SSC
SPORTS SURGERY CLINIC
Specialists in Joint Replacement, Spinal Surgery, Orthopaedics and Sport Injuries

DCU
Ollscoil Chathair Bhaile Átha Cliath
Dublin City University

JOB DESCRIPTION

Full Professor and Chair of Orthopaedics and Surgical Biomechanics

This position is a joint appointment between Dublin City University and the Sports Surgery Clinic
3 Year Fixed Term Contract

Introduction

The Sports Surgery Clinic (SSC) is the leading private orthopaedic hospital in Ireland with both a national and international reputation for orthopaedic surgery and sports medicine.

SSC offers a rapid access facility for screening, diagnosis, rehabilitation and surgical treatment.

In addition, it is home to Europe's largest Sports Medicine department that not only focuses on the outpatient diagnosis and rehabilitation of patients from across Europe and the world, but also using SSC Lab's unique approach to tailored rehabilitation, driven by 3D biomechanics research performed at Sports Medicine and also on outcomes improving athletic performance and reducing injury risk, through advanced biomechanical analysis.

The practice of surgery and medicine at SSC is underpinned by evidence-based methods and there is a strong culture of research throughout the institution. SSC Sports Medicine is also home to SSC Lab led by the Director of Sports Medicine. Sports Medicine has been the current primary focus of research activity at SSC, and support's a varied biomechanics research team investigating clinical biomechanical outcomes of ACL Reconstruction, Joint replacement, Knee osteoarthritis, athletic groin pain, shoulder stability, Achilles and ankle pain and low back pain. SSC Lab employs a team of Biomechanists and industrial placement students who provide raw data for the Sports Medicine research team and a wider team of clinical PhD students studying SSC specific goals. These students collaborate with a global portfolio of expertise in clinical management and biomechanics highlighting the real commitment that SSC places on promoting future breakthroughs in Orthopaedic Surgery and Sports Medicine.

Facilities at SSC include seven ultra clean-air operating theatres dedicated to orthopaedic and spinal surgical procedures, an onsite diagnostic imaging department including two 3.0 Tesla MRI Scanners, 27 consultant rooms and 83 Inpatient beds and 18 day-case beds, and SSC Sports Medicine, a standalone 10,000 sq. ft. facility seeing 40,000 outpatients for assessment and rehabilitation.

Since it was established in 2007, SSC has developed into the busiest private orthopaedic hospital in Ireland. The high quality and efficient clinical services that have been developed cater for increasingly larger numbers of patient's year on year. In 2019, 1522 anterior cruciate ligament reconstructions were performed at SSC, making it one of the highest volume centres for knee surgery in Europe. With these numbers likely to increase further in the future, there is tremendous potential to establish SSC as a leading institution in orthopaedic research internationally. This provides an ideal opportunity for collaboration with DCU, a neighbouring University with a burgeoning reputation for research and innovation internationally, particularly in the fields of sports science and bioengineering.

Dublin City University (www.dcu.ie) is a research-intensive, globally engaged, dynamic institution that is distinguished by both the quality and impact of its graduates and its focus on the translation of knowledge into societal and economic benefit. DCU prepares its students well for success in life, and in the workplace, by providing a high- quality, broad education appropriate to the challenges and opportunities of the 21st century. As Ireland's University of Enterprise, it is characterised by a focus on innovation and entrepreneurship and a track record of effective engagement with the enterprise sector. Excellence in its education and research activities has led to its consistent position in the rankings of the world's top young universities (e.g. THE 100 Under 50).

Aside from the geographic proximity of DCU and SSC (located 3 kilometres apart on Dublin's Northside), there are many similarities between the respective institutions in terms of culture and ambition. DCU, like SSC, is a young institution, which has grown rapidly in scale and performance since being established as a university in 1989. But, the similarities do not stop there; DCU has not adopted the traditional mould to third level education much akin to the unconventional approach SSC has followed in the delivery of musculoskeletal care in Ireland. Sport is also a common thread, which plays a huge role in the university and as the name would suggest is central to the services provided at SSC. However, it is DCU's commitment to research particularly in the fields of sports science, human performance, and bioengineering that makes the possibility of a collaboration with SSC very exciting. Our proposal also builds upon the already existing relationship between SSC, SSC Sports Medicine and colleagues within both the School of Health and Human Performance (www.dcu.ie/shhp) and Insight SFI Research Centre for Data Analytics (www.insight-centre.org) within DCU. Together we have already graduated two full-time PhDs and two more are completing their studies part-time, gaining from the rich experience of both a clinical work environment in the SSC and a dedicated research experience in DCU.

The appointment of a Full Professor and Chair of Orthopaedics and Surgical Biomechanics, offers the opportunity to harness the strengths of each respective institute to effect real change in the practice of Surgical Biomechanics, Orthopaedics and Sports Medicine.

It is proposed that the applicant for this role will have a distinguished reputation in research and will be expected to develop novel research strategies between DCU and SSC, which are related to both: the biomechanical analysis of anatomical injury and surgical techniques, and the outcome following surgical interventions. Therefore, the two key elements of this role are as follows:

1. The development of a cadaveric biomechanical laboratory in conjunction with DCU School of Mechanical and Manufacturing Engineering (www.dcu.ie/mechanicalengineering).

2. Establishment of a robust database of clinical practice within SSC to capitalise on the volume of pre-operative, intra-operative and post-operative data available. It is anticipated that the collaboration with Insight SFI Research Centre for Data Analytics will facilitate whole clinic data collection, advanced data mining and subsequent interpretation to evaluate orthopaedic outcomes.

It is expected that this post will work closely and in parallel with the Sports medicine and clinical biomechanics work run by the Director of Sports Medicine and SSC Sports Medicine sharing similar goals.

It is proposed that this jointly-appointed post will be based within the School of Health and Human Performance, Faculty of Science and Health and work closely with the School of Mechanical and Manufacturing Engineering and Insight SFI Research Centre for Data Analytics.

Responsibilities of this Role:

- Establish a robust clinical outcome-based research platform and dedicated team of outcome-based researchers to ensure compliance and high levels of patient follow-up. This team will develop links between the SSC Sports Medicine department, Biomechanics department and Surgical Department to provide a coordinated approach to data acquisition, limiting repetition, redundancy and overburdening patients.
- Collaborate with DCU and Insight SFI Centre for Data Analytics to develop an automated database which is integrated with the practice software to ensure all patients involved in studies are followed up at the appropriate time. To work on a specific project basis to share SSC owned data with INSIGHT /DCU for the purposes of collaboration.
- Establish robust data management processes to ensure data is collected and managed according to General Data Protection Regulations as established by the European Commission. In addition, the use of data must comply with the SSC and DCU Ethic Research Committee guidelines.
- Engage with current and future consultants at SSC to develop clinical registries and data gathering infrastructure that will underpin the workings of the SSC and the collaboration with DCU to enhance research and the ability to participate in clinical trials, international collaboration, residency and fellowship training, etc.

Education and Innovation:

- One of the key elements of providing world class surgical education is to have a surgical skills laboratory. This facility should simulate an orthopaedic operating theatre with wet-laboratory stations and arthroscopic equipment.
- The skills laboratory will facilitate performing operation on cadaveric specimens, which is not only a valuable teaching tool but also fosters innovation in testing out new operative techniques. There is also the possibility of a commercial usage for this space by allowing implant and device companies to run skills courses.

The appointed individual will:

- Work closely with the School of Mechanical and Manufacturing Engineering to develop equipment and biodevices to enhance surgical techniques and improve efficiency.
- Liaise with industry partners to test instruments and biodevices.

Clinical:

- The successful candidate will develop a focused clinical service in orthopaedics and sports medicine. A key role will be to act as patient advocate and work with all potential stakeholders (healthcare providers/health insurers/industry) to expand the delivery care in Ireland in

keeping with best international practice. S/he will be expected to play a key role in the further academic development of orthopaedics and sports medicine clinical services at the Clinic and to liaise between SSC and the DCU to integrate the needs of the clinical services with the clinical experience needed by students if required in the future. The successful candidate will also act to help develop and promote the Athletic Therapy and Training programme(s) within the School of Health and Human Performance. A clinical team with secretarial support will be available to support the clinical interests of the incoming Professor. A minimum of two full days of operating room access will be provided in addition to any clinical consultancy/office-based sessions required for the effective and safe delivery of clinical care.

Other activities:

- The successful candidate will be expected to contribute to research-led teaching and related activities in the University as required. The candidate should therefore have experience in the organisation and/or delivery of high-class teaching.

The appointed individual will:

- Contribute to the development of clinical programmes at SSC for future DCU students within the Athletic Therapy and Training (BSc Hons),Sport Science and Health (BSc Hons) and Biomedical Engineering (BEng/MEng) programmes.
- Liaise with relevant medical training bodies as required in the future.
- Act as advocate for DCU priorities at national level in relation to orthopaedic surgery, sports medicine, musculoskeletal and clinical aspects of bioengineering.

The development of the cadaveric biomechanical laboratory and the surgical skills laboratory will require the appointee to source and secure external research funding for equipment, personnel and space.

Summary of duties of post, responsibilities, commencement and hourly commitment of the post of Full Professor of Orthopaedics and Sports Medicine:

- Have a joint appointment as a Full Academic Professor and be expected to contribute to the clinical services, assessment, research activities and service development in the Sports Surgery Clinic;
- To be accountable for the delivery of the clinical component of the post and to demonstrate leadership in academic matters relating to patient care;
- Oversee the development of various components of orthopaedic surgical biomechanics research at the School of Health and Human Performance, DCU, in conjunction with the Sports Surgery Clinic and other relevant institutions suitable to the DCU-SSC alliance;
- Develop whole clinic data recording and centralised registries at SSC and provide a resource for collaboration with INSIGHT in data mining.
- To be accountable via the management and governance structures in place in the University in relation to the delivery of the academic commitment;

- To take part in undergraduate and postgraduate teaching as part of the School of Health and Human Performance and the School of Mechanical and Manufacturing Engineering as required and to supervise research students;
- To carry out other responsibilities including audit, external quality assessment and administration as advised by the clinical and academic Head of Discipline;
- To contribute to the research within the School of Health and Human Performance, the School of Mechanical and Manufacturing Engineering, and Insight SFI Centre for Data Analytics and maintain an internationally competitive research group including acquiring the necessary funds and recruiting, supervising, and supporting through to successful completion of post-graduate degrees of research students and/or post-doctoral fellows;
- To carry out from time to time, duties on behalf of the Clinic and the University and to represent the School of Health and Human Performance, DCU, on appropriate national and international advisory boards and professional bodies;
- Liaise between the service providers and the University to integrate the needs of the clinical services with the clinical experience needed by students if required in the future.

The successful candidate will be expected to meet exacting criteria in the following areas:

Research:
The candidate should have an excellent and world-class record in research, an ability to attract substantial funding as Principal Investigator or named collaborator and be productive in research output. S/he will also demonstrate the ability to work collaboratively with colleagues in orthopaedic surgery and sports medicine and other specialities. The core skills required will be the ability to apply sound scientific principles to the study of musculoskeletal biomechanics and related topics, to be able to communicate the outcome and value of research, and to encourage others, especially junior colleagues, to participate in research.

Biomechanical Research:
The study of biomechanics is an integral component of orthopaedic research. One of the key roles of orthopaedic surgery is to restore joint kinematics with a view to maintain normal function. To achieve this, one needs to understand not only the biomechanics of the joint but also the effect on the kinematics of the whole skeleton. As such, the proposed collaboration would involve the development of a Cadaveric Biomechanical Testing Laboratory

Cadaveric Biomechanical Testing Laboratory:
In order to test the biomechanics of a joint, one needs to be able to simulate normal movement under varying loads. Robotic testing using a six-degree-of-freedom robotic arm has become the gold-standard for evaluation of joint reconstruction techniques. The robotic arm that is equipped with a universal force torque sensor which allows accurate testing of cadaveric human joints to gain insight into their kinematics. In a typical setup, one end of the cadaveric human joint is securely fixed to a pedestal, while the other end is held in the end effector of the robotic arm allowing the robot to move the joint it is by applying load.

The robot can submit the joint to specific forces while measuring displacements and rotations in all three dimensions. This provides data on how the joint behaves in terms of range of motion, stiffness and response to standardized clinical tests usually performed by surgeons. The main advantages of using a robotic system compared to evaluating joint kinematics by hand include accuracy and repeatability.

Cadaveric cutting Studies:

Key to the understanding of the kinematic of a joint, is a thorough knowledge of the role of each anatomical structure. Cutting studies can be performed to identify the effects of joint structures, such as tendons and ligaments, on joint kinematics. To accomplish this, an evaluation of the intact joint kinematic is performed as a reference. Next, sequential sectioning the structures being examined is carried out, with re-evaluation of joint kinematics after each cut. This produces important information about which structures are primary and secondary stabilizers for given joint motion.

Cadaveric Reconstruction Studies:

The aim of reconstruction studies is to evaluate the performance of surgical procedures on restoring joint kinematics following an injury. To accomplish this, an evaluation of the intact joint kinematics is carried out, then a joint injury is simulated, and finally a reconstruction is performed to evaluate joint kinematics after each state. Successful reconstructions are those that present minimal kinematic differences compared to the intact state, because this shows that the joint's motion is close to the way it was prior to injury.

- Work closely with the current affiliated faculty at DCU to develop and staff a cadaveric biomechanical testing laboratory including internal strain, joint kinematics and kinetics and tissue engineering.
- Contribute to the development of parallel lines of research into biotechnologies to enhance soft tissue repair through the design of instruments and biodevices for implantation.
- Lead the investigation and development of point of care interventional strategies to enhance soft tissue reconstruction techniques. This will occur through collaboration with relevant Principal Investigators at DCU including faculty members engaged in tissue engineering and medical device research.

(A.2) Clinical Biomechanics (Field):

SSC Sports Medicine, runs SSC Lab within its facility, including the existing two (2) field change of direction VICON labs, 2 isokinetic dynamometers and the Shoulder VICON lab. It is envisaged in 2021, a Joint Lab will add a third isokinetic dynamometer and walking 3D VICON lab, and that RunLab will take the capacity to five (5) labs with an instrumented treadmill along with 3D motion capture in addition to the cadaveric laboratory proposal.

- SSC Sports Medicine has several areas of clinical biomechanics research, it is envisaged that surgical biomechanics projects would integrate, align and build parallel activity streams alongside the work already being done under the Director of Medicine and the Head of Performance's management and vision.

- There is potential for shared appointment of laboratory staff to cross the bridge between surgical and clinical biomechanics, to increase collaborative ventures globally and enhance output and outcome.

(A.3) Clinical Outcome Based Research in Surgery:
Collecting pre, peri, intra and post-operative outcome data is not only essential to monitor the effectiveness of a particular treatment, but also to understand the natural history of orthopaedic conditions. Indeed, it is likely that this data will become obligatory in the future to demonstrate clinical effectiveness. At SSC, a key focus for the future is to conduct prospective studies to evaluate specific patient groups. This evaluation involves the assessment of objective, subjective and functional outcomes over a specific time period, but also to harness the potential of machine learning on large data sets.

It is the goal that a single point of record for every patient at SSC encapsulates both wellness, health and lifestyle factors, commonly used pre and post-surgical patient reported outcome measures (PROMS) and intra and post-operative data.

It is envisaged that this position can lead the collaboration with INSIGHT delivering and leveraging data mining techniques to optimise both streamlining, outcomes, presentation to patients and commercial success, using the high capacity of the clinic.

Collaborate and coordinate with SSC Sports Medicine research programs and SSC Lab research activity and global collaborations. An example will be the commissioning of Joint Lab, by SSC Sports Medicine, which is driven to collect pre, peri and post-operative novel data on patients undergoing total knee arthroplasty. SSC Sports Medicine have existing Marie Curie/Horizon grant application in place for biomechanical support to this project under the research proposal “BioHOURS: The Biomechanical influence on Health Outcome following joint Replacement Surgery”.

This is only possible through a commitment from the administrative, medical and surgical departments alike and a strong culture of research within the institution.

Qualifications & Experience:

Mandatory/Required:

- The candidate should have an excellent and world-class record in research, an ability to attract substantial funding as Principal Investigator or named collaborator and be productive in research output.
- Clinical training in the generality of Orthopaedic Surgery (Higher Surgical Training in Orthopaedic Surgery or equivalent international training).
- Completion of an international clinical and academic structured Orthopaedic Surgery Fellowship Programme in the sub-speciality of Orthopaedic Sports Medicine.
- The possession of the clinical qualification of FRCS (Trauma & Orthopaedics) or a qualification equivalent.
- A higher degree in research (MD or PhD).
- Experience in teaching and administration of Orthopaedic Surgery and Sports Medicine.
- A track record of publishing high quality journal papers in this field.

Desirable:

- Extensive biomedical and bioengineering research experience and demonstration of long-standing commitment to an academic career.
- Translational research experience in orthopaedic sports medicine, cartilage repair and the biological augmentation of soft tissue surgery.
- Registration as a specialist in the Specialist Division of the Register of Medical Practitioners maintained by the Medical Council in Ireland in the speciality of Trauma and Orthopaedic Surgery.