



QUEEN'S UNIVERSITY BELFAST

*Title of studentship	Development of 3D Printed drug-eluting mesh implants
Value / what is covered?	
Awarding body	
Number of studentships	
*Summary descriptive text / Example of research project	<p>Mesh is a broad term used to describe a number of different types of manufactured biological or synthetic implantable devices, and is used in a range of surgical procedures to support tissues. Nowadays, mesh implants are widely used in surgery, not only for hernia repair procedures but also for other diseases such as Stress Urinary Incontinence (SUI) and Pelvic Organ Prolapse (POP). The Food and Drug Administration (FDA) continues to rapidly approve “untested” mesh products, which benefits the medical device manufacturers but has the potential to cause harm to the patients. Synthetic mesh implants are frequently used in many surgical interventions, especially in hernia and vaginal repair. The current mesh implants have many issues which have received attention in the news nationally and internationally and have been the subject of a number of recent documentaries.</p> <p>The aim of this research proposal is the preparation of mesh implants by 3D printing using FDA approved biodegradable polymers (synthetic and natural). These systems will be prepared by 3D printing, and will be incorporated with antibacterial drug agent(s) for sustained and controlled drug release in order to prevent biofilm formation. The surgeons will also be able to demand bespoke production in the hospital; bespoke fabrication helps in reduction of injuries and therefore pain. Eventually, the quality of life of patients will be substantially improved.</p> <p>The specific objectives of this work are as follows:</p> <ol style="list-style-type: none"> i) Mesh Designs and Modeling. ii) Physicochemical properties / assessment of polymers. iii) Manufacturing & characterization of Mesh Implants. iv) <i>in vitro</i> release, cytotoxicity and antimicrobial studies. v) Controlling the release of antibiotics using natural polymers. vi) Sterilization and Packaging / Process Validation.
*Supervisor(s)	Dr Dimitrios A. Lamprou (https://pure.qub.ac.uk/portal/en/persons/dimitrios-lamprou(b349022a-2087-46d6-a727-f180d16be470).html)
*Eligibility / residence Status	
Country	Northern Ireland

*Start date and duration	1 October 2020
*Faculty	MHLS
*Research centre / School	Pharmacy
Subject area	3D Printing, Drug Delivery, Medical Devices, Pharmaceutical Technology.
Candidate requirements / Key skills required for the post	Applicants should have a 1 st or 2.1 honours degree (or equivalent) in a relevant subject. Relevant subjects include Pharmacy, Pharmaceutical Sciences, Biochemistry, Biological/Biomedical Sciences, Chemistry, Engineering, or a closely related discipline. Students who have a 2.2 honours degree and a Master's degree may also be considered, but the School reserves the right to shortlist for interview only those applicants who have demonstrated high academic attainment to date
*Deadline for applications	
*How to apply / contacts	Postgraduate Research applicants for Pharmacy who are interested in applying for a fully funded DFE studentship must have applied to Queen's, via the Direct Applications Portal, and submitted all required supporting documents by the closing date, which will be announced later in the Academic year. https://dap.qub.ac.uk/portal/user/u_login.php
Relevant links / more information	http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/PostgraduatePositions/ http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/
Keywords for search filters	3D Printing, Drug Delivery, Meshes, Scaffolds,
Training provided through the research project	The successful applicant will be integrated into QUB research groups of experienced researchers with access to world-leading facilities. The techniques that will be used during the project cover a wide-range and include: Atomic Force Microscope (AFM), Computed Tomography (CT), Contact Angle Goniometry (CAG), Differential Scanning Calorimetry (DSC), Fourier-Transform Infrared (FTIR) Spectroscopy, Rheology, Scanning Electron Microscopy (SEM), X-Ray Powder Diffraction (XRPD), X-ray Photoelectron Spectroscopy (XPS), 3D Printing equipment and software, <i>In Vitro</i> Release Studies, and modeling.
Expected impact activities	The PhD student would be encouraged to engage in a variety of impact activities, disseminate the research project findings through public talks, and participate in QUB showcase events. Examples of impact activities includes: Blogs or web articles, Magazine articles, Public lectures, School visits, oral & poster Presentations (at local, national and international conferences), and Publication of scientific papers in peer reviewed journals.