**CALL FOR COMPUTING PROJECTS**

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| **Project No.** [[to be filled by the unit coordinator]] | | |
| **Title: Online Interactive Mathematical Visualisations** | | |
| **Supervisor Details** | | [[to be filled by the unit coordinator]] |
| **Description**   1. << Brief background to the project. Roughly about 2-3 sentences>>   This project aims to address the problem of the mathematical under-preparedness of students transitioning into university study, and the risk this poses to their engagement. It seeks to improve students’ engagement with their mathematical studies by allowing them to collaboratively explore visual representations of important concepts in the discipline.  A further aim is to pilot the use of these visualisation tools as examples of an approach to curriculum that combines dynamic online content with opportunities for socially constructed learning and formative assessment.   1. <<List of high-level functionality. Use bullet points.>>   Development of three web sites, each featuring   * Mathematical learning material – delivered as micro lessons – dedicated to a particular mathematical concept (e.g. the limit definition of the derivative, the delta-epsilon definition of the limit or the Central Limit Theorem). * A pair of (pre and post) quizzes, as well as feedback-rich prompts to allow students to check their understanding as they progress through the site. * An interactive mathematical visualization. * A database recording student’s identifying information, their interactive behavior with the website (particularly the visualization at its centre), performance on the pre and post quizzes and self-checking prompts. * An instructor’s dashboard that would allow real time monitoring of the information recorded in the database.  1. <<Potential users of the system. E.g. Elderly people between the age of 65-75, teenagers, etc. >>   WSU students studying mathematics units such as Analysis of Change, Mathematics 1A, or any of a range of first level statistics units. Depending on the project’s generalisability, potential users outside of the mathematics and statistics disciplines areas could be engaged, both at WSU and other universities.   1. << Devices that the system will be used on. E.g. PCs, Laptops, Tablets, Mobile Devices, etc..>>   PCs, laptops, tablets (probably not mobiles due to the need for students to interact with clearly presented, visually accessible and easily manipulated on-screen widgets and information.   1. << Whether the system should be used in any specific technology. E.g. Python, PHP, etc.. If the options are open for the students to suggest suitable technologies, please indicate that.>>   HTML5, CSS, JavaScript, possibly SQL, PHP, the NUMBAS assessment system (<https://www.numbas.org.uk>), and ProcessingJS (<http://processingjs.org>).   1. << please answer following questions.   If the end product is a web application, have you decided on hosting options?  No. I hope to discuss this further with the Professional Experience unit coordinator closer to the time of deployment (July/August 2018)  If the end product is mobile application, would it need be IOS or Android compatible and does the app need to go on app store/google play? >>  NA   1. << Please provide Any other information that will help the students get idea what your system would be. E.g. A similar web site they should look at or an app somewhat similar to what you want developed>>   The following paper (and references therein) gives further information about some of the educational design and development principles underlying the interactive mathematical visualisations I wish to use in my educational practice: <http://ascilite.org/conferences/dunedin2014/files/concisepapers/160-Pettigrew.pdf>  Examples of visualisations can be found here:   * <http://www.jim-pettigrew.com/mesh/autumn2014/RandomSampling> * <http://www.jim-pettigrew.com/SecantsLimitingToTangent6> * <http://www.jim-pettigrew.com/DeltaEpsilonDefinitionOfLimit3> * <http://www.jim-pettigrew.com/wordpress/f0f1f2>  1. << Please answer following questions:   Do you want students to have high level of programming skills?  Yes.  Do want students to have high-level of mathematics skills?  High level skills are not strictly necessary, but some facility with first level university mathematical concepts, particularly those related to differential calculus, would be very helpful.  Do you want students to have high-level of design skills?>>  I would like the websites to be both highly functional as online learning modules as well aesthetically inviting. My experience with online interactive learning environments is that well structured and robustly delivered content is ‘let down’ by messily or unattractively designed interfaces (e.g. involving rasterized or awkwardly typeset mathematical notation, haphazard layout or poorly coordinated colour schemes).   1. << If further documentation (forms, excel sheet that you record data manually, etc.) is available please provide those separately.>> | | |
| **Client Contact Details** | << Please provide the following details for at least one person who is the main contact from your side   * Name : Jim Pettigrew * Email : j.pettigrew@westernsydney.edu.au * Phone (preferably mobile): >> 0408 958 257 | |
| **Student Group** | | [[to be filled by the unit coordinator]] |