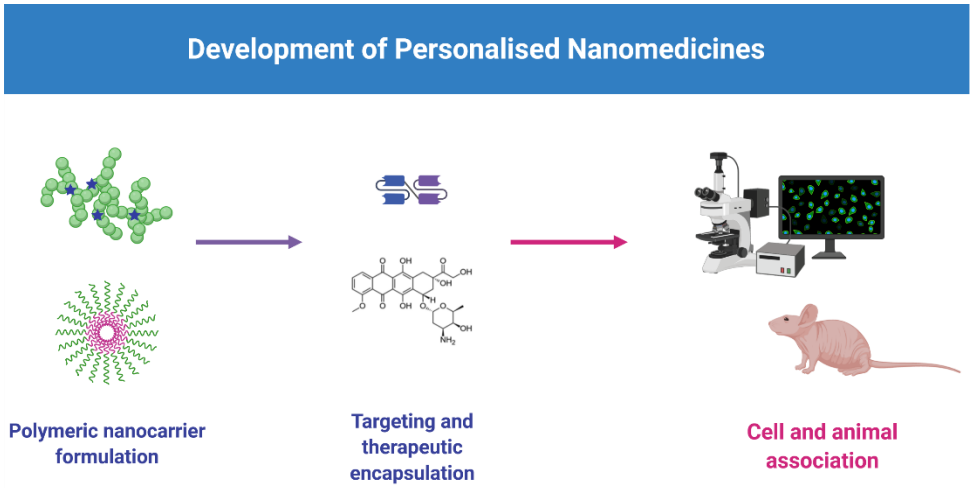
2022 Global Change Youth Research Project Description

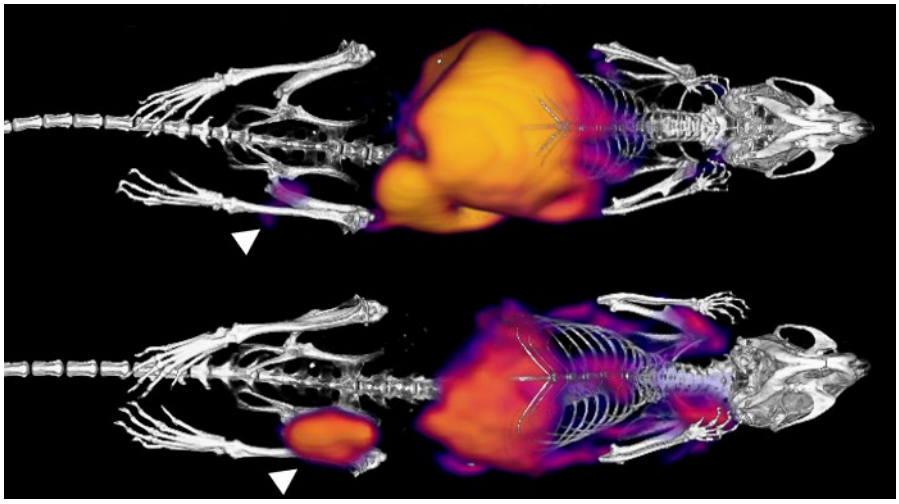
Please use this template to create a description of each research project, eligibility requirements and expected deliverables. Project details can then be uploaded to each faculty, school, institute, and centre webpage prior to the launch of the program.

Project title:	**Development of nanomaterials used for personalised nanomedicines**
Project duration, hours of engagement & delivery mode	Duration of the project 4 weeks during Winter Vacation and 1 day a week during semester 2, 2022. Hours of engagement must be between 20-36hrs per week COVID-19 considerations: Please outline if the project can be completed under a remote working arrangement or if on-site attendance is required. *For example, applicant will be required on-site for the project.*
Description:	 This research project involves the development of polymeric materials to be used as nanomedicines. Our aim is to modulate the chemistries involved in producing polymeric nanocarriers. These nanocarriers would then be capable of therapeutic loading and tumour cell receptor targeting, thereby producing personalised nanomedicines that are able to effectively target tumorous areas as well as carry therapeutics at sufficiently high concentrations to treat those areas.
Expected outcomes and deliverables:	Applicants will gain experience in the latest polymer synthetic techniques and strategies, polymer/protein hybrid material development, as well as experience in post-polymerisation chemistries and imaging experiments. There is the potential to generate publications from this research, and the student will be asked to present an oral presentation to the Thurecht group at the end of their project.

Suitable for:	This project is open to applications from 2nd year and later undergraduate students with a background in chemistry and biotechnology.
Primary Supervisor:	Dr Craig Bell
Further info:	For further information, potential candidates can contact Dr Bell (c.bell1@uq.edu.au) or Prof Thurecht (k.thurecht@uq.edu.au). Students who are interested must get in contact for discussions about the project and research dates prior to submitting an application.

2022 Global Change Youth 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.

Project title:	**Optimizing nanomedicine pre-targeting for precision cancer radiotherapy**
Project duration, hours of engagement & delivery mode	4 weeks full time (~36 hrs/week) during Winter Vacation and 1 day a week on average during semester 2, 2022. During semester hours can be flexible around study commitments. Applicant will be required to be on-site for the majority of the project with some opportunity for remote work during data analysis.
Description:	Nanomedicine, the application of nanotechnology and biotechnology to medicine, is a rapidly expanding field of research with great promise for making meaningful changes in the way we treat many diseases including cancer. Targeted nanomedicines capable of selectively delivering radiotherapies to tumours in a precision medicine approach are particularly appealing as these enhance tumour treatment while limiting unwanted off-target effects. We have recently validated a novel pre-targeting strategy, where we are able to decorate the surface of the tumours with ligands able to bind nanomaterials to further boost tumour accumulation of nanomedicines (Figure). This project will work to further develop this strategy towards a targeted radiotherapeutic approach by exploring targeting ligand interactions with a panel of therapeutic nanomedicine formats.  PET-CT image demonstrating enhanced tumour localization of pre-targeted nanomedicine (bottom panel) compared to conventional targeting approach (top). Arrowheads highlight tumours.
Expected outcomes and deliverables:	This project will allow students to gain skills in a variety of synthetic and analytical techniques, primarily in monitoring nanomedicine/protein association and cellular interactions using equipment based at the Australian Institute for Bioengineering and Nanotechnology (AIBN). During the course of the project they will also be provided exposure to a range of advanced imaging modalities (Optical imaging, SPECT, PET-CT and PET-MR imaging) at the Centre for Advanced Imaging (CAI). Being based within the

	Thurecht Group they will also be able to gain a broad experience and understanding of nanomedicine science, with the opportunity to be involved in multiple projects. The results from this work will potentially form this basis of publications.
Suitable for:	This project utilizes a multidisciplinary approach and will be suitable for all students with an interest in nanomedicines and biology/biophysical chemistry. However given the technical nature of the work involved 2-3 rd year biomedical/biology (or equivalent relevant experience) background will be better suited to achieve the most from the project
Primary Supervisor:	Dr Nicholas Fletcher and Professor Kristofer Thurecht
Further info:	For further details please email n.fletcher1@uq.edu.au or k.thurecht@uq.edu.au