Master 2 level research internship - Experimental characterization and finite element modelling of the artificial gingiva–titanium interface

Application Deadline: 30 November 2026

- Duration: **6 months**
- Expected start date: **January or February 2027**
- Language: **English and/or French**
- Facilities: ~600 €/month, PC

First enrolment institution

Laboratoire EULER, ISAE-SUPMECA-Institut Supérieur de Mécanique de Paris, Saint-Ouen, France.
Supervisors: Maria Letizia RAFFA, associate professor; maria-letizia.raffa@isae-supmeca.fr
Julien BOISSE, associate professor; julien.boisse@isae-supmeca.fr

Partner institution

ERRMECe- Equipe de Recherche sur les Relations Matrice Extracellulaire-Cellule CY Cergy Paris Université, France.

Required profile and skills

- Strong skills in solid mechanics and knowledge of finite element (FE) software (Abaqus or Comsol).
- Interest in experimental research and biomechanics.

Context and objectives

The long-term stability of dental implants depends on the quality of the soft-tissue seal at the gingiva/implant interface. The mechanical adhesion at this interface determines the level of protection against bacterial infiltration and, therefore, the risk of peri-implantitis. In the context of the M2GI-COAT project, this research internship aims to develop and validate an experimental–numerical framework to characterize the mechanical behaviour of a titanium/artificial-gingiva interface. Two Master's students will work in parallel within two collaborating research teams. They will jointly conduct the initial experimental activities. Weekly travel between the two partners is expected during the first part of the training program

Work program

1. **Joint experimental phase (≈ 1/3 of the internship)**
   - Literature review and definition of experimental specifications.
   - Design and preparation of mechanical test setups, based on the tensile testing facilities available in both laboratories and previous student projects at ISAE-Supméca.
   - Development and fabrication of an artificial gingiva specimen.
   - Fabrication of titanium specimens and mechanical surface treatment.
   - Preliminary mechanical testing of the titanium/artificial-gingiva system without surface functionalization.
2. **Numerical modelling phase (≈ 2/3 of the internship)**
   - Development of FE models reproducing tensile and shear mechanical tests, including cohesive-zone laws.
   - Calibration of the numerical models against experimental results.
   - Identification of the relevant model parameters and assessment of their sensitivity to experimental conditions.

The internship will provide hands-on experience in **experimental mechanics, additive manufacturing and finite element modelling**, within an interdisciplinary and collaborative research environment.

To apply, please send your resume, cover letter, and most recent transcript to:
maria-letizia.raffa@isae-supmeca.fr