POSITION DESCRIPTION

THE UNIVERSITY OF MELBOURNE

School of Computing and Information Systems

Faculty of Engineering and Information Technology

Postdoctoral Research Fellow – Digital

The ARC Digital Bioprocess Development Hub

(3 x positions available)

Position No	0057790, 0057791, 0057792
Classification	Level A
Salary	$77,171 - $104,717 p.a. (PhD entry Level A.6 - $97,558 pa)
Superannuation	Employer contribution of 17%
WORKING HOURS	Full-time / part-time opportunities
BASIS OF EMPLOYMENT	Fixed term positions available for up to three years, with possible extension. Applications for part-time or other flexible working arrangements will be welcomed and will be fully considered subject to meeting the inherent requirements of the position
Other Benefits	https://about.unimelb.edu.au/careers/staff-benefits
How to Apply	Online applications are preferred. Go to http://about.unimelb.edu.au/careers, select the relevant option ('Current Opportunities' or 'Jobs available to current staff'), then find the position by title or number.
Contact for enquiries only	Department of Chemical Engineering Professor Sally Gras Email sgras@unimelb.edu.au Dr Artem Polyvyanyy Email artem.polyvyanyy@unimelb.edu.au Dr Pauline Lin Email pauline.lin@unimelb.edu.au Dr Ling Luo Email ling.luo@unimelb.edu.au *Please do not send your application to these contacts.*

For information about working for the University of Melbourne, visit our website:
about.unimelb.edu.au/careers

Acknowledgement of Country

The University of Melbourne acknowledges the Traditional Owners of country throughout Australia. The University recognises the unique place held by Aboriginal and Torres Strait Islander peoples as the original custodians of country and their continued connection to the land, waterways, songlines and culture. The University respects all Aboriginal and Torres Strait Islander People and warmly embrace those students, staff, Elders and collaborators who identify as First Nations.

Commitment to Diversity and Inclusion

The Faculty of Engineering and Information Technology (FEIT) is committed to creating a diverse and inclusive environment that welcomes and values all people. We recognise that diversity is essential in contributing to the success of FEIT. Women, Aboriginal and Torres Strait Islanders, the LGBTIQ+ community, people living with disability and those from a culturally and linguistically diverse background, are strongly encouraged to apply. Those seeking support in submitting an application are welcome to contact the Faculty HR team at feit-hr@unimelb.edu.au

Position Summary

The ARC Hub for Digital Bioprocess Development is part of the Industrial Transformation Research Hub grant scheme (ITRH Scheme) and aims to assist the Biopharma industry by increasing digital innovation, productivity and competitiveness. The Hub will engage an interdisciplinary team of engineers, scientists and computing specialists to develop digitally integrated advanced manufacturing processes and a platform for industry adoption. The program will address key bioprocessing research challenges and develop new process and digital models that can predict and optimise manufacturing processes, resulting in greater yields, faster and more flexible processes and enhanced product stability. The Hub will transform biopharmaceutical manufacturing and unlock growth opportunities to forge an internationally competitive Australian Biopharma sector.

The ARC Hub for Digital Bioprocess Development is a collaborative program of significant scope and scale. It will draw together expertise from The University of Melbourne, University of Technology Sydney and RMIT University, together with CSL Innovation, Patheon and Pall and three leading international universities, forming a substantial team. The Hub will have the critical mass of researchers and expertise needed to address key biopharma research challenges, contributing to industry outcomes and positioning Australian Biopharma manufacturing to benefit from Industry 4.0.

The program will include multiple positions as follows:

Research Fellow (RF4 Digital) – Digital Twin Approaches for Automated Monitoring, Controlling and Improvement of Bioprocesses
Chief Investigator Dr Artem Polyvyanyy and Professor Marcello La Rosa
The position will design, implement, and evaluate digital twin technology for monitoring, controlling, and improving real-world bioprocesses building on and adapting existing tools, which traditionally focus on optimizing process throughout time and cost. They will build an end-to-end digital representation of bio-engineering processes. The resulting end-to-end model will be calibrated using automatically discovered simulation parameters to reflect the real-world (as-is) bioprocess as accurately as possible. This as-is model will provide a starting point for assessing different what-if scenarios, each capturing one or more tactical interventions aimed at improving the corresponding real-world bioprocess, including configurations that go beyond the limitations of current laboratory equipment. A goal related to the envisioned technology is to forecast the performance of the future bioprocesses, such as expected yield and quality, and, thus, identify potential issues at an early stage when interventions are still effective. A goal related to the envisioned technology is to extend existing tools beyond the analysis of process throughput time and cost, and to consider other process dimensions, such as yield and quality.

Research Fellow (RF5 Digital) – Modelling and Optimisation for Validation
Chief Investigator Dr Pauline Lin
This position will investigate ML/AI enhanced capabilities in both process development and process validation. In particular, the project aims to identify critical process parameters and their key interactions, and to predict the quality of output with quantified uncertainty. These process parameters can then be closely monitored or controlled to reduce the failure rate. The prediction risks can inform and be used to enhance production strategies. To achieve these goals, historical process development data and production/manufacturing data will be assessed, including data from various batches, both small and large. A key challenge is to develop robust ML/AI methods for data that are typically sparse, heterogeneous, and noisy, and have quantified uncertainty. The project is an iterative process. The potential for new data generated by new Process Analytical Techniques (PAT), may also be assessed.

Research Fellow (RF6 Digital) – Modelling and Optimisation of Unit Operations
Chief Investigator Dr Ling Luo
This position will focus on unit operations within the downstream processing stages of bioprocessing, constructing machine learning models to enhance real-time monitoring and process control. ML and AI techniques will be designed to analyse large-scale operational data from the process control platform and optimise the experimental design of key unit operations. Real-time monitoring and control will be improved, and predictive methods developed to assist process optimisation. This role will develop a software interface, design new machine learning models using existing operational data, work closely with the experimental team to incorporate experimental data, domain knowledge and mechanistic models to machine learning models, and verify and further train models to enable translation.

1. Selection Criteria

1.1 ESSENTIAL

- A postgraduate research degree at PhD level (or near completion) or Higher Education qualification in a field relevant to the position described above. Specifically:
    - Research Fellow (RF4) - Digital Twin Approaches for Automated Monitoring, Controlling and Improvement of Bioprocesses – process mining, data science, machine learning or computer science.
    - Research Fellow (RF5) - Modelling and Optimisation for Validation – statistical machine learning or computer science.
    - Research Fellow (RF6) - Modelling and Optimisation of Unit Operations – machine learning or computer science.
- A record of high-quality research as evidenced by publications in leading journals and at conferences commensurate with opportunity.
- Ability to perform independent research with a commitment to interdisciplinary research.
- Ability to work with industry partners to achieve applied outcomes and to work with others across the sector to achieve industry impact and sector transformation.
- Demonstrated ability to lead and contribute in a cross-functional, multi-disciplinary team environment, including teams of industry researchers with different skills.
- Detail oriented, self-motivated and committed to the profession.
- Experience in working with minimal supervision and ability to prioritise tasks to achieve project objectives within timelines, demonstrating flexibility to flourish in a fast-paced environment.
- Demonstrated capacity to communicate research concepts to technical and non-technical audiences.
- Excellent written and verbal communication skills, demonstrated by presentation of research results at conferences, internal forums and manuscript submissions.
- Excellent interpersonal skills, including an ability to interact with internal and external stakeholders (academic, administrative and support staff) in a courteous and effective manner.
- Demonstrated ability to develop, administer and see through to completion appropriately designed research projects with limited supervision.

1.2 DESIRABLE

For all positions i.e., RF4-6, desirable skills include:

- The ability to prepare data including data collation, assessment, cleaning and storage.
- Experience in supervision of students or other researchers.
- A record of applying for and attracting research grant funding.
- Experience interacting with industry partners to achieve impact within industry.
- Demonstrated capacity to build collaborations with a range of other researchers.
- Experience in the relevant digital techniques. This includes strong data processing skills, the ability to work with Domino Data Labs, SQL, Python and R programming skills.
- The ability to assess data quality and the ability to flexibly work with existing data processing pipelines and systems currently used within industry.
- Experience in experimental design and problem formulation.
- Experience in statistical and mathematical modelling.
- Experience of both fundamental and applied Machine Learning with a track record of working in collaboration with commercial and international partners.
- Experience of implementing Machine Learning methods and developing open source software libraries (for example in Python or R), associated documentation, software testing and deployment.

- For RF Digital 4, specific describable skills include:
    - Process mining and visual data analytics, continuous and discrete simulation methods, descriptive, predictive and prescriptive analytics, digital twin modelling, and statistical analysis methods.
- For RF Digital 5, specific describable skills include:
    - Machine learning, statistical inference, quantification of uncertainty and robustness, optimisation, simulation methods, and exploratory data analysis.
- For RF Digital 6, specific desirable skills include:
    - Advanced computational methods, statistical machine learning, transfer learning methods, optimisation, and real-time data streams analysis.

1.3 OTHER JOB-RELATED INFORMATION

- Flexibility in job location (CSL & University of Melbourne (RF4), Patheon & University of Melbourne (RF5) and Pall & University of Melbourne (RF6) and the ability to work across multiple worksites will be required.
- This position requires the incumbent to hold a current and valid Working with Children Check.
- Occasional work out of ordinary hours, travel, etc.

2. Key Responsibilities

- Independently plan and carry out research on the proposed research project and work towards completion of the aims of the project.
- Develop effective timelines and milestones based on goals of the research program.
- Liaise effectively with collaborators and a variety of internal and external stakeholders to foster collaborative partnerships and work with teams to achieve joint outputs and outcomes. This will include working with partnership organisations to translate research findings and to provide recommendations.
- Participate in Hub meetings and workshops and contributions to the broader Hub program, including activities to benefit the sector (called theme 3 activities) and reporting as required by the Hub program. This includes outreach and translation activities, mentoring programs, supervision of masters students and industry placement programs and participation in or contribution towards microcertification programs and best-practice case studies.
- Assist other researchers in carrying out research activities, as described in the Digital Bioprocess Development Hub program in order to work as a team and further both the DBD Hub and department's research output.
- Prepare and publish research outcomes in conferences and journals and other scholarly outputs to a high academic standard in accordance with the research expectations of the University of Melbourne.
- Actively participate in research seminars and conferences to disseminate research findings as opportunities arise.
- Conduct presentations to a broad audience, including key industry and/or clinical partners, and in public forums.
- Provide strong mentorship through the co-supervision of PhD students.
- Attend and actively participate in departmental seminars, meetings and committees as required by your supervisor.
- Undertake administrative functions and obligations primarily connected with the staff member's area of research.

3. Equal Opportunity, Diversity and Inclusion

The University is an equal opportunity employer and is committed to providing a workplace free from all forms of unlawful discrimination, harassment, bullying, vilification and victimisation. The University makes decisions on employment, promotion, and reward on the basis of merit.

The University is committed to all aspects of equal opportunity, diversity and inclusion in the workplace and to providing all staff, students, contractors, honorary appointees, volunteers and visitors with a safe, respectful and rewarding environment free from all forms of unlawful discrimination, harassment, vilification and victimisation. This commitment is set out in the Advancing Melbourne strategy that addresses diversity and inclusion, equal employment opportunity, discrimination, sexual harassment, bullying and appropriate workplace behaviour. All staff are required to comply with all University policies.

The University values diversity because we recognise that the differences in our people's age, race, ethnicity, culture, gender, nationality, sexual orientation, physical ability and background bring richness to our work environment. Consequently, the People Strategy sets out the strategic aim to drive diversity and inclusion across the University to create an environment

where the compounding benefits of a diverse workforce are recognised as vital in our continuous desire to strive for excellence and reach the targets of Advancing Melbourne.

All FEIT employees are required to behave in a manner that creates; supports and encourages an inclusive and safe work environment for all.

https://eng.unimelb.edu.au/diversity

4. Occupational Health and Safety (OHS)

All staff are required to take reasonable care for their own health and safety and that of other personnel who may be affected by their conduct.

OHS responsibilities applicable to positions are published at:

https://safety.unimelb.edu.au/people/community/responsibilities-of-personnel

These include general staff responsibilities and those additional responsibilities that apply for Managers and Supervisors and other Personnel.

5. Other Information

5.1 SCHOOL OF COMPUTING AND INFORMATION SYSTEMS

The School of Computing & Information Systems (CIS) undertakes research and teaching across a range of information technology disciplines including Software Engineering, Information Systems, and Computer Science. CIS is the most highly ranked School of Computing and Information Systems in Australia according to all major rankings (THE, QS, ARWU). t offers a comprehensive range of IT and IS courses at all levels, including offerings in science, engineering, and business, and is at the forefront of computing research in Australia and internationally with close links to major computing research initiatives, including Melbourne Bioinformatics, CSL, The Cremorne Digital Hub and CSIRO's DATA61.

The School's aim is to attract and retain outstanding staff available in order to maintain a leading research and teaching. We have an existing highly successful research team in the area of the appointment, a large number of PhD students, and a substantial cohort of graduate students in our coursework Masters programs.

To find out more about CIS, visit: http://www.cis.unimelb.edu.au/

5.2 FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

The Faculty of Engineering and Information Technology (FEIT) has been the leading Australian provider of engineering and IT education and research for over 150 years. We are a multidisciplinary School organised into three key areas; Computing and Information Systems (CIS), Chemical and Biomedical Engineering (CBE) and Electrical, Mechanical and Infrastructure Engineering (EMI). FEIT continues to attract top staff and students with a global reputation and has a commitment to knowledge for the betterment of society.

FEIT has never been better positioned as a global leader, anchored in the dynamic Asia Pacific region, creating and curating knowledge to address some of the world's biggest challenges. Through our students and our relationships with communities, we can not only respond to society's needs but anticipate and create engineering and IT solutions for the future.

https://eng.unimelb.edu.au/

https://eng.unimelb.edu.au/about/join-feit

Our ten-year strategy, FEIT 2025, is our School's commitment to bring to life the University-wide strategy Advancing Melbourne and reinforce the University of Melbourne's position as one of the best in the world.

To achieve our ambitions, we will continue to build new infrastructure to enable our teaching, research and engagement; we continue to recruit outstanding people from around the world; and we continue to attract high-quality students from across the globe who are at the heart of our enterprise.

https://eng.unimelb.edu.au/about/mse-2025

5.3 THE UNIVERSITY OF MELBOURNE

Established in 1853, the University of Melbourne is a leading international university with a tradition of excellence in teaching and research. The main campus in Parkville is recognised as the hub of Australia's premier knowledge precinct comprising eight hospitals, many leading research institutes and a wide-range of knowledge-based industries. With outstanding performance in international rankings, the University is at the forefront of higher education in the Asia-Pacific region and the world.

The University employs people of outstanding calibre and offers a unique environment where staff are valued and rewarded.

Further information about working at The University of Melbourne is available at **http://about.unimelb.edu.au/careers**

5.4 CSL

CSL Limited is a company that fosters a work culture emphasising Superior Performance, Innovation, Integrity, Collaboration and Patient Focus with a commitment to support, train and grow its people. As a genuine leader in the biopharmaceutical industry, CSL is a multinational ASX Listed Company that is actively growing its Australian based manufacturing operations to support global growth. CSL develops, manufactures and markets products to treat and prevent serious human medical conditions and is globally one of the largest manufacturers of plasma-derived therapies.

Further information about CSL is available at **https://www.csl.com/**

5.5 PATHEON

Patheon, by Thermo Fisher Scientific Inc., is the world leader in serving science, with annual revenue of approximately $40 billion. Our Mission is to enable our customers to make the world healthier, cleaner and safer. Whether our customers are accelerating life sciences research, solving complex analytical challenges, increasing productivity in their laboratories, improving patient health through diagnostics or the development and manufacture of life-changing therapies, we are here to support them. Our global team delivers an unrivaled combination of innovative technologies, purchasing convenience and pharmaceutical services through our industry-leading brands, including Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific, Unity Lab Services, Patheon and PPD.

5.6 PALL

As a global leader in high-tech filtration, separation, and purification, Pall Corporation thrives on helping our customers protect people. Our products serve a wide range of markets, along the spectrum of Life Sciences to Industrial. Pall is proud to work alongside a community of nine fellow Danaher Life Sciences companies. Together, we're pioneering the future of science and medicine, developing products that enable researchers in the fight to save lives.