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**2024 recruitment - job description**

**Assistant-professor**

**MdC**

**Ecole nationale des travaux publics de l’Etat**

**(ENTPE)**

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**Job title :** Teacher researcher : Assistant professor on mechanical and thermomechanical behaviour of materials for transport infrastructures

**Discipline(s) :** Civil Engineering, Mechanics

**Specialty(ies):** Behaviour of materials for transport infrastructures

**Assignment laboratory:** Laboratoire de Tribologie et Dynamique des Systèmes (LTDS, UMR5513 CNRS)

**Location :** ENTPE, 69120 Vaulx-en-Velin

**Contact(s) :** A l’ENTPE :

* Luc Delattre, Director of research and doctoral training, luc.delattre@entpe.fr; Tél. : 04 72 04 70 90
* Antoine Le Blanc, Dean of Education,

antoine.leblanc@entpe.fr ; Tél. : 04 72 04 71 05

 Au LTDS :

* Jean-Luc Loubet, Director of UMR LTDS, jean-luc.loubet@ec-lyon.fr
* Cédric Sauzéat, in charge of ENTPE LTDS site, cedric.sauzeat@entpe.fr
* Denis Branque, in charge of GCD/OID research group, denis.branque@entpe.fr

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**1- Context and issues**

Higher education and research institution, a public scientific, cultural and professional establishment (EPSCP) under the supervision of the French Ministry of Ecological Transition, the École nationale des travaux publics de l'État (ENTPE) offers training and research in all professional fields of urban development and management:

* Buildings and infrastructure;
* Town and country planning, urban policies and urban planning;
* Transport systems and mobility;
* Soil, water and anthropized hydro systems: controlling environmental impacts and preserving hydro systems.

In an increasingly competitive environment, a major challenge for ENTPE today is to position the school even more firmly and gain even greater recognition in the academic and socio-economic spheres, both nationally and internationally. With this in mind, the ENTPE has drawn up a new strategic project that affirms its determination to make the school a pilot and exemplary establishment for the challenges of ecological and socially responsible transition.

Today, the ENTPE trains around 700 engineering students, most of whom are recruited from "classes préparatoires aux grandes écoles". It also offers a range of masters and specialized masters degrees, as well as continuing professional education programs. A Bachelor's degree program opened in September 2023, with the first year under student status and the following two years under apprentice status, with a target enrolment of 50 students per year. ENTPE is part of the dynamic Lyon Saint-Étienne site, and works closely with the site's 3 other engineering schools: INSA Lyon, Ecole Centrale de Lyon and Mines Saint-Etienne.

The ENTPE is home to 5 research laboratories, 4 of which are affiliated to the CNRS and one to the Université Gustave Eiffel. The ENTPE employs and hosts 80 researchers, including 60 permanent staff. Around a hundred theses are in preparation.

Training is managed by the Department of Education (DFI), which relies on the skills of laboratory staff to implement the training courses offered by the establishment.

To coincide with the opening of the "Ecological Transition and Territories" bachelor's degree course in 2023, the establishment has created its own status for teacher-researchers, enabling it to recruit on permanent contracts and offer a career path tailored to the progress of the staff concerned.

In this context, ENTPE is recruiting a teacher-researcher (Assistant professor) to carry out a dual mission: 50% of his/her time will be devoted to research within the Laboratoire de Tribologie et Dynamique des Systèmes (LTDS), and the remaining 50% to teaching in the courses offered by the school.

**Description of laboratory topics**

The Tribology and Systems Dynamics Laboratory (LTDS), a CNRS Joint Research Unit 5513, brings together researchers from 3 schools: Ecole Centrale de Lyon, Ecole Nationale des Ingénieurs de St. Etienne, now an internal school of Centrale Lyon, and ENTPE. The LTDS at ENTPE carries out research in the engineering sciences, applied to civil engineering and building, combining approaches in 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 by the following three teams:

- Geomaterials and Sustainable Construction (GCD): The research carried out concerns natural or man-made geomaterials (soils, primary and bio-sourced materials, concrete, bituminous materials, composite materials, etc.) with a view to their use in structures. Complex loads and multi-physical couplings (thermo-/hydro-/chemical-/hygro-/electro-mechanical couplings) are considered, as well as scientific issues relating to energy efficiency in buildings. Civil engineering structures (roads, tunnels, embankments, dykes, earthworks, masonry, etc.) are also covered, with the aim of understanding their specific pathologies, rehabilitating them, defining innovative and sustainable construction methods and proposing advanced design tools.

- Complex Systems Dynamics (DySCo): Research focuses on model reduction in linear and non-linear dynamics, developed within the framework of mechanics, applied mathematics and engineering physics.

- Bioengineering & Perception, Mechanics of Materials and Processes (BPMNP): The aim is to develop knowledge of the physics and perception of buildings and their environment, particularly in the fields of acoustics, light, heat and air quality.

**2- Missions**

**Position**

The researcher/lecturer will be assigned to the "Geomaterials and Sustainable Construction (GCD)" team of the LTDS laboratory on the ENTPE site. His/her activities will be split 50% for research and 50% for education. His/her research activities will be part of the scientific programme of LTDS unit. His/her teaching activity will be part of the collective and contracted commitment that his/her laboratory and the Department of education (DFI) define each year. All of his/her activities are under the responsibility of his/her research unit director at ENTPE.

**Training activities**

The person recruited will be involved in all the courses offered by ENTPE, in particular and as a matter of priority in the post-baccalaureate "Ecological Transition and Territories" Bachelor's course which opened in September 2023 (levels L1 to L3), but also in the initial engineering training offered by ENTPE, in the Master's degrees with which ENTPE is associated and in the continuing education which ENTPE implements.

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

The targeted areas of teaching are as follows: fundamental core science courses (mathematics, mechanics of materials, etc.), courses in the professional field of civil engineering (civil engineering materials, soil mechanics, structures, etc.), and in particular in the professional field of transport infrastructure (pavement materials and structures, road geotechnics, pavement evaluation, monitoring, pavement pathology and maintenance, road asset management, etc.) with the aim of addressing the challenges of the ecological transition (recycling, low-carbon materials, life cycle analysis, etc.).

**Research**

The appointed person will be responsible for conducting research on the behaviour of materials for transport infrastructures (soils and pavement materials), within the "Geomaterials and Sustainable Construction" team of LTDS unit, and will focus in particular on:

* Understanding and studying multi-physical behaviour in the laboratory, including both mechanical and thermomechanical aspects, at the scale of materials,
* The development of laboratory experiments to study materials or structures at a small scale and in-situ tests for structures, the development of models to reproduce phenomena observed at a small scale or to simulate the behaviour on a large scale,
* The development of new materials, or new solutions, that include the reuse of road materials and the recycling of secondary materials, and/or bio-sourced products with a low carbon footprint.

From the socio-economic point of view, this research aims to identify, develop, characterise and validate the use of innovative materials for transport infrastructures from design to operation, considering their environmental impact throughout their lifecycle.

The candidate must propose a scientific project in line with the concerns of the Ministry of Ecological Transition, the ENTPE and its alliances and partnerships.

The scientific project could potentially impact professional practices.

The appointed researcher will fit in with the LTDS by suggesting inter-disciplinary approaches, drawing on the skills of the other thematic areas of the LTDS teams. He or she will propose strategies for enhancing the alliance with the laboratory's partners at regional level (Lyon St. Etienne College of Engineering, MEGA Doctoral School, Labex, etc.) as well as at national and international levels.

In more general terms, the person appointed as a researcher/lecturer is expected to produce, supervise and promote research. In particular, he or she will be expected to publish his or her work in international peer-reviewed journals that meet the standards of their discipline. He or she will also be expected to communicate your work to your peers and to society at large. The person will also help to set up research projects in areas related to her research activities and may be required to provide support for public policy and expertise to supervisory bodies. She or he will be involved in the supervision and training of young researchers (PhD students, post-docs). They will also participate in the scientific group of the laboratory to which they are assigned and will be involved in discussions on the direction and operation of both the laboratory and ENTPE.

**3- Expected profile**

* **The candidate** must hold a PhD in civil or mechanical engineering ;
* He/she must be able to demonstrate an interest in, and a willingness and experience of, teaching and tutoring students; he/she must be able to cover a fairly broad spectrum of civil engineering courses in order to meet the changing needs of the training programme;
* He/she should be able to demonstrate that he/she has published in scientific journals, given papers at conferences or written internationally recognised books in his/her disciplines and field of research;
* He/she should have a good knowledge of the socio-economic world and a vision of skills requirements in the field of transport infrastructure;
* He/she must be fluent in written and spoken English.

The recruitment panel will also take the following into account:

* Experience abroad or the ability to mobilise a national and international network;
* Have research experience at the end of the thesis;
* Have a good knowledge of their scientific field and the issues, players and networks involved, both in their own discipline and in related disciplines;
* Demonstrate knowledge and skills in the use of experimental methods for characterising pavement materials and numerical modelling tools;
* Demonstrate the ability to work as part of a team and collaborate across disciplines.

**4-Application procedures**

If you are interested, please send your application by email to:

recrutement-enseignants-chercheurs2024@entpe.fr,

stating your surname, first name, email address and the position you are applying for.

In return, you will receive a message informing you of the application procedure: this is a paperless procedure via the https://recrutement.entpe.fr website.

The application procedure includes the creation of a Research and Training application file. In order 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 details on each job description).