

## PhD project

Title: Mathematical modelling of the heart and the circulation

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Cardiovascular disease is the leading cause of disability and death in the UK and worldwide. The British Heart Foundation (BHF) estimates it has a £19B annual economic impact. Structural impairment such as mitral regurgitation and myocardial infarction are heart diseases that, even when treated in time, can lead to diastolic heart failure with preserved ejection fraction, for which there is no recommended treatment options. Mathematical modelling of the heart can advance our understanding of heart function, and promises to support diagnosis and develop new treatments.

This PhD project will focus on developing mathematical descriptions of the whole heart and its interactions with the circulation, using a combination of one-dimensional and lumped parameter models. State-of-the-art structured-tree models will be used for systemic, pulmonary and coronary circulations. The objectives of the project are to identify how the heart functions under different pathological diseases and what treatment options may be effective. The student will develop expertise in fluid and solid mechanics modelling, as well as insights into mathematically-guided clinical translation. The project will be performed in the research environment of SofTMech ([www.softmech.org](http://www.softmech.org)) where extensive collaborations with clinicians and international research groups are forged. The student will have the opportunity to visit and work with our collaborators, including our clinical and industrial partners, and will be part of a large dynamic group of researchers at the University of Glasgow.

Upon completion you will be a mature researcher with broad interdisciplinary education. You will not only be prepared for an independent scientific career, but will be much sought after by both academia and industry for the rare combination of mathematical and numerical skills.