

Bridging the sex gap in traumatic brain injury biomechanics

2x Fully-Funded PhD Positions:

1. Sex Specific Biomechanics of Cerebral Vasculature in Traumatic Brain Injury
2. Sex Specific Biomechanics of the Brain in Traumatic Brain Injury



Two fully-funded 4 year PhD positions are available in the School of Mechanical & Materials Engineering at University College Dublin, Dublin, Ireland.

Stipend:

€25,000 tax-free stipend per annum, plus PhD registration fees.

Project Description:

The worldwide incidence of traumatic brain injuries (TBI) is on the rise and is most prevalent in people younger than 25 and older than 75 years. TBIs lie on a continuum from transient symptoms to fatal haemorrhages with mild TBI (mTBI) being the most common type of TBI. It is estimated that 42 million people sustain a mTBI or "concussion" worldwide each year. Current brain models used to simulate TBI and design preventative, diagnostic, prognostic, and therapeutic technologies have mostly been developed using adult male data. Therefore, due to the significant morphological differences between male and female brains, the lack of female specific brain models and data may be having a detrimental effect on the advancement of these technologies. Moreover, this may adversely affect progress on reducing the economic, societal, and clinical burdens of TBI.

These PhD projects are part of a larger European Research Council funded project and aim to determine the role of sex specific biomechanics in the initiation and development of TBI by characterising the sex specific damage properties of cerebral vasculature and brain tissue under large strain and dynamic loading conditions. These projects will involve the development of a novel mechanical testing apparatus for testing brain and vasculature, and the development of new microstructure-informed material models for brain tissue. This is a unique challenge in TBI biomechanics with the potential to have life-saving impacts by providing overdue and novel tools to understand the differences of TBI biomechanics in men and women. The outputs of these PhD projects have the potential to significantly impact our understanding of TBI. The potential gain from these projects cannot be overstated, particularly in their ambition to address the inequality in research on women's health.

Principal Duties and Responsibilities:

The candidates will be required to:

- Work full time on their PhD projects at University College Dublin.
- Engage in teaching assistance, e.g., delivering lab demonstrations to undergraduate students.
- Take part in training and development.
- Contribute to public engagement and outreach activities.

Selection Criteria:

Mandatory:

- Masters degree or Primary degree (First or Upper Second Class Honours) in Mechanical Engineering, Biomedical Engineering, Applied Mathematics, or related cognate discipline.
- Excellent experimental skills.
- Excellent coding skills in Python or Matlab.
- Excellent English communication skills.
- Excellent report writing skills.
- Experience with data analysis and visualization.
- Attention to detail and organisational skills.
- Ability to manage a complex workload and tight deadlines.
- Ability to work independently and as part of a team of researchers.
- Be self-motivated.
- Willingness to work closely with other collaborators.
- Willingness to learn new skills e.g., machine learning, coding languages, conduct experiments.
- Awareness of equality, diversity and inclusion.

Desirable:

- Experience working with biological tissues.
- Experience designing / building experimental apparatus.
- Experience in mechanics of materials / constitutive modelling.
- Experience with microscopy / histology.
- Good research skills.

How to apply:

Please send the following in PDF format to david.macmanus1@ucd.ie

- Cover letter detailing which project you are most interested in and why you are interested in pursuing a PhD on this topic and how your experience to date makes you the ideal candidate (max. 2 pages).
- Your CV.
- Academic transcripts or a copy of your degree certificate.
- Two academic reference letters.

Closing date for applications:

The positions will remain open until filled.

Start date:

The successful candidates will commence their PhDs from the 1st May 2025.

Informal Enquiries:

Please email any informal enquiries to Dr David MacManus: david.macmanus1@ucd.ie

Supplementary Information:

- The University: www.ucd.ie
- UCD School of Mechanical & Materials Engineering: <https://www.ucd.ie/mecheng/>
- Equality, diversity, and inclusion: <https://www.ucd.ie/equality/>