2015 YCCSA SUMMER SCHOLARSHIP PROJECT SUBMISSION

This form is for prospective project supervisors to submit their projects to be included in the YCCSA Summer Scholarships Programme for 2015.

It is the purpose of the Summer School that any projects submitted are interdisciplinary in nature.

Date	5-12-14
Main Supervisor's Name	Jenny Southgate
Main Supervisor's Department	Biology
Co-supervisors' name(s) and Departments	*Each project needs at least one co-supervisor, as it is important that students have access to a supervisor or co-supervisor at all times during their project, and the duration of the projects is over the summer vacation.* Fiona Polack – Computer Science
Project Title	Scoping exercise on tissue homeostasis models: an exploratory initial feasibility study in developing computational models from biological models
Project Description	*Please aim for around 2 paragraphs. Remember that this must be pitched at prospective project scholarship students.* As the epithelium that lines the ureters and bladder, urothelium is a remarkable tissue. Not only is it recognised as the tissue that forms the tightest barrier in the body, but it has an exceptional capacity for regeneration, being regarded as one of the most rapidly repairing of all mammalian tissues. Unlike other epithelial tissues, such as skin and gut, which show a continuous turnover, urothelial cells are mitotically-quiescent and long-lived, but retain the capacity to switch into a proliferative state in response to tissue damage. This presumably reflects the critical importance of maintaining an intact urinary barrier and makes it a fascinating tissue to model, not least from the point of view of understanding what regulates the switch from differentiated (specialised barrier) to regenerative (proliferative) states. The Jack Birch Unit (JBU) has developed cell and tissue culture systems to investigate these mechanisms in normal human urothelial cells/tissues in oreder: 1) to inform the generation of healthy cells for applications in Tissue Engineering and Regenerative Medicine (TERM); and 2) as a prerequisite to studying the dysregulation of tissue homeostasis implicit in the development of urothelial (bladder) cancer. YCSSA and its related interdisciplinary research groups (notably YCIL) have a strong local track record in collaborative development of relatively-simple computational models of structures and dynamics to support laboratory research in a range of biological contexts (CoSMoS, YCIL). The first stage of such developments is to develop a collaboration. The second stage is to identify potential subjects for simulation, and hypotheses that can be explored computationally. The intern would be a catalyst for collaboration: by discussing the work of the two groups with researchers, reading papers, and observing the practical operations of the groups, the intern would be expected to identify subjects for simulation, potentially proposing appropriate forms of simulation, and also noting hypotheses that could benefit from simulation. CoSMoS: www.cs.york.ac.uk/nature/cosmos/

	YCIL: www.york.ac.uk/computational-immunology/ JBU: http://www.york.ac.uk/biology/jack-birch-unit/
Required skills	*A short synopsis of the necessary skills for the summer student. Please be careful to specify the skills rather than requiring students to have followed a particular degree programme.* Required: a scientific background, with some understanding of scientific method; a sense of enquiry; ability to absorb new concepts and terminology. Desirable: a background or significant interest in molecular biology, computational modelling, or practical software engineering; an appreciation of at least some of the challenges of developing simulations of complex systems to support laboratory experimentation.
Project dates	*To create a cohort of students who can work and learn together, ideally all projects would run for 9 weeks, starting on Monday, 13 July 2015 and finishing on Friday, 11 September 2015. If you have any special requirements regarding the dates of your project, please indicate these here.*
Other information	*Anything that doesn't easily fit above.*
References	*Please include at least one relevant journal reference.* 1: Baker SC, Shabir S, Southgate J. Biomimetic urothelial tissue models for the in vitro evaluation of barrier physiology and bladder drug efficacy. Mol Pharm. 2014;11(7):1964-70. PMID: 24697150. 2: Wezel F, Pearson J, Southgate J. Plasticity of in vitro-generated urothelial cells for functional tissue formation. Tissue Eng Part A. 2014;20(9-10):1358-68. PMID: 24350594. See also publications associated with CoSMoS and YCIL (urls above).

When complete, please email the form to sarah.christmas@york.ac.uk