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**2024 recruitment - job description**

**Full professor / Assistant professor**

**Pr/MdC**

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

**(ENTPE)**

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**Position title:** Teacher-researcher :Assistant professor or Full Professor in the regulation of transport and energy systems using artificial intelligence methods

**Discipline(s):** IT, Automation, Civil or Electrical Engineering (Modelling, Control, Data processing)

**Specialities:** Control, Learning, Massive data processing, Modelling/Optimisation, Transport systems, Energy management and storage systems

**Laboratory:** Laboratory « Laboratoire d'Ingénierie Circulation Transport - Eco-gestion des systèmes énergétiques pour les transports » (LICIT-Eco7), joint research unit of ENTPE and Gustave Eiffel University

**Localisation :** ENTPE – rue Maurice Audin, 69518 Vaulx-en-Velin Cedex - FRANCE

**Contact(s) :** At ENTPE :

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At the LICIT-Eco7 : Ludovic Leclercq, laboratory director, [ludovic.leclercq@entpe.fr](mailto:ludovic.leclercq@entpe.fr) ; Tel : 04 72 04 77 16.

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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 or Full professor, to carry out a dual mission: 50% of his/her time will be devoted to research within the the LICIT-ECO7 laboratory, and the remaining 50% to teaching in the courses offered by the school.

**Description of the laboratory's themes**

The LICIT-ECO7 laboratory (https://licit-lyon.eu/) is a joint unit under the supervision of both the ENTPE and Gustave Eiffel University. Its research focuses on the management of mobility and energy in transport systems. The laboratory works on the development of innovative tools for intelligent mobility, studies the impact of new mobility technologies and services and ways of improving the resilience of transport systems. The models and tools developed by the laboratory provide practical decision-making support. As an applied research laboratory, the LICIT-ECO7 sits at the interface between the physical and digital worlds, with an experimental base: the knowledge produced is then validated experimentally using operational data. The LICIT-ECO7 therefore pays particular attention to the comparison of data and models, which requires experimental activity and increased support for its projects from experimental platforms and living labs.

**2-Missions**

**Position**

The teacher-researcher will be assigned́ to the LICIT-ECO7 laboratory at its ENTPE site. Their research activity will be related to the scientific programme of this unit́. Their teaching activitý is part of the collective and contractual commitment that his laboratory and the Department of education (DFI) define each year. All of their activitý is placed under the responsibilitý of the director of their research unit́ at ENTPE.

**Teaching Tasks**

The person recruited will be involved in all the courses offered by the ENTPE, in particular and as a matter of priority in the post-baccalaureate Bachelor's degree course "Transition Ecologique et Territoires", which opened at the start of the 2023 academic year (levels L1 to L3), but also in the initial engineering training offered by the ENTPE, in the Masters courses with which the establishment is associated and in the continuing education courses that it offers.

The teaching mission consists in contributing to the pedagogical engineering of the various courses offered by the 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 apprenticeship supervisor. The teacher-researcher must be able to teach in English and at a distance (or in a hybrid format).

The targeted areas of training are transport engineering, mathematics and computer science.

**Research**

The LICIT-ECO7 laboratory is dedicated to the joint resolution of mobility and energy issues within transport systems. The position is part of a cross-disciplinary approach to the two themes and aims to address mobility and energy issues at all levels of transport systems, from individual vehicles to overall transport and energy systems. The tasks of this position involve the design of regulation devices and strategies, the creation of associated modelling, control and implementation frameworks, and their validation through real experiments or numerical simulations. A variety of applications in the field of transport can be envisaged, encompassing optimal energy management at vehicle level, large-scale distribution and storage systems, as well as supply regulation in the context of multimodal transport. This can include, for example, dynamic allocation of traffic lanes, perimeter control, and adaptive management of travel demand through dynamic pricing mechanisms. The interactions between the dimensions of mobility and energy will be a central area of research.

From a methodological point of view, the candidate is expected to take advantage of the new opportunities offered by the field of artificial intelligence and automated learning to develop innovative control algorithms. The aim is to strengthen the laboratory's artificial intelligence skills, while focusing specifically on regulation and control problems. In addition, the candidate will be able to capitalize on the laboratory's modelling expertise to design effective feedback loops. This commitment to key areas of current research reflects our desire to continue to innovate and make progress in our understanding and management of integrated energy mobility systems.

The person recruited as an assistant professor is expected to have an activitý of producing, supervising and promoting research. In particular, they will be expected to publish their work in international refereed journals that meet the standards of their discipline. They are also expected to be activé in communicating their work to their peers, but also to societý. They will also help to set up research projects in areas related to their research activities and may be required to carry out tasks in support of public policies and expert appraisals for supervisory bodies. 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. They will contribute to the integration of the laboratory and the ENTPE in the organizations and initiatives structuring the Lyon/St-Etienne university site. Finally, the LICIT-ECO7 is strongly committed to the principles of open, reproducible and ethical research. The person recruited must adhere to these principles and be a driving force behind this dynamic at laboratory level.

**3-** **Profile expected**

- For **Assistant Professors**: The candidate must hold a doctorate in computer science, applied mathematics and applications of mathematics, or Civil or Electrical Engineering (Modelling, Optimization, Control).

- For **Professors**: The candidate must be qualified to direct research, or be able to prove an equivalent level, particularly for foreign candidates (publications, doctoral supervision, experience of scientific direction of research projects, teaching).

- The candidate must be able to demonstrate an interest in, and a willingness and experience of, teaching and tutoring students; they should be able to cover a fairly broad spectrum of teaching in transport engineering, applied mathematics and/or computer science in order to meet the changing needs of the course.

- They will have to provide proof of scientific publications in journals and communications in conferences or the writing of internationally recognized works in their disciplines and field of research.

- It is not necessary for the candidate to already have experience in the applied fields of transport and energy, but they should propose a scientific project that is firmly in line with the themes presented above.

- The candidate is expected to have solid expertise in control theory (automation), if possible using both physical/modelling and data-oriented (model-free) approaches.

- They should have a good knowledge of the socio-economic world and a vision of the needs for skills in the field of transport and mobility engineerinǵ.

- They must be fluent in written and spoken English.

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

- Experience abroad or the ability to mobilize a national and international network;

- Research experience after the thesis;

- Have a good knowledge of their scientific field and the issues, actors and networks involved, both in their own discipline and in neighboring disciplines;

- If applying as a lecturer, have participated in research projects (national and/or European) and, if applying as a professor, have proven experience in setting up and running collaborative research projects, transfer/upgrading projects or, more broadly, partnerships;

- Master one or more programming languages (Python, Matlab, C++, Java, etc.) in order to implement their own tools;

- Demonstrate the ability to work in 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](mailto: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).