THE UNIVERSITY OF MELBOURNE

POSITION DESCRIPTION

Centre for Epidemiology and Biostatistics
Melbourne School of Population and Global Health
Faculty of Medicine, Dentistry and Health Sciences

Research Fellow in Simulation Modelling and Software Engineering

POSITION NO	0051396
CLASSIFICATION	Research Fellow Grade 1, Level A
WORK FOCUS CATEGORY	Academic Specialist
SALARY	$73,669 - $99,964 p.a
SUPERANNUATION	Employer contribution of 9.5%
WORKING HOURS	Full-time
BASIS OF EMPLOYMENT	Fixed-term position available for 12 months
OTHER BENEFITS	http://about.unimelb.edu.au/careers/working/benefits
HOW TO APPLY	Online applications are preferred. Go to http://about.unimelb.edu.au/careers, under 'Job Search and Job Alerts', select the relevant option ('Current Staff' or 'Prospective Staff'), then find the position by title or number.
CONTACT FOR ENQUIRIES ONLY	Prof Antony Blakely Tel: +61 466 850095 Email: ablakely@unimelb.edu.au Please do not send your application to this contact

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Position Summary

The research fellow will contribute to the design and implementation of simulation models for evaluating the health gains and cost impacts of public health interventions. Interventions like tobacco tax ad dietary interventions – through to COVID-19 policy responses. Models will be implemented using the open source Python-based VIVARIUM framework initially developed at the University of Washington, USA, and repurposed by us for macrosimulation of sex by age cohorts using lifetable models.[1] (https://github.com/ihmeuw/vivarium).

The research fellow will be working in a growing and vibrant team of epidemiologists, economists and econometricians, data and computer scientists. He or she will need experience and skills in Python programming language and software engineering. Skills and experience in epidemiology and/or demography, mathematics and biostatistics are desirable – but not essential if the candidate is willing to learn.

About the project

We know much about many exposure-outcome associations in health, but we seldom systematically answer questions like: "when applied to the population, how much health gain will intervention X achieve compared to intervention Y? Over what time period? At what cost and what cost-effectiveness?"

We have collaborated with The Institute of Health Metrics and Evaluation (IHME; home of the Global Burden of Disease) University of Washington, USA to develop novel computational models to address this type of question. IHME has developed VIVARIUM, a general Python-based intervention simulation framework; we have repurposed this for proportional multistate lifetable modelling (a hybrid of lifetables and Markov models).

We are focusing on simulating interventions for:

- tobacco and e-cigarette interventions in Australia, New Zealand, Pacific Island Countries and Territories, and Asian countries
- COVID-19 policy responses, working with University of Melbourne colleagues who have developed an agent-based COVID-19 Policy Response model. (Our team provided simulation modelling to the Victorian Department of Human and Health Services (Vic DHHS) to underpin the RoadMap out of Victoria's second wave.)
- Health housing interventions, including temperature and mold.

We aim to further expand into diet, body weight and physical activity interventions.

About the role

The role will involve design, implementation and improvement of core and add-on Python modules for:

- Core lifetable simulation modelling.
- Python code to disaggregate populations (already developed) to routinely quantify the impacts of population interventions by socioeconomic position – and hence the impact on inequalities
- Converting existing simulation models from Excel to Python (e.g. e-cigarette)
- Epidemiological coherence of inputs – a Python version of the DISMOD II calculator.[2]

The role also involves the sourcing and preparation of inputs to the PMSLT, including data from the Global Burden of Disease, cost data, and many other inputs (working with other team members). This part of the role requires general data management skills, and likely some statistical analysis skills (e.g. regression modelling).

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[1] Blakely T, Moss R, Collins J, Mizdrak A, Singh A, Carvalho N, Wilson N, Geard N, Flaxman A. Proportional multistate lifetable modelling of preventive interventions: concepts, code and worked examples. Int J Epidemiol 2020. 10.1093/ije/dyaa132

Barendregt JJ, Van Oortmarssen GJ, Van Hout BA, Van Den Bosch JM, Bonneux L. Coping with multiple morbidity in a life table. Math Popul Stud 1998;7(1):29-49, 109.

The successful candidate will report to Professor Tony Blakely (epidemiologist; Director of Population Interventions Unit, Centre for Epidemiology and Biostatistics (CEB), University of Melbourne (UoM)).

The successful candidate will have up to 20% of their time for self-directed study and continuing professional development, pursuing their own small projects and collaborations, contributing to teaching and service within the University (a requirement of all academic staff at MSPGH), and community service beyond the University. The remaining 80% plus of their time will be spent undertaking work as agreed with the Head of Population Interventions.

1. Key Responsibilities

1.1 RESEARCH AND RESEARCH TRAINING

- Design and implementation of new Python modules, including refactoring and optimizing code to improve run-times.
- Calibration and validation of developed models, in collaboration with domain experts.
- Ensuring compatibility of developed code with existing IHME systems, in collaboration with IHME-based software engineers.
- Maintenance of code and technical documentation.
- Contribution of technical expertise to writing of methods, and preparation of results, for journal publications and other research outputs as co-author.
- Contribution to funding applications.
- Training of researchers (postgraduate students and research staff) in Population Interventions to use Python simulation training, including user-friendly documentation explaining the code and how to use and adapt the code.
- Running of workshops on using Python simulation code, within and beyond MSPGH.
- Developing of user-friendly interfaces for non-experts to run simple simulations (e.g. web-based calculators).

1.2 LEADERSHIP AND SERVICE

- Participate at School and/or Faculty meetings and with guidance, contribute to planning activities or committee work to support capacity-building in the School/discipline.
- Participate in community and professional activities related to the relevant disciplinary area.
- Effective demonstration and promotion of University values including diversity and inclusion and high standards of ethics and integrity
- Occupational Health and Safety (OH&S) and Environmental Health and Safety (EH&S) responsibilities as outlined in section 4.

2. Selection Criteria

2.1 ESSENTIAL

- Either or both:
  - Undergraduate or graduate degree in computer science, mathematics, engineering, statistics, or related field.
  - Demonstrated skills and/or experience satisfactory to complete the position role and tasks.
- Demonstrated skills and experience with Python.
- Demonstrated skills and experience in software engineering and object-oriented software development.
- Strong interpersonal and communication skills, with an ability to build and maintain relationships with key stakeholders (internal and external) and work collaboratively.
- Ability to manage time and work independently to meet deadlines.
- Ethical scholar who values diversity and works effectively with individual differences.
- Demonstrated ability to write easy-to-understand documentation and user-guides of computing code.

2.2 DESIRABLE

- Skills and experience in statistical analyses (e.g. regression modelling) is highly desirable.
- Experience with computer simulation modelling.
- Experience with scientific computing or data analysis.
- Experience using version control systems, preferably Git.
- Experience designing and optimizing simulation (or similar) models for run-time efficiency and output functionality.
- Skills and experience in epidemiology, demography, public health, and tobacco control.
- Publication track record.

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 University's People Strategy 2015-2020 and policies that address 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 Growing Esteem.

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:

http://safety.unimelb.edu.au/topics/responsibilities/

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

5. Other Information

5.1 CENTRE FOR EPIDEMIOLOGY AND BIOSTATISTICS

The Centre for Epidemiology and Biostatistics (CEB), Melbourne School of Population and Global Health. https://mspgh.unimelb.edu.au/centres-institutes/centre-for-epidemiology-and-biostatistics.

The Centre for Epidemiology and Biostatistics is one of 4 Centres and an Institute that comprise the Melbourne School of Population and Global Health.

Our Centre's units include:

i) Allergy and Lung Health

ii) Australian Twin Registry

iii) Biostatistics

iv) Breast Cancer

v) Colorectal Cancer

vi) High Dimensional Analytics

vii) Indigenous Health and Epidemiology

viii) Population Interventions

ix) Modelling and Simulation

x) Sexual Health

xi) Neuroepidemiology

xii) Teaching and Learning

xiii) Causal Inference in Epidemiology

The Centre for Epidemiology and Biostatistics is at the forefront of a preventative health revolution. Big data, changing infectious diseases patterns and multi-disciplinary collaborations are transforming the ways public health disciplines are researched and taught. Our Centre aims to be a leader in this evolving environment.

Epidemiology and biostatistics provide solutions to global public health challenges that demand multi-disciplinary responses. Our Centre's approach to research, teaching, and research training reflects this reality. We combine deep expertise with a broad range and reach – through our nine units, and our active links to other renowned institutions. This ensures our researchers and graduates are ready to contribute to preventing and alleviating the world's common, debilitating and burdensome health issues.

5.2 MELBOURNE SCHOOL OF POPULATION AND GLOBAL HEALTH

The Melbourne School of Population Health was established in the Faculty of Medicine, Dentistry and Health Sciences in 2001. It became the Melbourne School of Population and Global Health in 2013. Approximately 300 academic and professional staff work across the School and its partner agencies. The School's total budget is in excess of $50m. There are approximately 120 higher degree research students (predominantly PhD).

The School aims to strengthen the understanding, capacity and services of society to meet population health needs and to improve the quality and equity of health care. It employs a population health framework that incorporates public health and preventative medicine, health promotion, clinical medicine and allied healthcare disciplines and an equity and evidence-based approach to health care and health policy. Its research programs aim to elucidate the genetic, environmental, social and economic determinants of health, and to focus on the evaluation of the health systems, programs and services that seek to prevent disease and injury and to promote health. The School provides research and professional development opportunities for medical undergraduates, postgraduates in a wide range of disciplines, clinicians in all sectors of the health care industry, scientists, professionals and leaders in population health.

The School is currently composed of four Centres, one Institute and one partnership unit:

CENTRES

- Centre for Health Equity (CHE)
- Centre for Health Policy (CHP)
- Centre for Epidemiology and Biostatistics (CEB)
- Centre for Mental Health (CMH)

INSTITUTES

- The Nossal Institute for Global Health (NIGH)

PARTNERSHIP UNITS

- Global Burden of Disease Group

Further information about the School is available at http://www.mspgh.unimelb.edu.au/

5.3 FACULTY OF MEDICINE, DENTISTRY AND HEALTH SCIENCES

www.mdhs.unimelb.edu.au

The Faculty of Medicine, Dentistry & Health Sciences has an enviable research record and is the University of Melbourne's largest faculty in terms of management of financial resources, employment of academic and professional staff, teaching of undergraduate and postgraduate (including research higher degree) students and the conduct of basic and applied research. The Faculty's annual revenue is $628m with approximately 55% of this income related to research activities.

The Faculty has a student teaching load in excess of 8,500 equivalent full-time students including more than 1,300 research higher degree students. The Faculty has approximately 2,195 staff comprising 642 professional staff and 1,553 research and teaching staff.

The Faculty has appointed Australia's first Associate Dean (Indigenous Development) to lead the development and implementation of the Faculty's Reconciliation Action Plan (RAP), which will be aligned with the broader University – wide plan. To enable the Faculty to improve its Indigenous expertise knowledge base, the Faculty's RAP will address Indigenous employment, Indigenous student recruitment and retention, Indigenous cultural recognition and building partnerships with the Indigenous community as key areas of development.

5.4 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.

5.5 GROWING ESTEEM, THE MELBOURNE CURRICULUM AND RESEARCH AT MELBOURNE: ENSURING EXCELLENCE AND IMPACT TO 2025

Growing Esteem describes Melbourne's strategy to achieve its aspiration to be a public-spirited and internationally-engaged institution, highly regarded for making distinctive contributions to society in research and research training, learning and teaching, and engagement. http://about.unimelb.edu.au/strategy-and-leadership

The University is at the forefront of Australia's changing higher education system and offers a distinctive model of education known collectively as the Melbourne Curriculum. The new educational model, designed for an outstanding experience for all students, is based on six broad undergraduate programs followed by a graduate professional degree, research higher degree or entry directly into employment. The emphasis on academic breadth as well as disciplinary depth in the new degrees ensures that graduates will have the capacity to succeed in a world where knowledge boundaries are shifting and reforming to create new frontiers and challenges. In moving to the new model, the

University is also aligning itself with the best of emerging European and Asian practice and well-established North American traditions.

The University's global aspirations seek to make significant contributions to major social, economic and environmental challenges. Accordingly, the University's research strategy Research at Melbourne: Ensuring Excellence and Impact to 2025 aspires to a significant advancement in the excellence and impact of its research outputs. http://research.unimelb.edu.au/our-research/research-at-melbourne

The strategy recognises that as a public-spirited, research-intensive institution of the future, the University must strive to make a tangible impact in Australia and the world, working across disciplinary and sectoral boundaries and building deeper and more substantive engagement with industry, collaborators and partners. While cultivating the fundamental enabling disciplines through investigator-driven research, the University has adopted three grand challenges aspiring to solve some of the most difficult problems facing our world in the next century. These Grand Challenges include:

- Understanding our place and purpose – The place and purpose grand challenge centres on understanding all aspects of our national identity, with a focus on Australia's 'place' in the Asia-Pacific region and the world, and on our 'purpose' or mission to improve all dimensions of the human condition through our research.
- Fostering health and wellbeing – The health and wellbeing grand challenge focuses on building the scale and breadth of our capabilities in population and global health; on harnessing our contribution to the 'convergence revolution' of biomedical and health research, bringing together the life sciences, engineering and the physical sciences; and on addressing the physical, mental and social aspects of wellbeing by looking beyond the traditional boundaries of biomedicine.
- Supporting sustainability and resilience – The sustainability and resilience grand challenge addresses the critical issues of climate change, water and food security, sustainable energy and designing resilient cities and regions. In addition to the technical aspects, this grand challenge considers the physical and social functioning of cities, connecting physical phenomena with lessons from our past, and the implications of the technical solutions for economies, living patterns and behaviours.

Essential to tackling these challenges, an outstanding faculty, high performing students, wide collaboration including internationally and deep partnerships with external parties form central components of Research at Melbourne: Ensuring Excellence and Impact to 2025.

5.6 GOVERNANCE

The Vice Chancellor is the Chief Executive Officer of the University and responsible to Council for the good management of the University.

Comprehensive information about the University of Melbourne and its governance structure is available at http://www.unimelb.edu.au/governance