

PhD post in Orthopaedic biomechanics at Imperial College London, UK: Patient-specific surgical planning of knee osteotomies

General Description: One PhD scholarship funded by the [Academy of Medical Sciences](#) and the [MSk Lab](#) is open for applications at Imperial College London with a focus on developing techniques to predict the functional outcome of surgical interventions at the knee joint. The PhD will be based in the Dept. of Civil and Environmental Engineering, in a research group collaborating with the Dept. of Surgery and Cancer. The position offers a wide range of training and development opportunities in a highly stimulating environment, as well as access to world-leading academics and clinical figures, facilities and networks.

Project details: Osteotomies around the knees, and high tibial osteotomies in particular, are surgical interventions used to correct the leg alignment of young and active individual at risk of damaging their knee cartilage. This surgery has potentially great benefits for the patient because it redistributes the loads within the joint and prevents osteoarthritis development or progression while leaving the natural knee untouched. However, the long-term success of this intervention has been reported as variable because of the purely geometrical criteria guiding the malalignment correction. The aim of this PhD is to develop a computational tool to evaluate if an osteotomy around the knee will be effective in redistributing the knee joint loads using personalised models of the musculoskeletal system created from the patients' pre-operative data, specifically medical images and gait lab data. A framework to implement virtual surgeries consistent with those planned for the patients will be developed and the post-operative gait and function will be predicted using computational advanced methods.

Supervisors:

Dr Luca Modenese (Dept. of Civil and Environmental Engineering),
Dr Andrew Phillips (Dept. of Civil and Environmental),
Mr Gareth Jones (MSk Lab, Dept. of Surgery and Cancer),
Prof J. P. Cobb (MSk Lab, Dept. of Surgery and Cancer).

Requirements: a competitive candidate for this role should demonstrate the following:

Academic requirements:

- A good Upper Second or First Class Degree (or [International equivalent](#)) in engineering, physical sciences, mathematics, kinesiology or medicine.
- A Masters level degree qualification

Experience and skills:

- Solid background in mechanics (multibody dynamics and continuous mechanics in particular)
- Good knowledge of Matlab and/or Python. C++ a plus.
- Familiarity with CAD software (Solidworks, Rhino, etc)
- Ideally, some experience in measuring human movement using motion capture optical systems, e.g. Vicon systems.

A lack of the above experience and skills could be compensated by evidence of research potential. Appropriate training will be provided.

Funding and eligibility: The studentship will provide funding for 3 years including tuition fees and a tax-free stipend at the standard UKRI London rate, £17,009 for the 2019/20 academic year. In

addition, a generous allowance is provided for research consumables, conference attendance and specialist training (including certifications).

Full funding is available to Home and EU students

How to apply: Applicants wishing to be considered for these opportunities should send the following application documents to Dr Luca Modenese (l.modenese@imperial.ac.uk)

- Current CV including details of their academic record
- Covering letter explaining their motivation and suitability
- Contact details of two academic referees

Application via the Imperial College Registry is not necessary at this stage.

The closing date for applications is the 30th July 2019. However, applications will continue to be accepted until the position is filled.

For further details, informal discussions and information about the project please contact l.modenese@imperial.ac.uk