr) indicating name, surname, e-mail address and the position applied for.

In return, a message will be sent informing you of the application procedure: this procedure is dematerialized via the website <https://recrutement.entpe.fr>

Application includes a Research and Training project. To prepare their applications and define their research and training projects, and until the closing date for applications, candidates are strongly encouraged to contact the heads of the recruiting units (see contact information on job description).