

UWS Australian Research Council Grants for 2015



UWS AUSTRALIAN RESEARCH COUNCIL GRANTS FOR 2015

UWS has been successful in winning \$ 4,672,283 in Australian Research Council (ARC) grants.

The stellar performance of our next generation of researchers has been recognised with UWS being awarded four Discovery Early Career Researcher Awards to the value of \$1,442,671.

UWS researchers will lead six new Discovery Projects, supported by grants totalling \$1,710,024, and are collaborating on ARC Discovery Projects and Linkage Infrastructure, Equipment and Facilities projects with research partners in other institutions.

Two UWS staff have been awarded four year Future Fellowships with a funding total of over \$1.5 million.

Congratulations to the following UWS researchers who have been awarded ARC grants for 2015.

Discovery Early Career Researcher Awards

MARCS INSTITUTE

Lead	Antoniou, Dr Mark
Total	\$364,536

LINGUISTIC PROCESSES (INCLUDING SPEECH PRODUCTION AND COMPREHENSION)

Mastery of a second language comes with economic advantages, especially in English-speaking nations with large immigrant populations such as Australia. It is not clear why some learners flourish while others struggle in the same educational setting. Successful learners must possess attributes that when combined with the features of the learning situation result in positive learning outcomes, whereas unsuccessful learners are likely mismatched to their training method. In a series of artificial language learning experiments, this project will identify the combination of factors that matter most in successful language learning. If successful, it may ultimately be possible to tailor training proactively to maximise learning outcomes.

HAWKESBURY INSTITUTE FOR THE ENVIRONMENT

Lead	Plett, Dr Jonathan M
Total	\$393,416

MYCOLOGY

Relationships between mutualistic fungi and plants are exploited as they foster plant productivity and vigour. One significant problem facing the agro-forestry and agricultural industries is that the ability of beneficial fungi to colonise plant hosts is highly dependent on the genetic background of the host. Ultimately, this means that if fungal inoculants are not matched with the appropriate plant host, maximal benefits from these relationships are not achieved. This project will identify the first genetic markers to be used for matching plants with appropriate fungal isolates, thereby guaranteeing optimal plant performance. This will add a critical component to the global effort of increasing the productivity of our natural resources.

Discovery Early Career Researcher Awards

INSTITUTE FOR CULTURE AND SOCIETY and SCHOOL OF SOCIAL SCIENCE AND PSYCHOLOGY

Lead	Power, Dr Emma R
Total	\$348,710

SOCIAL AND CULTURAL GEOGRAPHY

The project investigates the stability of single older women's senses of home, security and belonging as they negotiate asset and income insecurity. It examines (1) how national and housing-provider scale housing policy and governance frameworks shape the ways that older women experience and make decisions about home, and (2) how home is impacted by housing mobility. Using a housing pathways approach the project will develop knowledge of how housing markets and supply impact on and are shaped by homemaking cultures and practices. It addresses a research gap about how asset-poor older Australians maintain stable housing pathways and senses of home, security and belonging as they age.

INSTITUTE FOR CULTURE AND SOCIETY

Lead	Robertson, Dr Shanthi K
Total	\$336,009

MIGRANT CULTURAL STUDIES

Migrant mobilities between Australia and Asia are becoming more temporary and less linear. This project investigates the lived experience and the governance of 'temporally fluid' migration flows from Asia to Australia; explores migrants' senses of belonging over time at local, national and transnational scales; and develops methods and theories to analyse and visualise complex migrant journeys across borders, regions, visa statuses and labour markets. The use of time and temporality as framing concepts of the research will advance knowledge on how migration policy and migrants' decisions and experiences influence each other, and how belonging and transnationalism are being transformed by new types of mobility in the Asia-Pacific region.

Discovery Projects

MARCS INSTITUTE

Lead	Davis, Prof Christopher W
Other	Kim, A/Prof Jeusun (UWS)
Total	\$305,700

SENSORY PROCESSES, PERCEPTION AND PERFORMANCE

Our project adopts an innovative approach to better understand problems that elderly people have in recognizing speech in noise. Using a detailed computational (glimpsing) model, measures of auditory and visual information and novel priming methods, we will determine precisely what processing is carried out in the early stages of perception. Quantifying and systematically varying input information and measuring perceptual processing are essential for pinpointing where speech perception problems arise and provide a foundation for evaluating remediation and training. This research will contribute to theories of speech recognition and has practical application for assessment.

INSTITUTE FOR CULTURE AND SOCIETY

Lead	Gibson, Prof Katherine D
Other	Law, Dr Lisa B; Occeña-Gutierrez, A/ Prof Darlene; Win Oo, Prof Dr Nay
Total	\$197,300

SOCIAL AND CULTURAL GEOGRAPHY

Sharing, reciprocity and resource pooling are at the frontline of recovery and relief when economic crisis or disaster hits Monsoon Asia. This research sheds light on cases where these economic practices have been innovatively harnessed to diversify livelihoods and build economic resilience. Working with contemporary Asian scholars, practitioners in the disaster field and a data set gleaned from multiple sources, including mid-20th century tropical geography texts, the project brings to the fore a regional landscape of diverse economic practices across Monsoon Asia. A cross-regional on-line knowledge community is formed to explore how this asset base might be mobilized towards more effective local development and disaster response.

Discovery Projects

SCHOOL OF SOCIAL SCIENCE AND PSYCHOLOGY, CENTRE FOR RELIGION AND SOCIETY

Lead	Howell, Prof Julia D
Other	Woodward, A/Prof Mark
Total	\$185,200

RELIGION AND SOCIETY

This project is the first systematic investigation of a new type of counter-radical religious mobilisation in Muslim Southeast Asia: mass prayer rallies attended by tens of thousands of people and led by charismatic preachers of Hadhrami Arab descent. While transnational Islamist movements promoting an Islamic state have identified 'true Islam' with Arab practices, Hadhrami leaders of the new-style prayer rallies publicly resist such claims, promoting religious rituals beloved in Indonesian local Islam. This project seeks to document the scope and impact of the new-style prayer rallies and understand them as new religious forms responsive to the late-modern social changes affecting not just the West, but Islamic Southeast Asia.

INSTITUTE FOR INFRASTRUCTURE ENGINEERING and SCHOOL OF MEDICINE

Lead	Kwok, Prof Kenny C
Other	Macefield, Prof Vaughan G (UWS); Walton, Dr Darren K
Total	\$414,300

ENGINEERING DESIGN KNOWLEDGE

Current building motion design guidelines focus primarily on motion perception and complaint rates. However, wind-induced building motion can cause sopite syndrome or early onset motion sickness which adversely affects occupant wellbeing and work performance. This research will advance the understanding of the physiology of sopite syndrome, quantify the motion dosage that causes sopite syndrome and determine its adverse effects on building occupants in real-world motion environments. This knowledge will guide the formulation of building motion acceptability criteria based on safe motion exposure duration to facilitate the design of tall building that promotes population health and wellbeing and lifts work performance and productivity.

Discovery Projects

HAWKESBURY INSTITUTE FOR THE ENVIRONMENT

Lead	Nielsen, Dr Uffe N
Other	Eldridge, Dr David J; Singh, Prof Brajesh K (UWS)
Total	\$420,200

TERRESTRIAL ECOLOGY

Ecosystem functioning in drylands is governed by complex interactions between microbes, invertebrates and plants. Biological activity however is constrained by the availability of water and altered rainfall regimes could moderate how organisms interact, potentially causing trophic cascades and even ecosystem state changes. We will use an experimental approach to determine how rainfall regime structures dryland communities and ecosystem properties and potential responses to altered rainfall regime. By linking observed responses with soil microbial functional attributes using newly developed molecular techniques we seek to provide a mechanistic insight into ecosystem responses to climate variability and extreme climatic events.

SCHOOL OF COMPUTING, ENGINEERING AND MATHEMATICS

Lead	Tam, A/Prof Vivian W
Other	Le, Dr Khoa N (UWS); Shen, Prof Li-Yin
Total	\$187,324

BUILDING CONSTRUCTION MANAGEMENT AND PROJECT PLANNING

In Australia, the annual average temperature has increased 0.9 degrees Celsius since 1910. Residential and commercial building sectors produce about 23% of the national greenhouse-gas emissions. This project critically evaluates the cost effectiveness and greenhouse-gas emissions of green-building implementation in Australia. This will examine methods to lower cost and greenhouse-gas emissions from green-building implementation. A new high-tech scoring model will be developed to identify cost-effective and low-greenhouse-gas-emissions methods to achieve specific Green-star status for the Australian building and construction industries.

Future Fellowships

MARCS INSTITUTE

Researchers	Keller, A/Prof Peter E
Total	\$866,250

PSYCHOLOGY

Human interaction in musical groups is a culturally widespread activity that showcases the remarkable capacity for precision and creativity in interpersonal coordination. Although such activity has beneficial effects, including the facilitation of prosociality and positive therapeutic outcomes, the psychological and neurophysiological mechanisms that underpin an individual's ability to coordinate with others remain poorly understood. This project aims to investigate these mechanisms by examining relationships between behaviour, social factors, and brain structure and function in naturalistic and laboratory settings. This will inform the assessment and treatment of clinical conditions that affect movement timing and social interaction.

SCHOOL OF HUMANITIES AND COMMUNICATION ARTS

Researchers	Kelly, Dr Mark G
Total	\$653,338

PHILOSOPHY

This project aims to produce a new account of the emergence and role of the concept of norms. While norms have been the subject of significant academic attention, their history has never been recorded. This project aims to study the development of the conceptual vocabulary of norms, normality and normativity in the key areas of the life sciences, legal discourse, and ethics. Showing how these discourses link up to one another and to social institutions, it will produce new insights into the 'normalising' society. Its purpose is thus to understand how individuals and public policy can successfully navigate the proliferation of norms in various fields today, in a situation of increasing diversity of rules and cultural codes.

New UWS Staff: Discovery Early Career Researcher Awards

SCHOOL OF SCIENCE AND HEALTH

Lead	Kilah, Dr Nathan L (New Staff)
Administering Institution	University of Tasmania
Total	\$373,536.00

INORGANIC CHEMISTRY

The properties of substances we experience in our daily lives owe much to very weak interactions taking place between molecules. Consider a cup of coffee: very weak interactions hold the water together as a liquid, and result in the biological action of caffeine within the body. The project aims to develop new materials based on an underexplored class of weak interactions known as halogen bonds. These interactions will be used to assemble large molecules in solution, probe the presence of pollutants in water, and to separate active and inactive forms of pharmaceuticals. The development of health and environmental applications in the course of this project aim to significantly enhance our fundamental understanding of these weak interactions.

UWS Researchers Achieving Success in Collaboration with other Universities (Projects)

SCHOOL OF HUMANITIES AND COMMUNICATION ARTS

Researchers	Sheehan, Dr Paul G; Ng, Dr Lynda (UWS); Boehmer, Prof Elleke D
Administering Institution	Macquarie University
Total	\$169,560

LITERARY STUDIES

The reputation of J. M. Coetzee has undergone a dramatic global upsurge in the past 15 years, coinciding with his relocation to Australia and subsequent adoption of citizenship in 2002. This project aims to explore the proposition that the writings of the South African-born Coetzee possess profound and abiding transnational qualities, and then map the global shifts that this work has undergone in the new century. By examining these aspects through Coetzee's position in his adopted country, the project seeks to re-examine notions of Australian nationality and the parameters of its literary, cultural and political identity, moving them beyond an insular, border-defined understanding towards a wider international frame.

SCHOOL OF COMPUTING, ENGINEERING AND MATHEMATICS

Researchers	Sims, Prof Aidan D; Pask, A/Prof David A; Hazrat, Dr Roozbeh (UWS)
Administering Institution	University of Wollongong
Total	\$310,700

PURE MATHEMATICS

This pure mathematics project focuses on the interplay between abstract algebra and the area of functional analysis known as operator algebras. Specifically, it is intended to deal with generalisations of graph C^* -algebras and of Leavitt path algebras. Over the last decade, researchers have discovered striking similarities between these areas, but no unifying result that would allow them to transfer techniques and theorems systematically from one to the other. Recent research suggests that groupoid models for both algebras and C^* -algebras may provide the missing link. This project aims to determine the role of groupoids in the two theories, and analyse and exploit the resulting synergies between abstract algebra and operator algebras.

UWS Researchers Achieving Success in Collaboration with other Universities (Projects)

SCHOOL OF COMPUTING, ENGINEERING AND MATHEMATICS

Researchers	Ye, Prof Lin; Chang, Dr Li; Yang, A/ Prof Chunhui (UWS); Wang, Dr Dong
Administering Institution	The University of Sydney
Total	\$343,200

SCHOOL OF SOCIAL SCIENCES AND PSYCHOLOGY

Researchers	Clifford, Prof Colin W; Watson, Dr Tamara L (UWS)
Administering Institution	The University of New South Wales
Total	\$395,100

MATERIALS ENGINEERING

Lightning strike presents a great threat to various engineered structures made of fibre-reinforced polymer composites. This project aims to develop fundamentals for a framework of integrity analysis for such composites after lightning strike. This involves mechanistic models for coupled electrical-thermal-mechanical analysis and experimental characterisation, addressing intensive resistant-heat generation, pyrolysis of matrices and ablation of fibres, pore gas explosion, shock stresses and prediction of residual strength. The expected outcomes of the project are critical for the development of procedures for enhanced structural integrity assessment, driving down maintenance costs and extending the life-span of engineered composite structures.

PSYCHOLOGY

It is well known that expectation plays a large role in how we perceive the sex, age and other attributes of people, crucial to guiding our interactions with them. It has not yet been established whether expectation exerts its influence at a perceptual or cognitive level. This project will apply a mathematical model of the way in which expectation can influence perception to a range of judgements made by participants under conditions of uncertainty. The model aims to allow the description of how such expectations influence perception of attributes such as sex, age and attractiveness, in order to generate understanding of a key aspect of person perception and provide a novel theoretical foundation for further research.

UWS Researchers Achieving Success in Collaboration with other Universities (Projects)

SCHOOL OF SCIENCE AND HEALTH

Researchers	Yeoh, A/Prof Guan H; Timchenko, Dr Victoria; Valenzuela, A/Prof Stella M; Cornell, Dr Bruce A (UWS); Dombrovsky, Dr Leonid A
Administering Institution	The University of New South Wales
Total	\$266,300

INTERDISCIPLINARY ENGINEERING

Heat transfer of laser-irradiated nanoparticles in biological tissues requires a basic knowledge of the unique strong resonance absorption properties and a fundamental understanding of the thermal and chemical conversions as a consequence of these heated nanoparticles. This project aims to investigate the extent of the non-equilibrium heating effects of heated nanoparticles on the destruction of biological tissues. Comprehensive experimental studies and computational modelling to be performed are expected to significantly enhance the understanding of laser-induced heating phenomena of embedded nanoparticles in biological tissues and the prediction of the level of destruction that can be experienced by these heated nanoparticles.

SCHOOL OF COMPUTING, ENGINEERING AND MATHEMATICS

Researchers	Cheng, Prof Liang; Zhao, Dr Ming (UWS); Draper, Dr Scott; Harris, Dr John; Whitehouse, Prof Richard
Administering Institution	The University of Western Australia
Total	\$414,300

CIVIL ENGINEERING

This project aims to develop improved predictions and understanding of the potential and extent of scour and scour-induced settlement of subsea infrastructure on mobile seabeds. This is expected to enable scour and settlement to be accounted for directly in engineering stability and serviceability design, overturning current practice which ignores both effects on the basis of using scour protection and costly maintenance and remediation. Development of accurate predictions is expected to be achieved through physical model testing, numerical modelling and analysis of field data. Predictions should improve subsea reliability and lead to omission of scour protection in some situations, increasing international competitiveness of our offshore oil and gas industry.

UWS Researchers Achieving Success in Collaboration with other Universities (LIEF)

SCHOOL OF LAW

Researchers	Greenleaf, Prof Graham W; Mowbray, Prof Andrew S; Lunney, Prof Mark D; Twomey, Prof Anne F; Adams, Prof Michael A (UWS); Jones, Ms Judith S; Petrow, A/Prof Stefan; Nettelbeck, Prof Amanda E; Prest, Prof Wilfrid R; Finnane, Prof Mark J; Nielsen, Dr Jennifer M; Swain, A/Prof Warren M; Wells, Mr Andrew M; Genovese, Dr Ann L; Josev, Ms Tanya; Reynolds, Prof Rocque; Dorsett, Prof Shaunnagh G; Ailwood, Dr Sarah L; Sainsbury, Prof Maree T; Bond, Dr Catherine M; Stuhmcke, Prof Anita; Ford, Dr Lisa M; Stuckey, Prof Michael; Certoma, Prof Leroy; Williams, Prof John M; Appleby, Dr Gabrielle J; Kercher, Prof Bruce R; Kelly, A/Prof Catherine J; Handford, Prof Peter R
Lead Institution	The University of New South Wales
Partner Institutions	Griffith University, Southern Cross University, The University of Melbourne, University of Canberra, University of Notre Dame Australia, The University of Western Australia, University of Technology, Sydney, The University of New England, The University of Sydney, University of Western Sydney, The University of Queensland, The Australian National University, University of Tasmania, The University of Adelaide
Total	\$410,000

HISTORICAL STUDIES

The Australasian legal history libraries stage II: Australia's leading legal historians will partner with the Australasian Legal Information Institute (AustLII) to create a massive expansion of free online access to Australasian legal history through digitisation and data aggregation. The Legal History Libraries on AustLII will become a comprehensive trans-Tasman collection from 1788-1999, including all reported case series and those from colonial newspaper reports, and all Acts enacted, plus key collections of historical Bills, Gazettes, legal commentaries, and Parliamentary reports. The Libraries are expected to double in size from their current 50,000 items of cases and legislation. The Libraries will enable previously impractical access, comparative research, and international collaborations.

SCHOOL OF HUMANITIES AND COMMUNICATION ARTS

Researchers	Kenderdine, Prof Sarah I; Del Favero, Prof Dennis G; Thielscher, Prof Michael; Nakata, Prof Nicholas M; Ross, Dr Shawn A; Arthur, Prof Paul L (UWS); Lueg, Prof Christopher P; Bourke, A/Prof Paul D; Greuter, Dr Stefan; Gibson, Prof Ross J; Shaw, Prof Jeffrey; Kelly, Dr Lynda; Hart, Mr Tim; Neale, Ms Margo; Berry, Mr Drew
Lead Institution	The University of New South Wales
Partner Institutions	Australian National Maritime Museum, The Walter and Eliza Hall Institute of Medical Research, AARNet Pty Ltd, Intersect Australia Ltd, University of Western Sydney, RMIT University, University of Canberra, The University of Western Australia, University of Tasmania, City University of Hong Kong, National Museum of Australia, Museum Victoria
Total	\$220,000

FILM, TELEVISION AND DIGITAL MEDIA

DomeLab – an ultra-high resolution experimental full-dome: This project will establish the first ultra-high resolution (4000 x 4000 pixels) experimental full-dome in Australia (DomeLab). This full-dome facility will provide a powerful immersive dome-based video projection environment. Partners will work collaboratively across three themes: interactive media, future museology and experimental humanities. Through the national research services AARNet and Intersect's research data storage infrastructure, DomeLab will extend pioneering research in aesthetic frameworks and frontier technologies to benefit artistic, cultural, museological and humanities researchers. DomeLab is designed as a touring system and will be installed throughout the country at leading institutions.

UWS Researchers Achieving Success in Collaboration with other Universities (LIEF)

SCHOOL OF COMPUTING, ENGINEERING AND MATHEMATICS

Researchers	Zhao, Prof Jian; Ranjith, Prof Pathegama G; Khalili, Prof Nasser; Dyskin, Prof Arcady V; Liyanapathirana, A/Prof Samantha (UWS); Williams, Prof David J; Einav, Prof Itai; Karakus, Dr Murat; Sanjayan, Prof Jay G; Shen, A/Prof Luming; Ma, Prof Guowei; Wu, Dr Chengqing; Xu, A/Prof Chaoshui; Scheuermann, Dr Alexander; Pasternak, Prof Elena; Leo, A/Prof Chin J (UWS); Zhao, Dr GaoFeng; Perera, Dr Samintha
Lead Institution	Monash University
Partner Institutions	The University of New South Wales, The University of Western Australia, The University of Queensland, The University of Adelaide, Swinburne University of Technology, University of Western Sydney, The University of Sydney
Total	\$560,000

CIVIL ENGINEERING

3D compressed and monitored Hopkinson bar: The 3D compressed and monitored Hopkinson bar allows determination of the dynamic mechanical properties and fracturing behaviour of materials under such confinement. Understanding material behaviour under dynamic loading is essential in dealing with many engineering problems as excavation, fragmentation, earthquake, blasting, and structure design. In geotechnical and structure projects, materials are often subjected to existing confining stresses. The full-field optical techniques, with an ultra-high speed and resolution camera in the system, aims to assist the quantitative measurement of deformation fields including small strain induced in brittle material's failure and identification of constitutive parameters.

SCHOOL OF COMPUTING, ENGINEERING AND MATHEMATICS

Researchers	Rowell, Dr Gavin P; Burton, Prof Michael G; Green, Prof Anne J; Dawson, Prof Bruce R; Balazs, A/Prof Csaba; Filipovic, A/Prof Miroslav D (UWS); Crocker, Dr Roland M; Tothill, Dr Nicholas F; Veitch, A/Prof Peter J; Galloway, Dr Duncan K; White, Dr Martin J; Bicknell, Prof Geoffrey V; Braiding, Dr Catherine R; Ottaway, Dr David J; Hinton, Prof Jim; Berge, Dr David
Lead Institution	The University of Adelaide
Partner Institutions	The University of New South Wales, The University of Sydney, Monash University, University of Western Sydney, The Australian National University, University of Leicester, UK, University of Amsterdam, Netherlands
Total	\$270,000

ASTRONOMICAL AND SPACE SCIENCES

The Cherenkov Telescope Array: The Cherenkov Telescope Array (CTA) is a major advance in very high energy gamma-ray astronomy. It will be ten times more sensitive than current instruments and will transform many topics in high energy astrophysics concerning extreme particle acceleration, and in astro-particle physics such as dark matter. Over 1000 scientists from over 25 countries are involved and prototype telescopes are under construction. This project will enable a hardware contribution to the pre-production array of telescopes, bringing with it full membership, plus access to all data and core science programmes of CTA. Australian astronomers can then influence astrophysics goals of CTA, and add new scientific value to Australia's radio astronomical facilities.

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