

PhD Studentship on Multi-objective Optimisation of Antibiotic Treatments

Antibiotic resistance has been identified as one of the biggest challenges we face in modern times, comparable to climate change (World Health Organisation). A major contributing factor to antibiotic resistance is the overuse of antibiotics. Efforts have been devoted to reduce unnecessary drug prescriptions, but little work is devoted to optimising dosage regimes when they are prescribed. Traditional antibiotic regimens apply a constant daily dose for a fixed period, i.e. take X mg per day for N days. Until recently, there has been little evidence to change this practice. This studentship aims to challenge this traditional view. The objective is to automatically derive new, improved antibiotic regimes, which maximise treatment success but minimise total drug use.

This will be achieved by combining our current mathematical model of bacterial infection¹, with state-of-the-art evolutionary algorithms for multi-objective optimisation. The design of effective treatments should consider several conflicting objectives. The goal is to increase the treatment success, while reducing: the amount of drug used, the duration of treatment, the toxicity experienced by the patient at any point, and the chances of developing resistant bacteria. The project also seeks to develop adaptive variants of multi-objective heuristic algorithms to better suit the problem at hand.

We are seeking applications from candidates who have either a computing science background with strong numerical skills, or an applied mathematics background with programming experience. Ideally the candidate will have a 2:1 undergraduate degree or higher. The student will be based at the Division of Computing Science and Mathematics, Faculty of Natural Sciences, University of Stirling, and will work under the supervision of Dr. Gabriela Ochoa and Dr. Andrew Hoyle.

The starting date is flexible, but it must be before the end of September 2018.

The studentship will provide funding for tuition fees (home/EU rate), a stipend of £14,553 per annum plus Research Training Support Grant of £750 pa, for 4 years.

¹ I. K. Paterson, A.S. Hoyle G. Ochoa, C. Baker-Austin and N.G.H. Taylor (2016) Optimising Antibiotic Usage to Treat Bacterial Infections. Nature Scientific Reports, 6, 37853; doi: 10.1038/srep37853, <http://rdcu.be/m2Zw>

The position is part the Dynamic Adaptive Automated Software Engineering (DAASE) project. (<http://daase.cs.ucl.ac.uk/about/>) a research initiative involving several UK universities (University College London, Queen Mary, Birmingham, Sheffield and Stirling).

To discuss these posts informally potential candidates are invited to contact Dr Gabriela Ochoa (goc@cs.stir.ac.uk).

How to Apply

The requirements for completing an application are:

1. Cover letter
2. CV
3. Copy of degree certificate or academic transcript from previous study.
4. 2 reference letters

Formal applications should be made via the online PG application.

Instructions can be found at:

<https://www.stir.ac.uk/postgraduate/how-to-apply/>

Select Research Degree in Computing Science and register as a new user on the system to proceed to the application form.

The closing date for the return of applications is 5pm on 30th September 2017.