



2027 Summer Research Project

Section	Description
Project title	Metal-Organic Frameworks for Biofilm Eradication and Antibacterial Therapy
Hours & delivery	Duration: 11 January to 19 February 2027. Hours: 30-35 hours/week Delivery mode: On-campus Location: School of Pharmacy and Pharmaceutical Sciences, Dutton Park.
About the project (150–250 words)	Bacterial biofilms are communities of microorganisms that attach to surfaces and produce a protective matrix, making them highly resistant to conventional antibiotic treatments. Biofilm-associated infections are a major challenge in healthcare and can contribute to prolonged illness, treatment failure, and the development of antimicrobial resistance. This project will investigate the potential of metal-organic frameworks (MOFs) as novel antibacterial materials for biofilm eradication. MOFs are porous materials that can be engineered to carry and release therapeutic agents, making them attractive candidates for biomedical applications. During this six-week research project, students will prepare and evaluate MOF-based formulations and examine their antibacterial and anti-biofilm properties using standard microbiological techniques. Students will gain exposure to biomaterials research while contributing to ongoing efforts to develop innovative strategies for combating difficult-to-treat bacterial infections. The project is designed to provide practical laboratory experience and an introduction to translational antimicrobial research in a supportive research environment.
What you'll do (100-150 words)	Students will be involved in a range of laboratory and research activities, including: • Preparation and handling of metal-organic framework formulations. • Characterisation of formulated materials using basic laboratory techniques. • Performing antibacterial and biofilm inhibition assays. • Recording experimental observations and maintaining laboratory notebooks. • Analysing and interpreting experimental data. • Participating in discussions with the research team and presenting project findings. The project will provide hands-on experience with biomaterial-based antibacterial research and introduce students to methods used to assess biofilm eradication strategies
What you'll learn (100–150 words)	Students will develop practical skills in biomaterials and antimicrobial research, including the preparation and evaluation of metal-organic frameworks for biomedical applications. They will learn microbiological techniques used to assess bacterial growth and biofilm formation, as well as methods for analysing and interpreting experimental data. The project will also strengthen transferable research skills such as scientific communication, critical thinking, experimental design, data management, and



	teamwork. Students will gain an understanding of current challenges in antimicrobial resistance and the role advanced biomaterials can play in developing next-generation antibacterial therapies.
Project outcomes (75–125 words)	• Preparation and evaluation of metal-organic framework (MOF) formulations. • Assessment of antibacterial activity against bacterial cultures. • Investigation of MOF-mediated biofilm inhibition or eradication. • Collection and analysis of experimental data. • Development of practical skills in biomaterials and microbiology research. • Preparation of a short report and/or presentation summarising project findings. • Generation of preliminary data to support ongoing research into new antibacterial strategies.
Who should apply? (75–125 words)	Students with an interest in antimicrobial resistance, biofilm-associated infections, biomaterials, and drug delivery will be particularly suited to this project. Curiosity, attention to detail, and a willingness to learn laboratory techniques are highly valued. Previous research experience is not required. We particularly encourage applications from students who are interested in continuing their research experience beyond the Summer Research Program through two-semester research placement project as part of their degree.
Team & supervision (75–125 words)	1. Dr. Anjana Jayasree, Postdoctoral Researcher, School of Pharmacy and Pharmaceutical Sciences, UQ 2. Professor Amirali Popat, School of Pharmacy and Pharmaceutical Sciences, UQ
Additional opportunities (optional)	Students may have the opportunity to present their findings to the research team and engage with postgraduate and early-career researchers working in related areas. Participation in the project may provide pathways to future research projects, or ongoing involvement in biomaterials and drug delivery research programs.
Additional requirements (if applicable)	Students must be willing to undertake laboratory-based research and comply with all laboratory safety procedures and training requirements. Laboratory induction and supervision will be provided before commencement of experimental work.
Contact	Yes, students may contact the supervisor before applying. Direct enquiries to: a.jayasree@uq.edu.au