

# Knowledge <sup>Glamorgan</sup>

SHOWCASING RESEARCH

SUMMER 2009 VOL 5

## GLAMORGAN'S RESEARCH IS INTERNATIONALLY EXCELLENT

Research Assessment Exercise 2008 Special

University of Glamorgan  
Prifysgol Morgannwg



## Contents

**P3** Introduction from Professor Brian Hobbs

**P4** What is the Research Assessment Exercise?

**P5** Celebrating our success

**P6** English

**P7** Nursing and Midwifery

**P8** Theatre, Media and Drama

**P9** Communication, Cultural and Media Studies

**P10** Social Policy and Administration

**P11** Law

**P12** General Engineering

**P13** Computer Science

**P14** Applied Mathematics

**P15** Education

**P16** Built Environment

**P17** Sport, Health and Exercise Science

**P18** Psychology

**P19** History

**P20** Biological Sciences

**P21** Business and Management Studies

**P22** Chiropractic

**P23** Research Matters



# Introduction

Professor Brian Hobbs, Pro-Vice Chancellor (Research)



This edition of *Glamorgan Knowledge* celebrates the excellent results we achieved in the recent UK Research Assessment Exercise.

The details of the assessment process and the specific quality profiles awarded to our submission across 17 subject areas are summarised on page 4, but the key overall outcome is that

around 70% of our research activity was judged to be of an internationally excellent standard or better by panels of experts, including academic peers from other universities and professionals in the relevant fields. This is an extremely pleasing outcome and is a tribute to the commitment and hard work of our staff in building our research activity over the past decade. These results clearly demonstrate the significance of our contribution to the international research agenda across a wide range of disciplines and provide us with a very strong platform from which to both expand and enhance further our research activities.

I hope you will read the summaries of the work of our research groups and thereby gain an understanding of the breadth of work undertaken and the sense of excitement that research brings to the life of the University. These descriptions can only present a glimpse of the considerable breadth and depth of our work and if you are interested in finding out more, please do use the emails and web links to contact the relevant members of staff. We believe strongly in the beneficial relationship between research and our teaching at both undergraduate and postgraduate levels. We are also committed to working in partnership, both with other universities and with external stakeholders.

The world is increasingly being faced with complex challenges that can only be addressed effectively through multi-disciplinary approaches. As we take forward our research agenda, we are strengthening our commitment to multi-disciplinary working and are establishing a number of cross-University research and development centres which will harness the relevant skills and expertise from across all faculties in order to address issues in a holistic way. The first three of these centres focus on Enterprise; Regeneration and Sustainable Communities; and Disaster Management and Emergency Response (see page 23). These centres will work closely with their stakeholder groups as they build a portfolio of activities. The aim is to meet the specific needs of Wales but also to build an international reputation for their research, knowledge transfer and course development activities.

We recognise, however, that in many cases, the required range of expertise will not reside within any one university and that collaboration between universities will become increasingly important in the future. We are thus very pleased to be part of the recently launched St David's Day Group of the large, research active universities in Wales. We look forward to working with our colleagues in the universities of Cardiff, Swansea, Aberystwyth and Bangor to focus our combined resources on the key issues facing Wales and the wider world.







# What is the Research Assessment Exercise?

▲ The Research Assessment Exercise 2008 (RAE2008) was conducted jointly by the four UK higher education funding bodies with a primary purpose to determine the allocation of funding for research from 2009/10. The outcomes were expressed in the form of a quality profile of research activity in multiples of 5% which allowed for a more comprehensive analysis of research excellence than in RAE2001 where institutions received a single graded score for each Unit of Assessment (UoA).

The overall quality profiles were published in December 2008 and the sub-profiles were published in March 2009. The quality profiles received for each submission were determined by a process of peer-review consisting of a panel of experts in 67 UoAs, overarched by main panels grouped according to broader discipline-related areas of research. Sub-profiles based on the three elements of the






assessment – research outputs, research environment and esteem indicators – were combined to produce an overall quality profile for each submission. The quality profile shows the percentage of research activity in the submission judged to reach each of four ‘starred’ quality levels.

## The definition of each quality level

	Quality that is world-leading in terms of originality, significance and rigour
	Quality that is internationally excellent in terms of originality, significance and rigour but which nonetheless falls short of the highest standards of excellence
	Quality that is recognised internationally in terms of originality, significance and rigour
	Quality that is recognised nationally in terms of originality, significance and rigour

The percentage of research activity at each of the four classified quality levels submitted to RAE2008 by the University of Glamorgan is shown below and within each section of this issue of *Glamorgan Knowledge*.

## University of Glamorgan RAE2008 outcomes

Unit of Assessment	 Staff submitted (FTE)				
Nursing and Midwifery	22.60	10	25	40	20
Allied Health Professions and Studies (Chiropractic)	4.00	0	0	5	55
Biological Sciences	4.00	0	10	30	55
Applied Mathematics	4.00	0	20	45	30
Computer Science and Informatics	22.45	5	35	40	20
General Engineering	9.85	5	55	35	5
Built Environment	6.20	10	40	35	10
Business and Management Studies	27.10	5	10	50	35
Law	6.80	0	15	30	55
Social Policy and Administration	18.10	5	40	50	5
Psychology	12.70	0	10	25	55
Education	6.75	0	20	35	35
Sports-Related Studies	9.50	5	15	30	40
English Language and Literature	15.00	15	25	50	5
History	6.00	10	40	45	5
Drama, Dance and Performing Arts	15.40	5	25	45	25
Communication, Cultural and Media Studies	8.00	10	20	45	25

The University of Glamorgan experienced a 150% increase in the submission of staff from 87 in RAE1996 to 218 in RAE2008. Moreover, the number of submissions to RAE Units of Assessment has almost doubled since RAE2001 from nine to 17 in RAE2008, with a 50% increase in the submission of staff. The submissions to

RAE2008 also exemplified the multidisciplinary and cross faculty nature of research activities conducted at the University involving research from over 40 University research Units/Centres and contributions from the Royal Welsh College of Music & Drama.

# Celebrating our Success

▲ The University of Glamorgan achieved excellent results in RAE2008, confirming its status as one of Wales' research active universities.

The University submitted research evidence to 17 units of assessment and performed particularly well in English, History, Engineering, Built Environment, Nursing, Social Policy and Computing. Also worthy of note is the strong performance in the units of assessment relating to the Creative and Cultural Industries reflecting the significant investment that has been made in the new ATRium campus in Cardiff.

The University was compared with other institutions in *Research Fortnight's* University Power Rankings which is based on quality and volume of research activity, *Times Higher Education* and *The Guardian*.

We are confident that our research can make a contribution to cultural, economic and social development and are committed to research which meets the needs and aspirations of society in its broadest sense.

We are strongly committed to the view that research and knowledge transfer go hand in hand with learning and teaching and that the three activities are mutually reinforcing.

Our research feeds into our course development and delivery enhancing and enriching the educational experience of all of our students. Specific cutting edge knowledge is embedded into our courses and the overall culture of research informs the student working environment as they prepare their own research projects.

We are proud of the excellent work being done by our academic staff and are pleased that the results of RAE2008 confirm Glamorgan's status as a key research-active university.



# English

▲ English research at Glamorgan is in the top five modern universities according to *Research Fortnight's* Power Rankings and it has consolidated its strong position from RAE2001.



## The unit consists of five research groups:

- Creative Writing
- Welsh Writing in English
- Women's Writing
- Gothic Studies
- Literature and Science

Staff in these groups collaborate with one another and with academics from other Glamorgan departments and from other universities.

Eight of the staff are primarily creative writers, who between them won an impressive array of literary awards for their work during the last few years, including seven major literary prizes and thirteen shortlisted or special commendations. Several of these also belong to the **Welsh Writing in English** group, which edits and anthologises previously neglected Anglophone Welsh writers, and analyses the changing ways in which Welsh identities have been and are being imagined and constructed.

The main focus of the **Women's Writing** group is on the critical reappraisal and retrieval of forgotten women writers and the

re-assessing of literary genres from the perspective of female writers and readers. In 2007, members of the group helped to establish the new interdisciplinary **Centre for Gender Studies in Wales** at Glamorgan.

Staff in the **Gothic Studies** group recently established two new book series on Gothic literature to be published by the University of Wales Press. *Gothic Literary Studies* is a series of critical monographs and *Gothic Authors: Critical Revisions* a series of biographical studies.

**The Centre for Literature, Arts and Science** founded in 2006 focuses on the inter-relationship between literary and scientific discourses, histories and philosophies as they influenced one another and the broader culture of Britain in the nineteenth and twentieth centuries, and it has already succeeded in winning major grants to aid in developing its projects.

Through its continued work within these groups and outside of them, the **English Research Unit** will continue to publish energetically research of world-leading quality during the coming years.

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This information is the total score of the quality profile for each unit of assessment. It comprises the aggregate scores for each element of the assessment – research output, research environment and esteem.

# Nursing and Midwifery

▲ Research at the Centre for Research & Innovation in Care Sciences (CRICS) is amongst the top five of the modern universities for Nursing, according to *Research Fortnight's* Power Rankings. This is an indication of research growth within the Centre which continues to have a strong strategic vision.

Led by Professor Maggie Kirk, Head of Research in the Faculty of Health, Sport and Science, CRICS' research focus is on the promotion and maintenance of health and social wellbeing in groups that are especially vulnerable. Its component Research Units are each led by Professors of international standing. Interdisciplinary research is encouraged especially in terms of both the application and implication of new knowledge for health and social care practice, policy and professional education.

The Centre promotes user participation in research at all levels. Its innovative approach to public engagement includes citizens' juries, and involvement of young people in influencing policy.

One of CRICS' strengths is in nursing education in genetics and in leading the nursing programme of the National Genetics Education & Development Centre. In this role the Genomics Policy Unit is a world leader in influencing nursing policy in the USA and EU. All CRICS' Research Units enjoy international and national research links and collaboration both as leaders and collaborators.

## CRICS comprises a number of strong Research Units and emerging Groups including:

- Care Sciences Research Unit
- Genomics Policy Research Unit
- Health Economics and Policy Research Unit
- Unit for Development in Intellectual Disability
- Welsh Institute for Health and Social Care

Developing areas include: Forensic Nursing and Domestic Violence, Disaster Management, Clinical Simulation, and Enduring Health Needs.

International appointments and consultancies are held by a number of senior researchers and Unit leaders. Within the UK, CRICS' researchers are in demand for high level appointments, consultations and secondments with organisations such as Clinical Research Collaboration Cymru, the Chief Nursing Officer at the Welsh Assembly, the Wales School of Primary Care, the Human Genetics Commission (presenting on Designer Babies), Programme Board Membership of the NHS Service Delivery & Organisation National R&D Programme, the National Prevention Research Initiative and the Department of Health Advisory Group for Genetics Research, the Medical Research Council Advisory Panel and the UK Council of Deans for Health.

Research income is very healthy and includes prestigious sources such as the Wellcome Trust, Department of Health, Medical Research Council, British Heart Foundation, Welsh Assembly Government, Higher Education Funding Council for Wales and The Health Foundation as well as other local and national bodies.

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# Theatre, Media and Drama

▲ According to *Research Fortnight's* Research Power Rankings, Glamorgan is 16th in the UK.

RAE2008 concluded that 30% of research produced by the Theatre and Media Drama Research Unit (TMD) is either world-leading or internationally excellent, on the basis of a submission that was the largest of any modern university in the subject area. The submission also included a colleague from the Royal Welsh College of Music & Drama.

The work of the Theatre and Media Drama Research Unit staff continues to be highly diverse, encompassing research and publication in theatre/drama, film, radio and television, with a strong element of practice as research in the areas of theatre production, original writing for theatre, radio, screen and media production. The Unit is one of the largest and fastest-growing research cultures in this discipline in the UK, and produces research of international quality.

The Unit is involved in industry-facing research with, for example, an active involvement in a project funded by the BBC Trust to examine the impact of landmark television drama, principally Dr Who and Torchwood, on the representation of Cardiff and Wales. This project is an ambitious research initiative that has emerged out of close liaison between the Theatre and Media Drama Research Unit, the Communication, Culture and Media Studies Research Unit and the Centre for the Study of Media and Culture in Small Nations.

Following the success of 'Monument 1 – Well I Never...' in 2007 – a practice-based research project exploring the sense of belonging in Pontypridd – the Unit is supporting a major expansion of the project into an international context: 'Monument 2 – Mirror Image' will develop a collaborative research project between the twinned towns of Pontypridd and Nuertingen in Germany.

The Unit's first journal – the *Journal of Adaptation in Film and Performance* – launched with Intellect in 2007 and continues to consolidate its position as a leading publication in the field of adaptation studies, and is particularly distinctive for its genuinely cross-disciplinary ethos encompassing academia and industry. There have also been publications in 2009 closely affiliated to the Unit's activity in adaptation studies including an AHRC-funded critical edition of *Victory: The Play and Reviews* for the Rodopi Joseph Conrad Studies series. The Unit's second journal – the *Journal of Arts and Communities (Intellect)* – has recently launched and is the first journal of its kind, once again reflecting the Unit's expertise in the interface between academia and the public domain.

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# Communication, Cultural and Media Studies

▲ In a first-time submission to the Research Assessment Exercise (RAE), colleagues in CCMS achieved a stunning result, with 40% of research outputs judged to be either world-leading or internationally excellent.

Research undertaken in CCMS is at the heart of the creative and cultural industries, encompassing work on communication, culture, media, journalism and film studies. Such work may draw on, or address, theory, history, policy, institutional, textual, critical and/or empirical analysis, and also practice.

CCMS research has direct relevance to industry, policy-makers, third sector organisations, the wider public and, of course, students. For example, one project concerning a CCMS colleague with expertise in risk communication involved researching a week-long Citizens' Jury on Preventative Medicine. A research project focusing on the 65th anniversary of D-Day occupies another CCMS colleague. This will involve collecting oral accounts from survivors of Omaha Beach and preparing these records for deposit in the Smithsonian World War 2 archive in Washington D.C.

In addition to publishing articles in national and international journals, CCMS colleagues have produced a number of books over recent years. These include *Masculinities and Culture* (Open University Press, 2002); *The Media in Wales: Voices of a Small Nation* (University of Wales Press, 2005); *Communication in the Age of Suspicion: Trust and the Media* (Palgrave Macmillan, 2007); *Reading Media Theory: Thinkers, Approaches, Contexts* (Pearson Education, 2009). Forthcoming volumes include *Strategic Political Communication, Sousveillance and Iraq, 2003-9* (Continuum, 2010) and two book series, one on film

adaptations (Palgrave Macmillan) and the other entitled *Global Media and Small Nations* (University of Wales Press), both of which will appear in 2010. These publications underpin the belief that research informs teaching, as our aim is to develop students who are independent and critical thinkers and able to operate effectively as citizens and workers in a global information society.

The RAE2008 report on the CCMS submission specifically commended the Research Unit's clear research strategy, its strong emphasis on collaborative research, its good relationships with regional arts, cultural and policy-making institutions, and its international links. These relationships – locally, nationally and internationally – have been facilitated through collaboration with the Centre for the Study of Media and Culture in Small Nations. Since its inception, the Centre has initiated and organised a number of research related events such as public lectures, research seminars and research symposia. These events have attracted a wide range of participants (spanning academia, politics, regulatory bodies, civil society and industry) from Wales and beyond. Moreover, they have been instrumental in building a strong, supportive and vibrant research culture which is outward-facing and responsive to all stakeholders.

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# Social Policy and Administration

▲ After impressive RAE2008 results, Glamorgan is in the top 30 universities in the United Kingdom for Social Policy and Administration research and in the top five of the modern universities according to *Research Fortnight's* Power Rankings.

Research in this field is concerned with many of the issues that face society today and is focussed in four areas:

**The Centre for Civil Society Studies (CCSS)** is committed to increasing the understanding of civil society in its broadest sense – regionally, nationally and internationally. It exists to further knowledge about non-governmental, not-for-profit or voluntary organisations and to enable such organisations to perform their activities more effectively by strengthening their capacity. Staff at the Centre are involved in a wide range of policy-related projects including civil society and devolution in Wales, faith groups in Wales, youth policy in Europe, civil ceremonies, economic migrants in Wales, the family and fatherhood and asylum seeking children.

**The Programme for Community Regeneration** is now part of the newly launched **Centre for Regeneration and Sustainable Communities** and specialises in user-led research for key public and third sector organisations in Wales. The multi-disciplinary team works in the fields of social housing, community regeneration, community development training, social enterprise, urban food production and anti-poverty policy. Staff from the Centre have played a central role in policy development for the Welsh Assembly Government. Staff specialise in participatory action research with socially excluded populations.

**The Centre for Criminology** was established in 2001 to provide a physical base for research and teaching in criminology within the University. Projects in this area include girl gangs, policing strategies, offender management, violence and street crime, drug use and crime, and drug treatment programmes. Many of these projects have been in collaboration with organisations such as the Youth Justice Board, the Probation Service, South Wales Police and the Home Office.

**Public Policy and Management** research at Glamorgan has specialised in a number of fields. First, some of the work involves the evaluation of public services both in England and in Wales. In particular, colleagues have evaluated aspects of education policy and leadership in schools. A number of projects have been undertaken about school governors and their role, for example. Second, we have conducted a variety of research projects on devolution in Wales and also drawn comparisons between devolved services across the UK. The review of public service outcomes presents a third area of our work and here, colleagues have reviewed the impact of public services on young people. Colleagues regularly advise public service organisations on aspects of public management and leadership.

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# LAW

▲ A first-time submission to the RAE, 45% of Law research at Glamorgan was assessed as being recognised internationally for its excellence and originality in RAE2008.

At the University of Glamorgan Law School we are committed to, and take great pride in, the quality of our teaching and research. Merging research and practical legal training we are one of a select few Law Schools to offer the Legal Practice Course and conduct research.

Much of our research is applied and has direct relevance to specific communities, for example, the legal profession, educators, employers, health and community bodies.

This work feeds directly into policy development by government, both within England and Wales and in other European countries, affecting for example, equal opportunities, mental health care provision, non-resident trusts, land law related issues, sex offenders and the criminal law, occupational pensions and financial services. This work is also closely linked with the implication of devolution to Wales from 1998 and it responds to the distinctive legal agenda developing within Wales.

In specific terms this has involved members of the Law School in multi agency treatment policies for the treatment of offenders, the development of a strategy for carers in Wales, the Welsh Assembly Government's adoption of a new bilingual policy in relation to business leases, a major survey of the provision of legal education in Wales and the design and delivery of a high level, specialist postgraduate course for HM Patent Office.

The School also conducts research in the field of legal history which is seen as an area of major importance and staff also play an active role in the work of the Welsh Legal History Society.

The School is involved in many pan-European and global research activities. Often this work involves leading edge work on projects concerning the reconciliation of common law concepts and processes with those of civil law systems. Examples of this work include the role of the law of trusts, pensions law and intellectual property rights.

As a direct consequence of earlier work undertaken with the Government of Malta, property lawyers in the School will play a central role in the island's reform of its land law system. In recognition of the ground breaking work undertaken in the field of international finance the School will also contribute to the work of the newly-established Jersey Institute of Law.

Many members of the School's academic staff hold prestigious visiting professorships and fellowships at other universities and sit on national and international committees and bodies, including the OECD and the International Patent Organisation.

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# General Engineering

▲ The General Engineering submission to RAE2008 focussed on the research of the **Engineering and Sustainable Environment Research Centres** and was rated as 15th best in the UK according to the *Times Higher Education* league tables. This multidisciplinary submission included staff from the faculties of Advanced Technology and Health, Sport and Science.

## Engineering Research Centre (ERC)

ERC focuses on low carbon technology by developing more efficient combustion processes, the use of novel monitoring and control techniques, and work on fuel cells.

### Projects include:

- 'Intelligent' monitoring and control of combustion plants using optical and acoustic sensors coupled with neural networks has minimised nitrous oxide (NOx) emissions on a range of large scale coal-fired combustion facilities as well as improving the performance of burners in steel reheating furnaces. This has been undertaken in collaboration with RWE (UK), CSM (Italy), INETI (Portugal), Corus (both UK and Netherlands), BFI (Germany), Arcelor (Spain) and MEFOS (Sweden).
- Advanced modelling and control technology developed for rotary dryers and industrial Polymer Electrolyte Membrane fuel cells. Other research has focussed on application of hydrogen for transport with the development of an advanced hydrogen hybrid minibus.
- Development of a new hybrid Photovoltaic and wind source renewable energy system in collaboration with Energy Equipment Testing Services Ltd.

The ERC will continue to develop links with industrial partners such as RWE (UK) and BOC (UK) in the area of carbon capture and storage.

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## Sustainable Environment Research Centre (SERC)

SERC focuses on the production of renewable hydrogen, methane and electricity, the hydrogen economy and waste treatment.

### Projects include:

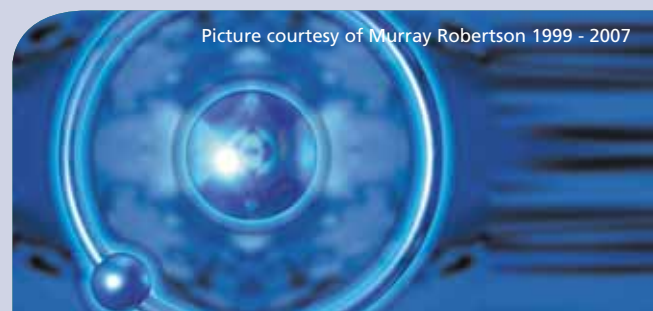
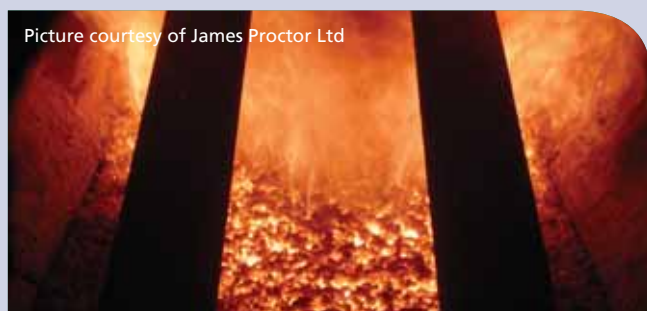
- The Hydrogen Centre at Baglan Energy Park for research and deployment of sustainable hydrogen production and fuel cell technologies.
- Leading the Hydrogen, Biogas and Fuel Cell theme of the HEFCW Low Carbon Research Centre.
- Theme leader in two EPSRC SUPERGEN consortia:
  - UK Sustainable Hydrogen Energy Consortium which was renewed in 2007 for five years.
  - Microbial Fuel Cell Theme of the Biological Fuel Cells SUPERGEN consortium funded until 2010.
- Hydrogen production at onsite-pilot scale evaluating the technical/economic feasibility of producing renewable transport fuels (Carbon Trust with Premier Foods).
- The Welsh Anaerobic Digestion Centre of Excellence to support R&D for the industrial deployment of Anaerobic Digestion.
- Development of a state-of-the-art facility for environmental analysis which builds on the research of three FP6 funded Marie Curie fellowships.

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Both Centres undertake significant commercially valued research with strategic industrial stakeholders and obtained grant income that was above average for this particular unit of assessment.



# Computer Science

▲ Computer Science at Glamorgan is amongst the top seven modern universities according to *Research Fortnight's* Power Rankings following excellent RAE2008 results. It was also the largest Computing submission in Wales.

**Research is structured around seven units/centres all of which have an international or national reputation.**

**Information Security** research encompasses Computer Network Defence, Computer Forensics, Corporate Intelligence and Cyber Threat Analysis, and Mobile/Wireless Computing Security. Collaborators and funders include BT, GCHQ, Defence Science and Technology Laboratory, DVLA and QinetiQ. The Computer Network Defence Research Laboratory can simulate a wide variety of attack and defence scenarios. The Computer Forensic Research Laboratory performs comprehensive forensics and the Visualisation Laboratory supports research in Computer Network Defence.

**The Geographic Information Systems (GIS) Centre** is supported by a European funded Marie Curie Chair. The group has pioneered the application of triangulated spatial data models for multi-scale databases and map generalisation. Two expanding areas of activity are GIS and GPS integration for Location-Based Services (LBS), vehicle tracking and navigation and GIS utilisations in the health sector. Partners include Carmarthenshire County Council, First Cymru Buses, WAG, South Wales Police and the NHS.

The **Artificial Intelligence Paradigms Unit** has projects that include modelling of crime and leukaemia incidence; automated classification of sedimentary organic matter, and automated stowage planning for container ships. Collaborative bodies include South Wales Police, The Welsh Leukaemia Registry, P&O Containers, Glamorgan Cricket Club and Bristol Urological Institute.

The **Hypermedia Research Unit** exploits Knowledge Organization Systems and Semantic Web technologies to augment search and information discovery, with funding from EPSRC and AHRC. Cultural heritage has been a particular focus, collaborators including English Heritage and the Science Museum. The Unit is pioneering study of online Welsh language use and bilingual design guidelines. The New Review of Hypermedia and Multimedia, is edited by unit members.

The **Data and Software Integrity Research Unit's** particular strength is in applications of graph theory and meta-heuristic algorithms to frequency assignment in mobile telephone systems and other radio systems. The Unit has been particularly successful in demonstrating the effectiveness of the methods it has developed on sets of benchmark problems. Funders include BAE Systems and QinetiQ. Collaborators have included Istituto Dalle Molle di Studi sull'Intelligenza Artificiale (Switzerland) and Cardiff University.

The **Integrated Communications Research Centre** integrates Radio Propagation with Mobile Computing and Communications. It covers the full networking protocol stack – from mobile applications through the network layer stack to wireless communications and radio propagation. Research is focused on Next Generation (NG) communications networks and services. Facilities include the NG laboratory (unique in a European university). Major sponsors include France Telecom, Orange, Agilent Technologies, Ubiquity Software Corporation, and Cantata Technologies.

Research in the **Medical Imaging Research Unit (MIRU)** has established itself internationally in the field of infrared digital imaging in medicine and has developed non-contact 3D measurement techniques for the objective measurement of chronic wounds and skin ulcers. The Unit's medical imaging laboratory has dedicated thermal imaging equipment and examination rooms for patients. The MAVIS-3D system is now produced by a University spin-out company (Photometrix Imaging Ltd.).

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# Applied Mathematics

▲ **Applied Mathematics achieved an excellent RAE2008 outcome with 65% of its research internationally recognised and results that are comparable with the best modern Universities.**

Research and consultancy in Applied Mathematics and Statistics has a long and successful tradition at the University of Glamorgan. We are enthusiastic research staff who work closely with their research students and whose work ranges from practical and funded collaboration with industry to more theoretical research that produces the highest quality academic publication.

Our primary research interests are in the applied mathematical analysis of partial differential equations, mathematical biology, general relativity, control theory, combinatorics & heuristics, system dynamics and applied statistics especially in relation to time series modeling and medical statistics. We also have a strong interest in mathematical pedagogy.

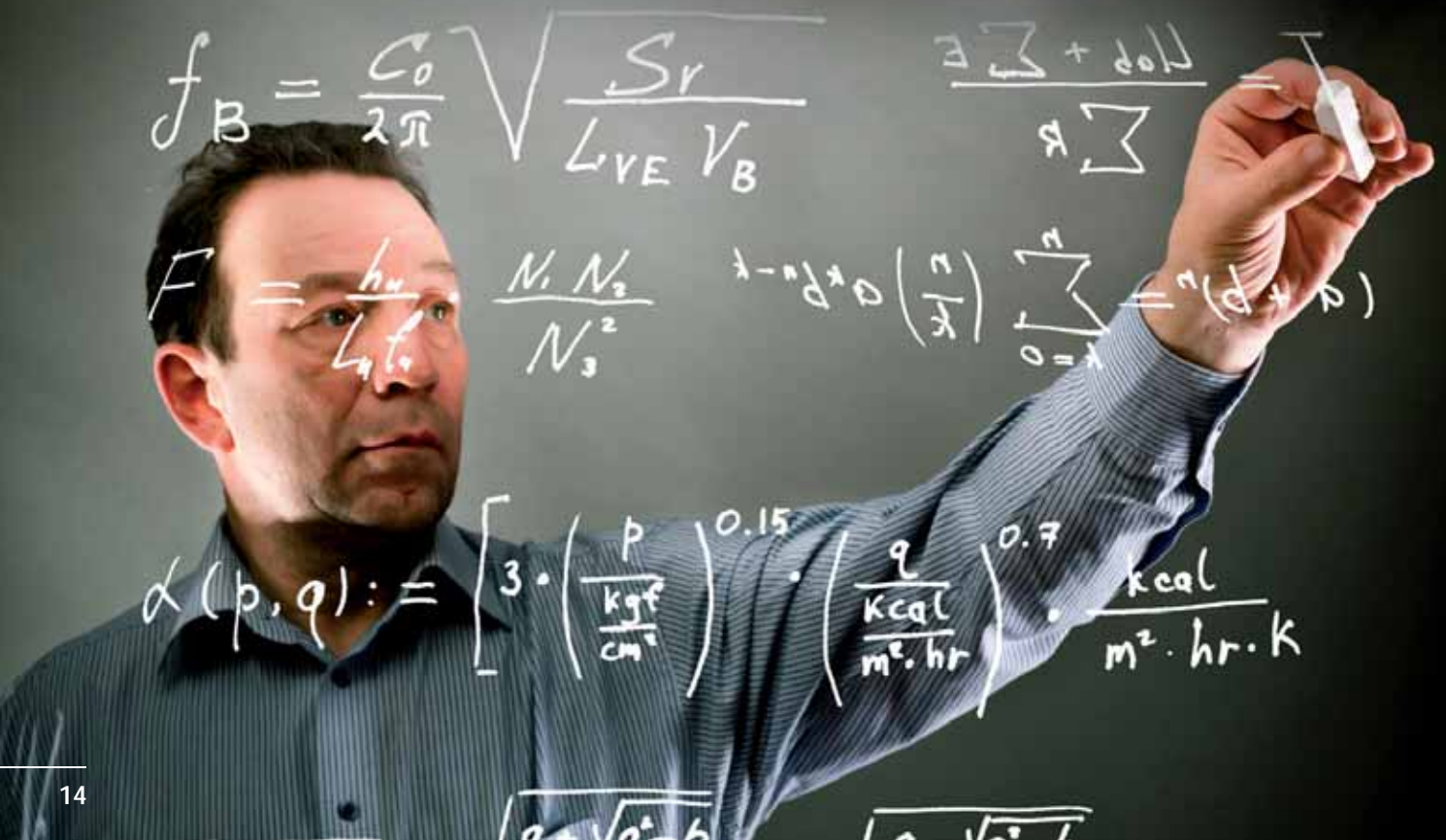
Examples of our work include:

- Application of System Dynamics to the mathematical social modeling of church growth and social diffusion
- Time series modelling methods in energy management applications ( an EPSRC funded project in collaboration with RUMM Ltd)
- Use of Sudoku in error correcting code construction and data compression
- Forecasting and official statistics
- Applied medical statistics with University College Hospital and Royal Glamorgan Hospital
- The evolution of gigantism in society

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We are multidisciplinary in our approach, working with colleagues in engineering and computing. In addition, the RAE2008 result considerably strengthens the overall Mathematics portfolio which includes a successful schools agenda and undergraduate teaching programme.

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# Education

▲ Education at Glamorgan achieved an excellent RAE2008 result with 60% of its outputs internationally recognised.

The Education group is multi-disciplinary and staff work with colleagues in the Faculties and support departments. The RAE2008 result highlighted the internationally recognised work of the staff.

Education research is focused around three central areas - the Department of Education, based in the Faculty of Humanities and Social Sciences (HASS), the Centre for Lifelong learning (CeLL) and the Centre for Excellence in Learning and Teaching (CELT), which co-ordinates education research across the University.

The main research themes are:

## Education management and policy

This includes research on the education, training and socialisation of key managers within educational institutions. It also encompasses analysis of direct policy interventions at community and national level, issues affecting post-compulsory education, and the impact of collaborative activity on higher and further education institutions

**Learning and teaching** research includes reflective research by staff researching their own practice, adult pedagogy, community-based learning, and capacity-building for voluntary groups. More recently, this work has extended into classroom practice in schools and in the early years.

**Blended learning** is an area in which we have specialised, resulting in our being regarded as one of the leading institutions in the field. Interests include the very practical issues of the student and staff experiences of blended learning, and extend into the policy arena and the ways in which technological support impacts upon quality assurance, institutional goals and student satisfaction.

We have been successful in securing significant funding from the European Union for community-based educational initiatives such as the E-College Wales project. We have also received funding from the Joint Information Services Committee and Welsh Assembly Government, and have provided researched policy advice.

The strategy over the next five years is to build on these successes. Future developments include the creation of a university wide Centre for Pedagogical Research which will draw on expertise across different faculties to promote further pedagogic research. The new online *Journal of Applied Research in Higher Education* <http://jarhe.research.glam.ac.uk> reflects this and aims to promote improved practice by encouraging informed debate into pedagogic and related matters in higher education.

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# Built Environment

▲ In RAE2008 85% of the Built Environment Research Unit's work was internationally recognised putting Glamorgan's built environment research in the top 20 of institutions in the UK.

The Unit is actively engaged in applied research to underpin the aims of economic regeneration in Wales and beyond. It has an excellent record of engagement with industry and the professions in the field, actively promoting knowledge transfer, working with many firms that are household names as well as with small and medium enterprises. These include:

- Wales Environment Trust
- Sir Robert McAlpine
- Nuttall Civil Engineering
- The Carbon Trust
- Cardiff County Council
- English China Clays

Projects consider all aspects of the built environment and examples include:

- A project into personal safety funded by the Valley Lines, and an EPSRC/SPARC grant. The research explored how individual design initiatives may impact on different groups in society, focusing on the elderly, the police and convicted criminals. An excellent example of how research can benefit the local community, the knowledge that the University developed can be found in design modifications at stations throughout the local rail network, providing both safer physical environments for rail passengers and reducing the level of fear of crime.

- Research and consultancy work into environment and sustainable development through the use of waste, and on environment protection through reducing the need to extract new material, minimising waste and reducing project costs by optimising materials fit for purpose. International sustainable development work is undertaken notably in Mbale with great success with a growing Africa/Wales collaboration through the PONT initiative.

The commercial arm is **The Centre for Engineering, Research and Environmental Applications (CEREA)**. A multi-disciplinary team of specialists provides a wide spectrum of knowledge and technology transfer services in the general areas of built and natural environment. Its mission is to facilitate collaborative links with industry and the business world and more specifically to provide high quality short and long-term solutions to local, national and international organisations.

The area of sustainability is of growing significance particularly in Wales where the Welsh Assembly Government has taken an ambitious position regarding Carbon Management and low/zero Carbon buildings. Responding to this agenda, a new research unit in Sustainability and the Built Environment is being developed. It will focus on the areas of Construction and Real Estate and Quality, Environment, Safety & Health. The emphasis of the Unit will be to develop and support a local network of companies and organisations that will provide knowledge and technologies to support sustainable development in Wales and beyond.

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# Sport, Health and Exercise Sciences

▲ A young and evolving research unit, over 55% of research outputs in the Sport, Health and Exercise Sciences Research Unit was assessed as internationally recognised by RAE2008.

The Unit comprises a functionally-integrated group of research scientists dedicated to understanding how physical activity impacts upon an individual's clinical health and athletic performance. The Unit houses specialist research laboratories equipped with state-of-the-art analytical equipment and takes advantage of multi-disciplinary research themes that provide unique mechanistic insight through the combined application of basic, applied and clinical science. The nature of our research demands extensive collaboration with internationally-established partners with a focus on high-quality translational science.

*Vascular Health Theme* focuses on the molecular, metabolic and anthropometric determinants of vascular health with a clinical focus. We are particularly interested in how regular physical activity protects the at-risk patient suffering from obesity, diabetes and occlusive atherosclerotic disease. Our specific interest focuses on free radical metabolism and how this impacts vascular endothelial function and the subsequent transport of oxygen to the brain, heart and muscle.

*Sports Performance Theme* takes advantage of our extensive collaborations with elite sports teams and takes a very practical approach to promoting physical activity amongst the young performer through to improving performance of the established elite athlete. We are currently interested in the mechanical and pharmacological aspects of power and novel training strategies that involve intermittent hypoxic training and ischaemic pre-conditioning as a means of improving sports performance.

*Sports Nutrition* - this group is leading innovative research into functional food development with the combined aim of improving elite sports performance and alleviating the burden of vascular disease in the at-risk patient. We have the unique capability of being able to manufacture functional foods in-house with unique products that are low in fat, sugar and salt fortified with specific antioxidants designed to optimise vascular health. This complements our interest in physical activity as a health-promoting behaviour.

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# Psychology

▲ The results of RAE2008 confirmed the department's status as a rapidly developing research unit. Although a relatively new department (2008 was the first time it entered the RAE), Psychology has already gained gradings of national and international standard in the great majority of its output and over 70% of staff entered into the RAE (with the remainder principally working in consultancy).

Research is conducted in two main areas:

## Developmental Psychology

Research in this area covers the entire lifespan and addresses aspects of typical and atypical development. Key texts published by researchers have been translated into 16 languages. Recent publications are in areas as diverse as: managing challenging behaviour in the classroom, the impact of play on learning in the early years, adolescent identity, and internet usage in older adults. Ongoing projects include: a national survey of the psychological and health status of older adults with Autism Spectrum Disorder (funded by Autism Cymru and in collaboration with Bangor University), routes into retirement, emerging adulthood and comparisons between online and offline delivery methods of learning. Policy contributions from this group include: representation on the Higher Education Steering Committee of PlayWales (linked to the Welsh Assembly Government) and membership of Scientific and Editorial Boards for organisations and journals such as the *European Association for Research on Adolescence* and the *Journal of Applied Behaviour Analysis*.

## Health, Sport and Exercise Psychology

Strong contributions are made from all members of this group to research, policy and practice. The FAST Alcohol Screening Test developed by Dr Bev John (in collaboration with University of Wales Institute Cardiff) is being used to screen all newly registered patients at surgeries in England, as well as in other countries. Group members are involved with professional bodies such as the Health Professions Council and the British Psychological Society. Ongoing projects include: promoting safe and sensible attitudes to drinking and skill acquisition and motor control (funded by the Leverhulme Trust).

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# History

▲ Glamorgan's historians make up the top-rated History department in Wales and one of the foremost History departments in the modern university sector, according to the *Guardian's* RAE2008 tables.



The research entered into RAE2008 was as unified in quality as it was diverse in specialism. History's submission included major projects on the Atlantic world, witchcraft and deviance, regionalism in France and Spain, communism and the Cold War and, closer to home, aspects of Welsh social, cultural, labour and gender history.

Among History's partner institutions are the University of Uppsala (Sweden) and, in the UK, the universities of Manchester and Reading. External funding has also been forthcoming. In particular, research projects have been supported by the Leverhulme Trust and the British Academy.

A number of new projects are worth a mention both for their contribution to knowledge and intrinsic wider public appeal and topicality. A major award from the Leverhulme Trust recently made possible the creation of the 'Outcast Europe' research team, which looks at the experience of refugees from the Spanish Civil War until the aftermath of the Second World War. The project is another link in Glamorgan's chain of contacts and collaborations with other institutions, nationally and internationally. As a member of the Exilio Network, there are ongoing conferences and workshops organised together with researchers at the universities of Southampton, Toulouse, Albi and Alicante.

Another project with wider appeal deals with shell shock after the First World War. This research is the springboard for a wider

project looking at 'taboo illnesses'. In addition, History can also introduce the research of two new colleagues attracted from beyond our shores. Dr Tim Jones joined us from the University of Melbourne, Australia; his specialism is sexuality in the Church of England. Dr Jane Finucane joined us from Trinity College, Dublin; her specialisms centre on war in early modern Europe – a topic made possible by her command of German, French and Swedish.

History staff are also integrated in international and national endeavours as consultants in a variety of forms, from membership of the international advisory board of the Berlin-based *Yearbook of Historical Communist Studies* to St Fagan's National History Museum.

It is this level of research and involvement in cultural transfer which inform a wide range of research-led courses offered to students. Among the newest developments are the plans to draw on the activities of History's pioneering 'War, Violence and Society' research cluster to inform modules at MA level.

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# Biological Sciences

▲ A first time submission to the RAE, Biological Sciences achieved excellent results in RAE2008 and conducts research that is recognised internationally.

**The Biological Sciences Research Group** at the University of Glamorgan was set up in 2005 and carries out internationally regarded research in its specialised areas of cell and molecular biology and ecology. The group currently consists of four academic researchers, including two early career appointees, and is headed by Professor Denis Murphy.

Professor Murphy's research interests are primarily focussed on the role of intracellular lipid-protein assemblies in various developmental contexts, including responses to biotic and abiotic stresses. He provides advice and consultancy up to senior government level in the UK and overseas, and has an extensive portfolio of international research collaborators. He is author of several notable books on biotechnology and agriculture. Current research interests include the evolutionary dynamics of biological sentinel species in collaboration with Cardiff University and Imperial College and rare and endangered plant species in the Brecon Beacons and Snowdonia with the National Museum of Wales and the National Botanic Garden of Wales. In 2008, he was asked to take a lead role as a Biotechnology Advisor with the UN Food and Agriculture Organisation to formulate strategies to address issues of global food insecurity and climate change.

Dr Martin Powell is currently researching into the molecular ecology and epidemiology of zoonoses, with particular interest in Toxoplasmosis. His initial research focused on generating data to provide effective research and surveillance of Toxoplasma in both humans and wildlife in Britain. Dr Emma Hayhurst recently joined the group and has worked on a combination of biochemical, genetic, and microscopy techniques to study the peptidoglycan structure of both *Bacillus subtilis* and *Staphylococcus aureus*.

Dr Peter Wiles is an internationally recognised researcher in the ecology and systematics of the Acari and exotic UK invertebrates in lowland river systems. He has also pursued biogeographic studies of water mites in tropical Australasia from Thailand to Papua New Guinea and has more recently extended this to the Caribbean, especially Cuba and Honduras. This work has involved use of many new field ecology techniques and he has devised new microscopic methods for the preparation of mites, used electrophoresis to identify species and is now employing DNA techniques to extend this approach. Dr Wiles has discovered several dozen new invertebrate species and has been actively involved in broader issues of conservation and management which has resulted in consultancy work for a variety of UK and overseas wildlife organisations and other bodies.

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# Business and Management Studies

▲ Glamorgan Business School expects all academic staff to be engaged in research or scholarship and therefore adopted an inclusive approach by submitting more than 27 (full time equivalent) staff to RAE2008. The outstanding results confirm Glamorgan Business School's status as a place where teaching is research informed.

The increasing scale and quality of Glamorgan Business School research is only surpassed by our ambitions! The School is determined that applied business research will continue to be the springboard to its success – in attracting high quality students, in working with business, in demonstrating value and relevance and, above all, in inspiring individuals to raise their own personal expectations and abilities and then in helping them to realise these ambitions.

Applied business research means the creation, development and application of knowledge about business – about knowing how as well as knowing what. Glamorgan Business School is rapidly becoming a centre for innovation in research, teaching and consultancy. The School itself continues to learn, with this learning shared and disseminated across its staff and partners.

Much of our research centres on shaping the theory and practice of management, informing our teaching and generating new opportunities for consultancy. Not surprisingly, we are keen to apply this knowledge to ourselves, developing benchmarks and targets for our own activities and carefully evaluating the effectiveness of the things we do and the ways in which we do them. In our diverse range of research units and groups, staff are working to develop new agendas and new insights, alongside practical tools, techniques and methods to improve business performance, including the contribution of individuals.

The School has a number of high profile research centres, each focussed on acting as a bridge between theory and practice. These include an outstanding survey assessment of workplace behaviour in the UK, the analysis of public sector workforce engagement in Wales, and the policy analysis of the energy needs in Wales and the UK. Glamorgan Business School also has the only Centre for Research into Futures and Innovation (CRI-FI) and Cri-FI is the UK node of the UN initiative on futures thinking.

In May, The Centre for Enterprise launched, bringing together expertise from across the University. The purpose of the Centre will be to provide individuals, institutions, communities and governments with a dynamic, robust and wide-ranging knowledge base for shaping and participating in enterprise and economic development policy and practice.

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# Chiropractic

▲ Founded following the previous RAE in 2001, the Chiropractic Research Unit was the first manipulation based therapy research group to be considered for submission to any RAE.

The mission of the Chiropractic Research Unit is to examine the tools and methodologies used to assess, diagnose and manage conditions seen by chiropractors in primary contact practice. We also investigate the causes of neuromusculoskeletal conditions and consider routes to their prevention. The Unit comprises five active members, headed by Professor Peter McCarthy.

Research encompasses a range of clinically-related topics that form two centres of activity.

## Assessment and development of diagnosis tools

An area that has significantly benefited from collaboration with both industry (local and international) and other academic centres, research is focussed on the following areas:

- Infra-red thermometry and thermography.
- Biomechanics and proprioception: assessment of joint range of motion and kinaesthesia in special populations (split into two sub-themes: immobility and seating and Cervical Spine dysfunction in professional sports).
- Respiratory health: assessment of respiratory muscle endurance in health and disease, as well as breathing patterns and the assessment of dyspnoea in Coronary Obstructive Pulmonary Disease (COPD).

## Study of clinical skill acquisition and development to aid in both diagnosis and the assessment of treatment efficacy

- Assessment of clinical protocol efficacy and clinical education
- Assessment of the teaching process, including the transfer and progression of clinical skills/ awareness and their efficacy in the clinical situation.

Outside the chiropractic profession, we have collaborated with a wide variety of commercial organisations (Invacare Ltd and Magstim Ltd), professional sports teams (Bath Rugby and Northampton Saints) and other academic centres (Motion Analysis Unit at the University of Wales, Swansea, University College London Hospitals; Massey University New Zealand and Murdoch University, Perth, Western Australia).

Outputs from the Unit range from case studies, through primary data via scientific experimental studies to randomised controlled clinical trials.

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# Research Matters

## University launches new research centres

In February, the **Centre for Regeneration and Sustainable Communities** was launched. The Centre brings together research teams engaged in a wide range of research activities in the following fields: physical renewal; transport; community regeneration; health equalities; environmental sustainability; social inclusion; social and economic policy; social enterprise; and social and cultural life.

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The **Centre for Enterprise's** purpose will be to provide individuals, institutions, communities and governments with a dynamic and wide ranging knowledge base for shaping and participating in enterprise and economic development. It is holding a sandpit event in May in conjunction with the **Centre for Regeneration and Sustainable Communities** that will look at how entrepreneurship and innovation will play a pivotal role in restoring economic prosperity underpinned by a new social responsibility and holistic approach to sustainability.

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The **Centre for Disaster Management and Emergency Response** will launch in the autumn. Current activity linked to the Centre includes the teaching of a successful MSc in Disaster Healthcare, participation in an Economic and Social Research Council (ESRC) engagement event, the hosting of an ESRC Education Seminar in Disaster Management at the end of June and a scoping report on Civil Contingencies Training and Exercise Requirements in Wales completed for the Welsh Assembly Government. The University is also co-organiser of the Dealing with Disasters conference series which this year is being held in Nepal.

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## Professor to advise on future of research and innovation in Wales

Professor Brian Hobbs, Pro-Vice Chancellor (Research), has been appointed to the HEFCW Research, Innovation and Engagement Committee for the next three years. The role of the committee is to advise the Funding Council on its strategies for innovation, engagement with external stakeholders (Third Mission) and research activities and the policies and principles that need to underpin them in the long term, including funding arrangements.

## Glamorgan launches new journal

The first edition of the *Journal of Applied Research in Higher Education* has been published by the University of Glamorgan. The aim of this new journal is to promote improved practice by encouraging informed debate into pedagogic and related matters in higher education. Papers in the journal include subject areas like higher education policy and management, learning and teaching, curriculum development and quality enhancement.

<http://jarhe.research.glam.ac.uk>



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