Duncan Sutherland

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Degrees:

2009-2014 **PhD** University of Sydney Applied Mathematics. Thesis: Numerical study of vortex generation in bounded flows with no-slip and partial slip boundary conditions, supervisor: C. Macaskill. Held an Australian Postgraduate Award scholarship.

2008 **BSc Adv** University of Sydney Applied Mathematics, Honours Class 1.

Positions held:

2018 - : **Lecturer**, School of Science, University of New South Wales, Canberra;

2014 - 2018: **Postdoctoral research fellow** Centre for Environmental Safety and Risk Engineering, Victoria University;

2012-2013 **Lecturer**, School of Mathematics and Statistics, University of Sydney, Summer School;

2008-2014 **Casual Academic** School of Mathematics and Statistics, University of Sydney;

2018 - : **Honourary Associate** Institute of Sustainable Industries and Liveable Cities, Victoria University;

2015 - 2018 : **Visitor** Department of Mechanical Engineering, University of Melbourne;

Grants and scholarships:

ARC Discovery project DP210101965: **Gravity Current Driven Smoke Dispersion In a Stratified Ambient** A. Ooi, K. A. M. Moinuddin; D. Sutherland, R. Manasseh, 2021-2024, Lead Organisation: University of Melbourne.

ARC Discovery project DP210102540: **Understanding the Origin and Development of Extreme and Mega Bushfires** T. Penman, J. Sharples; K. Moinuddin, J. Hilton; D. Sutherland, C. Clements, 2021-2024, Lead Organisation: University of Melbourne.

Defence Science Partnering Deed: **Modelling tools for optimising complex 3D geometry propellant forms** T. J. Frankcombe, D. Sutherland.$60,000, 2020. Lead Organisation: UNSW Canberra

Bushfire and Natural Hazards Cooperative Research Centre: **Fire spread across fuel types** K. A. M. Moinuddin, G. R. Thorpe, A. Ooi, V. Novozhilov, J. Philip, D. Sutherland, $523,000, 2017-2020. Lead Organisation: Victoria University, Melbourne.

Teaching experience:

Lecturer and convener ZPEM3301 (2018) Topics in Mathematics, ZPEM3306 (2019, 2020, 2021) Waves and Fluids, ZPEM1304 (2018, 2019, 2020, 2021) Engineering Mathematics 1B. I developed a completely new third-year course, Waves and Fluids (originally ZPEM3301, now ZPEM3306), including all lecture notes, tutorial and lab exercises, and assessment material. I also developed new notes, tutorial exercises, and assessments for Engineering Mathematics 1B. In 2019 I lectured half of Engineering Mathematics 1B, and enjoyed the opportunity of mentoring a postdoctoral fellow (Dr

Thomas Morril - now Assistant Professor at Trine University) who lectured the other half. Waves and Fluids covers the method of characteristics and separation of variables for partial differential equations, finite difference and Fourier spectral numerical methods, and introductory fluid dynamics. The course uses non-traditional project assessments suited to online learning. Engineering Mathematics 1B is a service course covering introductory ordinary differential equations, multivariate calculus, and statistics.

Lecturer Lectured half of MATH1001 junior normal level differential calculus, covering the topics of partial derivatives, differentiation rules, directional derivatives, limits, definitions of hyperbolic functions, and Taylor series.

Casual Academic Duties primarily involved taking tutorial classes of approximately 30 students. Students would be given a worksheet and the tutor would address the primary concepts and work through some examples on the blackboard, and assist the students to complete the worksheet. Computer tutorials were similar, except the worksheet consistent of a number of computing exercises to be completed in Matlab or Mathematica. Other duties involved marking and vetting exams, assignments, quizzes; processing marks; and occasionally running consultations near the end of semester.

Professional development courses (non-award, undertaken at UNSW Canberra)

Foundations of University Learning and Teaching The Foundations of University Learning and Teaching (FULT) course is designed to develop the capability to effectively design courses, critical thinking skills with respect to students' learning and engagement, and create valuable networks among teaching peers.

Online Teaching The purpose of this course was to develop capability in designing and teaching fully online courses. The learning outcomes included: identifying key online teaching concepts and strategies drawing on pedagogical literature, and designing and developing a student-centred online course.

Associate supervisor experience (Victoria University):

All students are primarily supervised by A/Prof. Khalid Moinuddin, unless otherwise stated.

Rahul Wadhwani PhD Student (2014-2020 Graduated). Topic: "Validation of pyrolysis and particle transport submodels for Fire Dynamics Simulator". Awards: VU International Scholarship, BNHCRC top up scholarship, the Sheldon Tieszen award, International Association of Fire Safety Science, Visiting studentship Imperial College London, e-Murray project on Bushfire evacuation simulation. Accepted a postdoctoral position at The Hong Kong Polytechnic University.

Sesa Roy MEng. Student (2017-2019 Graduated). Topic: "Modelling initial wind fields for physics-based wildfire simulation". Now a PhD student at Monash University.

Nicolas Frangieh Visiting Phd. Student (Sept-Nov 2017). Topic: "Flow development downstream of a vegetation canopy". Primary supervisor Prof. Dominique Morvan, Aix-Marseille Universite. Now graduated, and a postdoctoral fellow at University of Corsica.

Jasmine Innocent PhD Student (2016-Present, part time). Topic: "Physics-based simulation of grass fires over inhomogeneous fuel and terrain.

Computing skills:

Proficient in LaTeX, Matlab, Fortran, OpenMP, and MPI; competent in Mathematica and python; some experience with c and R; limited experience with the Microsoft Office suite.

Professional Affiliations:

I am a current or former member of the following societies: Australian Fluid Mechanics Society Modelling and Simulation Society of Australia and New Zealand Australian Mathematics Society American Physical Society International Association of Wildland Fire

References:

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Further references available upon request