

## UQ Summer or Winter Research Project Description

Please use this template to create a description of each research project, eligibility requirements and expected deliverables. Project details can then be uploaded to each faculty, school, institute, and centre webpage prior to the launch of the program.

<b>Project title:</b>	<b>Do invasive plants change fire regimes in Australia?</b>
<b>Project duration:</b>	4-5 weeks between June-July
<b>Description:</b>	<p>Invasive plants have the potential to create a positive feedback between fire regimes and vegetation. Invasive plants can increase fuel loads, leading to more frequent fire, and facilitating further invasion. This has been well documented in the USA but the extent to which this occurs in Australia is currently unknown.</p> <p>The aim of this project is to use existing data on the distribution of invasive plant species and bushfire frequency on public land in Australia to determine the extent to which invasive species drive fire regime feedbacks. We will compile a list of invasive plants that have the potential to change fuel structure and fuel loads. We will ask: is there relationship between fire frequency and invasive species occurrence, or is plant invasion driven by other factors such as habitat destruction and land use change?</p>
<b>Expected outcomes and deliverables:</b>	This project will provide high-levels skills in spatial data analysis, species distribution modelling and bioinformatics. Scholars will also gain skills in ecological theory, critical thinking and data base generation. Students will produce a report and, depending on the quality, will have the opportunity to submit the paper for publication.
<b>Suitable for:</b>	<p>This project would suit highly self-motivated students with a strong academic record. It should appeal to students with a broad interest in environmental science, land management, ecology and biology. Students must be willing to challenge themselves with learning software such as QGIS, ArcMap and R.</p> <p>It is suited to third or fourth year students enrolled at UQ.</p>
<b>Primary Supervisor:</b>	Dr Annabel Smith annabel.smith@uq.edu.au
<b>Further info:</b>	Please contact me with your CV and a brief description of your research interests. The project is based at Gatton where you'll be expected to attend weekly meetings but, other than that, there is flexibility in work timing and location (e.g. you can work from St Lucia if you prefer).

<b>Project title:</b>	<b>Discovery and Characterisation of New Molecular Components Required for the Development and Control of Legume Nodules</b>
<b>Project duration:</b>	Minimum = 5 weeks
<b>Description:</b>	Nitrogen fertilizer use in agriculture is inefficient, costly and can be environmentally damaging. Legume crops represent an economically and environmentally sound alternative, as their relationship with nitrogen-fixing soil bacteria enables them to thrive in the absence of nitrogen fertilizer. The bacteria (commonly referred to as rhizobia) are housed in specialized root organs, called nodules. Identifying critical components of legume nodulation is now needed to optimise the process and improve agriculture sustainability and food security. This project aims to discover and functionally characterise novel molecular factors that act in the development and control of legume nodule numbers. Findings could enhance the current nodulation model and could help underpin future strategies to reduce the current over-reliance on nitrogen fertilizers in agriculture.
<b>Expected outcomes and deliverables:</b>	Students will gain skills in molecular signalling and plant physiology. Knowledge pertaining to various research techniques could include aspects of the following: qRT-PCR, gene cloning, transcriptomic analysis, bioinformatics, Agrobacterium-mediated transformation, gene over-expression, gene editing (CRISPR), promoter::reporter fusions, hormone quantification, new signal discovery, etc.
<b>Suitable for:</b>	A background/interest in genetics, molecular signalling and development, and plant physiology will be ideal for this project.
<b>Primary Supervisor:</b>	A/Prof Brett Ferguson
<b>Further info:</b>	Contact: <a href="mailto:b.ferguson1@uq.edu.au">b.ferguson1@uq.edu.au</a>  Multiple positions are potentially available.