

# The Biomechanics of Injury & Prevention

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## Overview

The human body is a highly complex combination of strain-rate dependent materials and unique geometries, meaning that it represents one of the most challenging environments in which to apply fundamental engineering principles. The importance of doing so is increasing however, as the global population now expects a higher quality of life, sustained for a longer time-period. This demand now drives a multi-billion-dollar industry of innovations, ranging from intelligent automobiles, to 3D printed knee joint replacements. This lecture series will focus initially on the human body's bio-mechanical attributes, before applying this knowledge to understand and appreciate novel technologies that are being used to predict the severity of, and mitigate against, injury.

The primary objectives of this course are to:

- Understand the human body's complex anatomy and appreciate how person-to-person variation can impact upon engineering judgement.
- Understand the engineering complexity of biological tissues, in particular considering their composite construction and subsequent viscoelastic behaviour and to appreciate how this influences design.
- Become knowledgeable on injury measures, how they have been derived and how they are applied.
- Appreciate new and innovative engineering technologies, and how these are being used both to accurately predict, and mitigate against, injury.

<b>Modules</b>	<b>A: Fundamentals of Biomechanics : 17<sup>th</sup> – 19<sup>th</sup> Sept 2018</b> <b>B: Application of Biomechanics to Injury Prevention : 19<sup>th</sup> – 21<sup>st</sup> Sept 2018</b> <b>Participants for each module will be limited to fifty. 19<sup>th</sup> Sept will be common to both modules.</b>
<b>You Should Attend If You...</b>	<ul style="list-style-type: none"><li>▪ Design any system or component that interfaces with the human body, to understand the likely bio-mechanical response to your intervention</li><li>▪ Assess the risk of injury within an environment</li><li>▪ Are involved with systems that serve to reduce injury severity and risk, for example in the automotive sector.</li><li>▪ Work in a sport or exercise environment.</li><li>▪ Are responsible for design of implants fitted within the human body.</li><li>▪ Are an orthopaedic surgeon who wants to better understand the biomechanics of the human body.</li></ul>
<b>Fees</b>	The participation fees for taking the course (one or both modules) is as follows: <b>Participants from abroad : US \$500</b> <b>Industry/ Research Organizations: Rs. 20,000 (Rupees Twenty Thousand Only)</b> <b>Academic Institutions: Rs. 10,000 (Rupees Ten Thousand Only)</b> The above fees include all instructional materials, computer use for tutorials and assignments. The participants will be provided with accommodation on payment basis.

## The Faculty



**Dr Peter Theobald** is a Senior Lecturer at Cardiff University. He has extensive teaching experience in the areas of fundamental and applied biomechanics.

His research interests are in understanding tissue biomechanics and in using this to prevent injury. He works with national and international associations and manufacturers to try and mitigate injury risks.



**Dr Jitendra Prasad** is an Assistant Professor at IIT Ropar. His research is focused on computational engineering applied to design, analysis, innovation and discovery. In particular, he is interested in areas spanning applied mechanics, engineering

design, optimization, bone biology and biomechanics.

## Course Co-ordinator

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