2013 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 2013.

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

Date	*4th March 2013*
Main Supervisor's Name	*Dr Louis Rose, Computer Science*
Main Supervisor's Department	*Computer Science*
Co-supervisors' name(s) and Departments	*Dimitris Lagos, Centre for Immunology and Infection*
Project Title	*Flexible Graphical Modelling of Gene Networks*
Project Description	*Domain modelling is important for expressing and investigating our understanding of complex systems and phenomena. Domain modelling tools and techniques are increasingly prevalent in several software engineering communities (including model-driven engineering and language-oriented programming). Whilst contemporary domain modelling tools are rigid with respect to changing requirements, the domain modelling process is normally fluid as our understanding of complex systems and phenomena change over time.* *In an attempt to address this shortcoming Rose has started to develop a prototypical domain modelling tool ("Eugenia Live") that is more flexible with respect to change [1]. This project will involve adapting and extending Eugenia Live into a more complete tool, and applying Eugenia Live to iteratively and incremental develop a model of a gene networks. In particular, the model will be used to examine the effects of MicroRNA on the protein expression of target genes [2]. In collaboration with Lagos (the domain expert), the project student will incrementally develop domain models and domain modelling representations to describe and simulate MicroRNA with Eugenia Live.* *Work will involve familiarisation with the existing Eugenia Live prototype [3], design and implementing an action language for Eugenia Live to facilitate simple simulation ("animation") of a domain model, and applying Eugenia Live to develop several models of MicroRNA. The work will culminate in a technical report, and potentially lead to further collaboration with the project supervisors.*
Required skills	• *Some experience with metamodelling and with model transformation; ideally with EMF (http://www.eclipse.org/emf) and Epsilon (http://www.eclipse.org/epsilon)* • *Excellent programming skills, preferably in both an object-oriented and a functional programming language.*

	• *No prior knowledge of molecular biology is required.*
Project dates	*9 weeks between Monday 1st July and Friday 13th September.*
Other information	*Please note that the project supervisors might be away for parts of this period, in which case we will make arrangements to work remotely or for cover supervision* *.*
References	*[1] Louis M. Rose et al. "EuGENia Live: A Flexible Graphical Modelling Tool",* presented at the 1st Extreme Modeling Workshop, *Innsbruck, Austria, 2012. Available online at:* *http://www.di.univaq.it/diruscio/sites/XM2012/xm2012_submission_6.pdf* *[2] Shankar Mukherji et al. "MicroRNAs can generate thresholds in target gene expression",* Nature Genetics, *vol 43:9, 854-859, September 2011.* *[3] Louis M. Rose "Eugenia Live – Github Repository."* Internet: https://github.com/louismrose/eugenia-live, [4th March 2013].

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