



SAINBIOSE
Centre for Biomedical and Healthcare Engineering
Open position of Associate Professor (*Maître de conférences*) in data-driven
mechanics of living material

Mines Saint-Etienne (MSE), one of the graduate schools of *Institut Mines Télécom*, the #1 group of graduate schools of engineering and management in France under the supervision of the Ministry of the Economy, Industry and Digital Technology, is assigned missions of education, research and innovation, transfer to industry and scientific, technological and industrial culture.

MSE consists of 2,400 graduate and postgraduate students, 400 staff, a consolidated budget of €46M, three sites on the Saint-Etienne campus (Auvergne Rhone-Alpes region, Lyon Saint-Etienne metropolitan area), a campus in Gardanne (SUD region, Aix Marseille metropolitan area), a site in Lyon within the digital campus of Auvergne Rhone-Alpes Region, six research units, five teaching and research centres and one of the leading French science community centres (La Rotonde €1M budget and +40,000 visitors per year). The Times Higher Education World University Ranking ranked us for 2022 in the 251-300 range for Engineering and Technology. Our work environment is characterised by high Faculty-to-Student, Staff-to-Faculty and PhD-to-Faculty ratios, as well as comprehensive state-of-the-art experimental and computational facilities for research, teaching and transfer to industry.

The CIS gathers 70 people, including 18 permanent teacher-researchers in industrial/computer engineering, biomechanics and process engineering around health applications: biotechnologies, tissue engineering, e-health, computer-assisted surgery, personalized medicine and patient pathways... Since its creation in 2004, the CIS has been representative of Mines Saint-Etienne's ability to position itself as a leader in innovative fields such as Soft Tissue Biomechanics, Health Care Systems and Services Engineering, and Biomaterials and Inhaled Particles Engineering. The person recruited will also interact with the other centers of the School (SMS, SPIN, CMP in particular) in order to federate research and transfer actions in the field of biomechanics and bioengineering.

The SAnité INgénierie BIOlogie Saint-Etienne laboratory (SAINBIOSE, INSERM UMR 1059) brings together researchers from the CIS (biomechanics, biomaterials and bioengineering fields), the Jean Monnet University medical school, the Saint-Etienne University Hospital, Inserm and the Etablissement Français du Sang. The overall scientific objective of SAINBIOSE is a better understanding and innovative management of biostress in osteoarticular (LBTO team) and cardiovascular (DVH team) pathologies.

Biomechanics, both experimental and numerical, is a major transverse theme of SAINBIOSE, ranging from the modeling of the mechanical behavior of tissues to clinical and industrial applications, particularly with the textile sector. The dynamism of SAINBIOSE and the CIS in this field makes them world-class players today (ERC and other European funding, numerous international collaborations

and industrial contracts). The approach developed is largely based on established skills in numerical simulation and identification of behavior laws. The study, monitoring and prediction of the biomechanical properties of soft tissues, or of their interactions with medical devices, are areas of excellence. An additional dimension, of very high added value, will be obtained by integrating artificial intelligence and data science.

1) **Candidate profile and assessment criteria**

The candidate should hold a PhD degree in the field of mechanical engineering. A French CNU habilitation in section(s) 60 will be considered but is not mandatory. Specific skills and/or experience in computational mechanics applied to biological solids or fluids will also be considered for this position. Prior experiments considered with interest include:

- Development of original numerical models and implementation in non-commercial computing codes,
- Model reduction using machine learning for health applications,
- Structural fluid simulations in the cardiovascular or osteoarticular fields.

The position will strengthen and develop our research and teaching outreach in the field(s) of “Mechanics, Biology and Health”.

A significant experience in teaching in the aforementioned fields at undergraduate or post-graduate cycle levels will be appreciated.

Command of the English language is essential. Given the School’s international development projects, a significant international experience is strongly favoured. Otherwise, an international mobility with a foreign partner institution should be carried-out during the three years following recruitment.

Given the guidelines mentioned above, several characteristics will be important assets:

- Interest for teamwork and willingness to elaborate one’s research project in this context,
- Interest in industrial relations, transfer and innovation
- appeal for interdisciplinarity and multi-discipline collaborations
- Practical common sense, openness and intellectual curiosity
- The quality of oral and written communication

2) **Missions**

The research and teaching activities will be carried out on the Saint-Etienne campus. Occasional involvement in the other campus’ activities is possible and encouraged. Associated transport and accommodation costs will be covered if necessary.

Teaching

The teaching mission comprises lectures, tutoring, and lab -based courses, along with the tutoring of projects and internships/work experiences, principally in the degree(s) of Ingénieur Civil des Mines, Master of Biomedical Engineering and MSc in Health Management & Data Intelligence, in the fields of mechanics.

The teaching assignments could also involve other Engineering and Masters of Science programmes, doctoral studies, as well as professional and vocational training programmes.

The successful candidate will be actively involved with the teaching teams in charge of the courses cited above. The design of new activities and the

development of innovative teaching methods, in particular related to digital technology, will be an integral component of the teaching mission.

The candidate should be able to carry out the teaching assignments and possibly deliver MOOCs in English.

A minimum number of hours must be completed yearly. Course design, supervision and team management activities are included in the teaching hours log.

Research

The recruited person will propose a research project for the development of personalized medicine using numerical modelling, databases and artificial intelligence. He/she will actively participate in the development of new models and in the integration of open-source knowledge databases. The proposed work will be integrated into the themes and projects of the SAINBIOSE laboratory, in one of the following areas:

- Venous and arterial thrombosis.
- Digital simulation of medical devices (e.g. stents).

In addition, the person recruited will ensure the transfer of his/her work through collaborative research projects with companies or hospital structures.

3) **Candidate assessment criteria:**

The main evaluation criteria are (non-comprehensive list):

- Significant teaching experience (development of digital courses, reference works...) in the previously mentioned fields, at under-graduate or post-graduate level, along with development of new teaching methods.
- Capacity to reinforce the research outreach of Mines Saint-Etienne in "Mechanics, Biology and Health"
- Capacity to successfully integrate and contribute to the group, centre and research unit project
- Scientific production: number, quality and impact of peer-reviewed original research papers, book chapters or conference proceedings indexed in international electronic databases such as, e.g.: Scopus, Web of Science, PubMed, Nature Index, arXiv.org ..., contribution to and animation of national and international workgroups or research communities,
- Partnership-based research: direct industrial partnerships, collaborative research, support to start-ups ...,
- Ability to work in a team,
- Ability to participate and/or set up international projects,
- International partnerships,
- Good command of the English language, significant international experience
- Capacity to obtain the French accreditation to supervise research qualification (*Habilitation à Diriger des Recherches*) in the five to seven years following the candidate's recruitment

4) **Recruitment Conditions**

Permanent public law contract

Remuneration is based on the rules set out in the *Institut Mines Télécom* collective labour agreement.

Candidates should hold a doctorate diploma or a similar recognized qualification level, equivalent to the required national diplomas.

Required date for taking up the position: **October 1, 2022**

5) ***Application procedures***

The application file should include:

- An application cover letter
- A curriculum vitae outlining teaching activities, research work and where appropriate, relations with economic and industrial sectors (maximum 10 pages)
- Recommendation letters, at the discretion of the candidate,
- A copy of the Doctorate diploma (or PhD),
- A copy of an identity document

These documents should be submitted on the platform RECRUITEE by **April 15, 2022** at the latest

URL:

Candidates selected for an interview will be informed rapidly. Part of the interview will be held in English. Cover letters, CVs and application files written in English will be accepted, but applicants will have to demonstrate in their application file their operative ability to communicate in French with students, fellow faculty members and the school administration. For those invited to be interviewed, the same will be expected in oral form and tested by the selection committee.

6) ***Further information***

For further information concerning the position, contact:

- S. AVRIL, Deputy Director of SAINBIOSE laboratory (avril@emse.fr, +33 477 420 188)
- J. MOLIMARD, Head of the STBio department (molimard@emse.fr, +33 477 426 648)
- V. AUGUSTO, Director of Centre for Biomedical and Healthcare Engineering (augusto@emse.fr, +33 477 426 626)

For further administrative information, contact:

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