



# School of Pharmacy PhD Projects 2015/16

**Project Title****In Silico Protease-directed Drug Discovery Platform**

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**Supervisors**

Serine proteases control a great variety of physiological processes and represent potential drug targets for diseases ranging from hypertension to cancer, and inhibitors against these proteases also prove effective for combating parasitic and viral diseases. Despite some success in approval of protease drugs for the treatment of diabetes, Alzheimer's disease and infectious diseases, developing drugs for new protease targets has proven to be challenging. One of the main issues is the difficulty of achieving selectivity when targeting a protease active site.

**Description**

It is therefore highly desirable to explore alternative approaches to design small molecule inhibitors with high selectivity and specificity. It is expected that inhibitor selectivity can be greatly enhanced by exosites and allosteric sites. However, a single crystallographic snapshot is not always helpful in identifying or capturing the entire capacity of these sites. Incorporating protein flexibility in structure-based drug design could be beneficial in identifying highly selective inhibitors.

Computer simulations provide easy means to explore protein flexibility to guide structure-based drug design efforts. However, the standard analysis of computer simulations trajectories for drug discovery can be complicated and time consuming. It is therefore essential to develop novel fast methodologies in analyzing high-dimensional conformational space for drug discovery. Here, you will aim to merge computer simulations and pattern recognition methods to address the inhibitor selectivity issues across the serine protease family.

Upon completion of this project, you will have gained knowledge and experience in structural modeling and computational drug design. Accordingly, you will graduate with a comprehensive series of *in silico* skills and expertise that enables you to forge a career in either the academic or pharmaceutical sectors.

**Contact Details**

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**How to Apply**

Postgraduate applications should be made using Queen's Online:

<http://go.qub.ac.uk/pgapply>

Please note that there are two application processes: one for admission to the university and another for postgraduate awards.

**Further Information**

Additional information for prospective postgraduate students can be found on the School of Pharmacy website:

<http://www.qub.ac.uk/pha>

and the Queen's Postgraduate website:

<http://www.qub.ac.uk/home/ProspectiveStudents/PostgraduateStudents/>

**Start Date**

October 2015

**Keywords**

Molecular modelling, structural bioinformatics and chemoinformatics, drug design

