

**Project Title:** Medical Imaging, Mathematics and Bone Repair

**Summary of the project:**

This is an interdisciplinary project developing tools from mathematics, physics, spectroscopy and biomedical engineering to answer questions fundamental to orthopaedic research and bone repair.

The researcher will conduct a literature review including a review of the work done by the members of the Biomedical Engineering Research Group. The researcher will then review the physics and mathematics required for a thorough analysis of the use of group theory in molecular vibrations (and other symmetric structures at micro and macro levels). Applications of group theory to medical imaging (X-ray, CT and CAT tomography, magnetic resonance imaging (MRI), ultrasonic spatial resolution, photoacoustic imaging, infrared imaging thermography) and spectrographic analysis will also be reviewed.

The research will use techniques from Fourier analysis, group theory, fluid dynamics and spectroscopy.

The research will reinforce the experimental work conducted to date by providing mathematical analysis of experimental work using software applications to predict results and to qualify experimental results by creating a mathematical model of bone and repair processes.

**Profile of a suitable candidate:**

Suitable candidates will have an honours degree in mathematics, physics, engineering or a similar discipline. In addition to strong analytical skills, the successful applicant must work well as a member of the research team in collaboration with colleagues and external researchers.