Faculty of Science & Information Technology

SUMMER VACATION SCHOLARSHIPS
RESEARCH TOPICS (2011/12)

CONTENTS:

School of Design, Communication & Information Technology:

TOPIC NO.	TITLE OF RESEARCH TOPIC	DESCRIPTION OF RESEARCH PROJECT	PRINCIPAL SUPERVISOR CONTACT DETAILS	RESEARCH GROUP/CENTRE	DISCIPLINE	SCHOOL
1	**The role of key messages in corporate environmental communication material.**	This project comprises undertaking a pilot study of the environmental messages that are developed and disseminated by a large organisation. It is proposed that the study will use a qualitative approach undertaking textual and thematic analysis of the messages to identify key areas of focus and to categorise the types of messages, dissemination channels, intended audiences and themes. This project will inform a larger project examining the way organisations utilise messaging techniques in a public relations/public communication context.	Dr Melanie James P: (02) 4985 4520 E: melanie.james@newcastle.edu.au	Design, Information & Human Communication	**Communication**	DCIT
2	**Investigating the Mediation of the Slow Food Movement in an Australian Context**	This project involves a preliminary discourse analysis of recent Australian Specialist Food Magazine Publication content. With a view to exploring the re-emergence of Slow Food ideologies in contemporary food planning and preparation articles, the project will focus on the deconstruction of written and printed specialist texts. Through a 4000 word written report, the discourse analysis will identify themes and patterns consistent with the Slow Food Movement some of which include: farm produce, nutritional benefits, artisans and consumption habits. It is anticipated that this first stage discourse analysis of existing material will accommodate further exploration of the food journalism genre and support practice-based enquiry within the domain of food feature article writing.	Dr Judith Sandner P: (02) 4921 7474 E: judith.sandner@newcastle.edu.au	Design, Information & Human Communication	**Communication**	DCIT

3	**Internet news: A transnational study examining the news consumption habits of residents in Singapore and Australia.**	This project is an empirical study that aims to examine whether internet news has overtaken traditional newspapers in readership and popularity. At the same time, the study also examines why some people choose to consume news online instead of reading newspapers. An identical survey will be conducted simultaneously in two different countries, Singapore and Australia. Both countries were chosen because they share similarities in language, education, economic parity and access to new media technologies. They have one key difference – distinctly different press models. Australia has a media relatively free from political interference, whereas Singapore experiences a media structure that is government owned and tightly regulated. According to the widely cited Reporters Without Borders, Australia has consistently ranked amongst the top quartile of the Press Freedom Index while Singapore usually ranks amongst the lowest quartile of the index. Comparing the news reading habits of residents from both countries could thus also shed light on whether issues such as media ownership is a factor in determining news consumption choices.	Principal Supervisor: Mr Paul Scott P: (02) 4921 8644 E: paul.scott@newcastle.edu.au Co-supervisor: A/Prof Pieter (Pia) Aquilia P: +65 6517 2614 E: Pieter.Aquilia@newcastle.edu.au Co-supervisor: Dr Chua Ling-Yen P: +65 6517 2654 E: Ling.Chua@newcastle.edu.au	Design, Information & Human Communication	**Communication**	DCIT
4	**Natural History Illustration**	The Don McNair herbarium is a valuable resource for students of Natural History Illustration. This project requires a student to develop a series of black and white illustrations from specimens held in the herbarium. The illustrations will enhance the herbarium and will enable publication of the illustrations to assist with research and the dissemination of information about the collection.	Dr Anne Llewellyn P: (02) 4985 4544 E: Anne.Llewellyn@newcastle.edu.au	Wildlife Representation Group	**Design & Natural History Illustration**	DCIT
174	**Haven't I seen that somewhere before? Stopmotion animation and special effects**	This project is an investigation into stopmotion animation and special effects. It is a studio-based project combining experimental animation, looped sequences and projections. This research will inform a larger creative work exploring optical illusions, moving images and special effects.	Ms Jane Shadbolt P: (02) 4921 6369 E: jane.shadbolt@newcastle.edu.au		**Design & Natural History Illustration**	DCIT
5	**Simulating a Dialysis Machine**	In this project you will be part of a team building a software simulator to train operators in the use of Dialysis machines. This is a new project working with the School of Nursing and Midwifery, hospitals and an industry partner.	Dr Ric Herbert P: (02) 4349 4492 E: Ric.Herbert@newcastle.edu.au	Visual Information Processing (VIP)	**Information Technology**	DCIT

School of Environmental & Life Sciences:

TOPIC NO.	TITLE OF RESEARCH TOPIC	DESCRIPTION OF RESEARCH PROJECT	PRINCIPAL SUPERVISOR CONTACT DETAILS	RESEARCH GROUP/CENTRE	DISCIPLINE	SCHOOL
6	**Metabolic characteristics of interval training**	While the general oxygen uptake and metabolic demands of interval training is known, little is known on the consistency in the removal of oxygen from the working muscles. This project would aim to provide pilot data detailing the changes in muscle oxygenation levels with different interval training protocols. Considerable lab testing and data analysis is required in this project and would provide an introduction to honours research.	Dr Ben Dascombe P: (02) 4348 4150 E: Ben.Dascombe@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS
7	**Rating of perceived exertion in cricket players**	The use of subjective measures of exercise intensity (such as rating of perceived exertion), has received great attention in team sports due to their ease of monitoring individual training intensity and load. However, the majority of this research has been aimed at high-intensity intermittent sports such as rugby league, soccer or Australian Football. The use of RPE to monitor training intensity and load in cricket players has not been validated and therefore, is required before being used in future research studies.	Dr Ben Dascombe P: (02) 4348 4150 E: Ben.Dascombe@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS
8	**Assessing inflammatory markers using different collection techniques**	The measurement of assessing changes in inflammatory markers following high-intensity exercise often requires blood to be drawn from venepuncture samples. However the need for venepuncture increase the safety needs and offers discomfort for participants, as well as reducing the frequency of data collection. Therefore, this project aims to provide pilot data determining differences in inflammatory markers taken from blood (venepuncture and capillary) as well as saliva following exercise-induced muscle damage.	Dr Ben Dascombe P: (02) 4348 4150 E: Ben.Dascombe@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS
9	**Determining the optimal push-off angle for swimming**	The push off in swimming is an important technical aspect of racing, but is often overlooked by coaches and scientists. The optimal angle of the push off is complicated by the interaction of force application and buoyancy that act on a swimmer. The research will determine speed distance and other kinematic measures of high-performance junior swimmers across a range of push off angles.	Dr Ben Dascombe P: (02) 4348 4150 E: Ben.Dascombe@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS

175	**The kinematics of sprint deceleration at various sprint velocities and stopping distances.**	The research literature investigating the influence of running deceleration on athletic performance is severely limited. For the purposes of this study rapid sprint deceleration will be examined in the context of sports that require repeated maximal or near-maximal sprint running. The study will examine the kinematics of deceleration at various sprint velocities using a variety of stopping distances. In addition, the study will attempt to quantify the differences between athletes of varying deceleration ability.	Mr Adrian Schultz P: (02) 43484151 E: Adrian.schultz@newcastle.edu.au	Exercise and Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS
10	**The effects of agility drills on acceleration and lateral movement**	There are opportunities for research analysing the use of agility drills for running speed and lateral movement development in trained and/or untrained individuals. Details of the project will be determined in consultation with sport science academics.	Dr Robert Lockie P: (02) 4349 4428 E: Robert.Lockie@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS
11	**The effects of nutritional supplementation and resistance training on muscle strength and hypertrophy**	There are opportunities for research analysing the effects of resistance training in conjunction with a range of nutritional supplements on muscle strength and hypertrophy in trained and/or untrained individuals. Details of the project will be determined in consultation with sport science academics.	Dr Robert Lockie P: (02) 4349 4428 E: Robert.Lockie@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS
12	**Body composition throughout the menstrual cycle**	Hormonal changes throughout the menstrual cycle have many physiological effects. Females often report symptoms of fluid retention during the menstrual cycle, which may affect body composition measures. This project will investigate if body composition measures fluctuate throughout the menstrual cycle.	Dr. Xanne Janse de Jonge P: (02) 4349 7899 E: x.jansedejonge@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS
13	**The menstrual cycle and exercise performance**	Hormonal changes throughout the menstrual cycle have many physiological effects, which may in turn affect exercise performance. There are opportunities for research projects in this area. Details of specific projects will be determined in consultation with the academic staff.	Dr. Xanne Janse de Jonge P: (02) 4349 7899 E: x.jansedejonge@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS
176	**Jump testing in elite soccer**	There is an opportunity available to conduct a project on jump testing as a training monitoring tool in elite soccer. A professional soccer team is very interested in the project and details of the project will be determined in consultation with the soccer team's sport science staff and the project supervisor.	Dr. Xanne Janse de Jonge P: (02) 4349 7899 E: x.jansedejonge@newcastle.edu.au	Exercise & Sport Science	**Applied Sciences (Ourimbah Campus)**	SELS

14	**Storage effects on fruit juice phenolics and antioxidants**	Phenolics are naturally occurring compounds in fruit which have potent antioxidant capability. The effect of storage time, temperature and technique is not well documented on a range of juices, including apple juice. In addition, effects on antioxidant capacity also need to be studied. This will be done in conjunction with Industry & Investment (I&I) NSW at Narara / Ourimbah.	Supervisors: Dr Paul Roach / Dr Costas Stathopoulos P: (02) 4348 4129 / (02) 4348 4124 E: paul.roach@newcastle.edu.au / costas.stathopoulos@gmail.com Co-supervisor: Dr John Golding P: (02) 4348 1926 E: john.golding@industry.nsw.gov.au	Nutrition, Food & Health Research Group	**Applied Sciences (Ourimbah Campus)** **I&I NSW**	SELS
15	**Maintaining fruit quality with edible films**	Maintaining quality and shelf life is important for the marketing of horticultural produce. Edible films and coatings offer a potential to increase the storage and market life of perishable products such as cherries and peaches. A range of different postharvest coatings will be assessed under simulated storage conditions for their effectiveness to maintain fruit quality. This work will be done in conjunction with NSW Department of Primary Industries who are on-site at the Ourimbah campus.	Dr Costas Stathopoulos Phone: (02) 4348 4124 Email: costas.stathopoulos@newcastle.edu.au Co-supervisor: Dr John Golding Phone: (02) 4348 1926 Email: john.golding@dpi.nsw.gov.au	Nutrition, Food & Health Research Group	**Applied Sciences (Ourimbah Campus)** **NSW DPI**	SELS
16	**Maintaining cherry stem and fruit quality**	Maintaining the green colour and freshness of cherry stems during storage and at the retail level are important quality aspects of cherry fruit quality. The retail storage environment has a considerable affect on stem quality presentation to the consumer. The effect of different storage and simulated retail display environments on stem quality will be assessed. In addition the interaction of edible films and coatings will be assessed under different storage conditions. This work will be done in conjunction with NSW Department of Primary Industries who are on-site at the Ourimbah campus.	Dr Costas Stathopoulos Phone: (02) 4348 4124 Email: costas.stathopoulos@newcastle.edu.au Co-supervisor: Dr John Golding Phone: (02) 4348 1926 Email: john.golding@dpi.nsw.gov.au	Nutrition, Food & Health Research Group	**Applied Sciences (Ourimbah Campus)** **NSW DPI**	SELS
17	**An assessment of DNA packaging in human sperm.**	Human sperm package DNA with protamines to protect it from damage. However, a significant proportion of the genome remains poorly packaged and accessible to DNA damaging agents. We have developed an assay to assess packaging in human sperm. The project will use the assay to determine the extent of variation in packaging between humans.	Dr Shaun Roman P: (02) 4921 6818 E: shaun.roman@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS

18	**Evaluating the effect chronic exposure has in generating DNA damage in the paternal germline.**	DNA damage in the male germline is postulated to lead to detrimental effects such as cancer in the offspring. We are developing mouse models of chronic exposure to assess the genotoxic effect of chemicals. The project involves examining gene and protein expression in testis from exposed animals. We will also investigate the nature of the DNA damage generated.	Dr Shaun Roman P: (02) 4921 6818 E: shaun.roman@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS
19	**Molecular Pathways of Germ Cell Differentiation 1: regulation of gene expression in spermatogonia**	Using array technology we have previously identified a number of genes regulated by retinoids in spermatogonia. We have identified a pathway of genes that responds to retinoids via a transcription factor not previously implicated in retinoid signalling. The project involves assessing regulation of a target of this transcription factor at the promoter level via a reporter construct. We will use gene knockdown to evaluate the role of the transcription factor in the pathway.	Dr Shaun Roman P: (02) 4921 6818 E: shaun.roman@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS
20	**Molecular Pathways of Germ Cell Differentiation 2: regulation of BMP4 gene expression**	We are seeking to understand the transition from spermatogonia to spermatocyte at the molecular level. We have identified 2 signalling pathways that interact during spermatogonial differentiation: the BMP4 and retinoid pathways. Previously, we have found that the metabolites of vitamin A, known as retinoids, regulate BMP4 gene expression. The major metabolite of vitamin A is not the active molecule in this case. This challenges a dogma. Testis and germ cells will be examined for vitamin A metabolites. Retinoids, both extracted and commercially available, will be tested by assessing their affects on BMP4 gene expression in isolated cells.	Dr Shaun Roman P: (02) 4921 6818 E: shaun.roman@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS

21	**SLX4 – role in spermatogenesis**	Our newly identified protein **SLX4** is a scaffold molecule which serves to recruit, stimulate and regulate the activity of the nucleases responsible for DNA repair in **all** eukaryotic cells. SLX4 also plays a key role in homologous recombination, a type of genetic recombination in which nucleotide sequences are exchanged between two strands of DNA. Crossovers are vital for producing the inter-homologue cohesion which allows meiosis I to continue. No crossover results in the failure of meiosis and aneuploidy or cell death. Increased susceptibility to several types of cancer is associated with the dysfunction of the genes for homologous recombination due to the failure of accurate repair of double-strand breaks in DNA. In this proposal we will use our null mouse model and human testes tissues to investigate the role of SLX4 in the regulation of male meiosis and in increased susceptibility to cancer.	Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.McLaughlin@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS
22	**Characterisation of FZR1 in spermatogenesis**	We have created a tissue–specific FZR1 knockout in spermatogonia Mice have been derived in which all male germ cells have been depleted of FZR1 and they are sterile. The role of FZR1 in spermatogenesis is complex and preliminary analysis reveals that FZR1 gene and protein expression is highly up-regulated in the early stages of spermatogenesis. Indicating that FZR1 plays a key role in entry into meiosis and meiotic segregation in spermatocytes. The aims of this project are to characterise the expression of FZR1 mRNA and protein in the mouse testes and to investigate the use of shRNA experiments to elucidate signalling pathways controlled by FZR1.	Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.McLaughlin@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS

23	**Chemokines and spermatogenesis: roles of SDF-1 and CXCR-4/7**	In the mammalian testes, numerous spermatozoa are continuously produced throughout adult reproductive life. This process, known as spermatogenesis, is dependent on the establishment early in neonatal development, of a population of self renewing germ line stem cells known as GSC's, from which the highly differentiated haploid spermatozoa are produced. Little is known about the molecular and cellular mechanisms underlying the creation of GSC's from their immediate progenitors, the gonocytes, and how the stem cell niche in which they reside in the testes is defined. Recent evidence from our laboratory suggests that a chemokine SDF-1 and its receptors CXCR-4 and CXCR-7 are intimately involved in the processes of gonocyte survival and differentiation in the fetal testes and the eventual migration of the GSC population to the stem cell "niche" located in the basement membrane in the post natal testes. The aims of this proposal are: to elucidate the mechanism of maintenance and migration of male germ cells in the developing testis and the role of SDF-1/CXCR-4/7 interaction in the establishment of stem cell populations in the germ cell niche, to characterize the signalling pathways activated by CXCR-4/7 and their role in germ cell differentiation and to investigate the use of knockdown and overexpression technologies in vivo and in vitro to manipulate germ cell survival and differentiation.	Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.McLaughlin@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS

24	**Cytokines and ovarian folliculogenesis**	Female germ cells or oocytes are sequestered in primordial follicles before birth and remain quiescent in the ovary until recruited into the growing pool throughout the reproductive years. Programmed follicular cell death continues throughout a woman's reproductive lifetime and ultimately 99.9% of all oocytes are lost prior to ovulation with no opportunity to be fertilised. Very little is known about what triggers follicle activation, nor the intracellular mechanism by which the coordinated differentiation of somatic cells is harmonized with oocyte growth yet this holds the key to female germ cell maintenance as well as optimising oocyte cell health and development. In our pilot microarray gene expression surveys and confirmed by our protein localisation studies, we have identified that two key intracellular signaling molecules Signal Transducers and Activators of Transcription 3 (STAT3) and Suppressor of Cytokine Signalling 4 (SOCS-4) are induced on activation of the murine primordial follicle. The overall goal of our proposed project is to characterise the intracellular cytokine signalling pathways regulating activation and maintenance of mammalian ovarian primordial follicles.	Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.McLaughlin@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS
25	**Environmental impacts on female fertility**	All female mammalian ovaries contain a limited supply of primordial follicles which are present from birth. Recently it has become apparent that xenobiotics, such as organochlorine pesticides, polychlorinated biphenyls, dioxins, alkyl phenolic chemicals, phthalates and synthetic oestrogens are capable of interfering with normal female reproductive function in both humans and animals. Our recent studies of the effects of xenobiotic exposure in the ovary have demonstrated that environmental agents can cause significant primordial follicle loss and oocyte damage through oxidative stress. Our proposed model is based on preliminary findings which indicate that xenobiotic exposure has direct consequences on ovarian function. The aims of this project are: To characterize the ovarian follicle signalling pathways activated by xenobiotics and their role in oocyte growth, follicle differentiation and survival. Insight into these processes will illuminate the origins of primordial follicle loss and oocyte dysfunction leading to subsequent ovarian failure and infertility in human females.	Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.McLaughlin@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS

26	**Meiosis : role of Msi2 in male germ cell development**	Gametogenesis is whereby primordial germ cells differentiate into gonocytes the precursors of physically mature viable gametes. This process needs strict control over translational regulation and is achieved through RNA binding proteins (RBPs) which have been implicated in the regulation of spatial temporal and functional dynamics of mRNAs. The RBPs bind and regulate the translation of mRNA by attaching to specific target sites in the 3' untranslated region (UTR). The aims of this project are to identify mRNA and proteins which interact with Msi2 – this is intended to identify mRNA targets of translational regulation in gametogenesis using our transgenic over expressing msi2 mouse and Msi2 protein:RNA and Msi2 protein:protein pull downs.	Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.McLaughlin@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS
27	**miRNAs and spermatogenesis**	MicroRNA are a recently discovered class of noncoding RNA molecules of about 20-22 nucleotides long. These miRNA molecules specifically target the 3' untranslated region of mRNA molecules to repress their translation and thus control their expression. We have information as to the causes of testicular cancer by examining the gene expression and miRNA expression within mouse gonocytes and spermatogonia, and comparing to that obtained in normal human testes and testicular tumours. The changes in miRNA expression will be examined using a microarray and confirmed with real time PCR. The target gene expression pattern will be examined using real time PCR. The role of miRNA within spermatogenic stem cells as well as testicular germ cell tumours will be examined using shRNA knockdown within spermatogonia and the T-Cam2 cell line which was derived from a seminoma tumour.	Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.McLaughlin@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS
28	**Non surgical sterilization for the control of fertility in domesticated animals and feral pests**	The intention of this study is to develop a humane, safe and effective method of sterilising female domestic animals without surgical intervention. This study intends to target the supply of dormant eggs in the ovaries of female mammals. Every female mammal is born with a finite supply of eggs, once this supply is exhausted, reproduction ceases. Our study intends to isolate and characterise pharmaceutical agents which can specifically destroy the dormant egg population resulting in irreversible sterilisation. This study intends to increase the virulency of these peptides by attaching to biological agents which facilitate the destruction of the oocytes cellular membrane. Ultimately resulting in a sterilisation agent which is effective at low concentrations, providing a low cost alternative to surgical sterilisation.	Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.McLaughlin@newcastle.edu.au	ARC Centre of Excellence in Biotechnology & Development Priority Research Centre in Reproductive Science	**Biological Sciences**	SELS

29	**Cell Biology of Spermatozoa** ***i) Epididymal Transit and Maturation***	Upon leaving the testis, spermatozoa are incapable of progressive movement or the cascade of cellular events that result in fertilization of the oocyte. These functional characteristics are only acquired as spermatozoa undergo maturation during epididymal transit. Given the absolute importance of epididymal maturation for the generation of fertile spermatozoa, it is clearly important that the molecular mechanisms supporting this functional transformation be elucidated. Success in this area will have implications both for development of reversible male contraceptive agents and the aetiology of male infertility. This project aims to characterise changes in tyrosine phosphorylation and mitochondrial activation which appear to be particularly important parts of epididymal maturation.	Dr Brett Nixon P: (02) 4921 6977 E: Brett.Nixon@newcastle.edu.au Laureate Professor John Aitken P: (02) 4921 6143 E: John.Aitken@newcastle.edu.au	Priority Research Centre for Reproductive Science	**Biological Sciences**	SELS
30	**Cell Biology of Spermatozoa** ***ii) Capacitation and Development of Fertilizing Ability***	Transcriptionally inactive spermatozoa rely heavily on post-translational modifications in order to acquire functional competence. These processes occur in two distinct phases as spermatozoa pass through the epididymal lumen and then ascend the female reproductive tract. It is well established that both events are essential for fertility, however the biochemical mechanisms behind the maturation of these cells remains unclear. This project aims to characterise the entire complement of proteins present in spermatozoa. It will also decipher which proteins are up/down regulated, acquired and/or completely lost during both maturation procedures.	Laureate Professor John Aitken P: (02) 4921 6143 E: John.Aitken@newcastle.edu.au	Priority Research Centre for Reproductive Science	**Biological Sciences**	SELS

31	**Cell Biology of Spermatozoa** ***iii) Monotreme Sperm Biology***	As iconic symbols of Australia's unique fauna the platypus and echidna generate considerable interest from tourists and the Australian public, thus ensuring that their display in zoos is of significant commercial value. Nevertheless, the record of breeding the 3 extant monotremes in captivity is poor, and the New Guinea echidna faces extinction in the wild. Consequently, knowledge of monotreme reproductive biology is important for conservation practices. This project focuses on elucidation of the molecular processes leading to fertilization in monotremes, including: the proteins which form sperm into bundles to greatly enhance their motility (a unique sperm competition strategy) and the mechanisms involved in sperm bundle formation. The work will provide an understanding of the biological significance of adaptations unique to mammals, the need for maturation of sperm in the epididymis and a subsequent period of capacitation before they are capable of fertilizing an ovum.	Dr Brett Nixon P: (02) 4921 6977 E: Brett.Nixon@newcastle.edu.au	Priority Research Centre for Reproductive Science	**Biological Sciences**	SELS
32	**Cell Biology of Spermatozoa** ***iv) Formation of Sperm Zona Receptor Complex***	Mammalian sperm-egg interaction is arguably one of the most remarkable processes in biological science. This exquisitely specific cell recognition event depends upon a complex cascade of interactions between free-swimming sperm and ovulated eggs. Elucidating the nature of these interactions has been the subject of intense investigation by many laboratories. Although this has led to extensive characterization of the respective gametes, such studies have failed to elucidate the molecular basis of this event. In our considered judgement this lack of success stems from the incorrect assumption that the sperm receptor is a single molecular entity that is constitutively expressed on the cell surface. In contrast, recent research from our laboratory has provided support for a novel hypothesis that sperm-egg interaction is mediated by a multimeric sperm receptor complex. Furthermore, we have compelling evidence that this complex is assembled on the sperm surface through the concerted action of a family of molecular chaperone proteins that reside within specialised membrane domains, known as lipid rafts. In this project we aim to confirm the validity of this model, establish the molecular composition of the sperm surface receptor complexes and characterise the downstream signalling cascades that culminate in fertilisation.	Dr Brett Nixon P: (02) 4921 6977 E: Brett.Nixon@newcastle.edu.au Laureate Professor John Aitken P: (02) 4921 6143 E: John.Aitken@newcastle.edu.au A/Prof Eileen McLaughlin P: (02) 4921 5708 E: Eileen.Mclaughlin@newcastle.edu.au	Priority Research Centre for Reproductive Science	**Biological Sciences**	SELS

177	**Establish of sperm-oviduct epithelium cell co-culture system in the horse**	The project aims to develop an equine sperm-oviduct epithelial cell co-culture system as (1) a tool for future study molecular events involved in preparing the mammalian sperm to achieve fertilisation (sperm capacitation in the oviduct); (2) a potential method of sperm storage for the selective breeding program in race horses. An Honours student is invited to join this project. They will be involved in establishment of the co-culture system, and observation of sperm-oviduct cell interaction *in vitro*. Therefore, the student will receive training on a wide range of skills, including tissue/cell culture, producing immune fluorescence photos and electron microscopic picture, video imaging and tracking of cellular interactions *in vitro*.	Dr Minjie Lin P: (02) 4921 5707 E: Minjie.Lin@newcastle.edu.au Laureate Professor John Aitken P: (02) 4921 6143 E: John.Aitken@newcastle.edu.au	Priority Research Centre for Reproductive Science	**Biological Sciences**	SELS
178	**Reproductive Physiology, particularly the roles of cytoskeletal proteins on the fertilisation and embryonic development, in a marine invertebrate, *Galeolaria caespitose***	This study aims to examine the reproductive physiology of the marine polychaete Galeolaria caespitose, which is poorly studied at present. This project will focus upon the creation of a DVD film which depicts the continuous early embryonic development of G. caespitose from fertilisation to the larval trochophore stage. The dynamic changes in the cytoskeletal proteins actin and tubulin will be examined during fertilisation and cleavage. This will be done using fluorescent microscopy to visualise the proteins during cellular events as they occur in real-time and by using tubulin and actin inhibiting drugs to examine the proteins importance in reproductive and developmental events by analysing the impact of their inhibition on cellular processes. The nature of gametogenesis in both male and female G. caespitose is currently unstudied so that transmission and scanning electron microscopy will be used to examine these processes to provide new and useful information on the reproductive physiology of this species. This information will provide a basis from which to evaluate the potential of G. caespitose as a bio-monitor for use in Australian marine waters as it is already known to have a large distribution, quick generation time, is easily handled in lab conditions and has responded well in past toxicity testing studies.	Dr Minjie Lin P: (02) 4921 5707 E: Minjie.Lin@newcastle.edu.au Laureate Professor John Aitken P: (02) 4921 6143 E: John.Aitken@newcastle.edu.au	Priority Research Centre for Reproductive Science	**Biological Sciences**	SELS

33	**Discovery of new species: The Goblin Spiders PBI**	Spiders are a mega-diverse order of terrestrial predators. In Australia about 3000 species are described but over 6000 species are still not named yet. Especially the Goblin spiders of the family Oonopidae are poorly known. The proposed project will investigate the *Opopaea* species of 2 habitats, identify the new species and compare the two habitats according to their *Opopaea* fauna. This project will assist the "Goblin Spider Planetary Biodiversity Inventory (PBI)" funded by the National Science Foundation of America in describing new species. This will help to discover Australia's rich and unique Invertebrate Fauna.	Dr Barbara Baehr (Conjoint Senior Lecturer) P: (02) 4921 5876 E: Barbara.Baehr@newcastle.edu.au	Centre for Sustainable Ecosystem Restoration (CSER)	**Biological Sciences**	SELS
34	**Ants and seed dispersal: ant repellent methods**	Ants have been shown to be a major player in the failure of seeding programs of rehabilitated landscapes. Although ants play a vital role in established ecosystems by contributing to food chains, decompacting the soil, and dispersing seeds, on a newly rehabilitated site early generalist colonisers can have a negative impact on rehabilitation because they will harvest and eat the seed. Experiments on a variety of compounds like eco-oil (a natural product) and coopex (a chemical) that may be useful as ant deterrents, but not destroy them will be conducted in the field.	Dr Carmen Castor P: (02) 4921 5876 E: Carmen.Castor@newcastle.edu.au	Centre for Sustainable Ecosystem Restoration (CSER)	**Biological Sciences**	SELS
35	**Assessing the development of root associations across different aged rehabilitation areas at a Mount Owen mine.**	Root-associations are vital to natural nutrient acquisition and cycling as well as other processes such as soil aggregation. At mine sites, traditionally, there has been a reliance on the use of nutrients to promote plant growth and health. Over the past fifteen years we have promoted the use of root associations and avoidance of the use of nutrients other than at minor levels when sowing seed. The project will assess the levels of root associations formed at different locations in the rehabilitation areas and compare it to the levels in Ravensworth State Forest. As part of this project there will be the opportunity to learn to use the state of the art Portable Photosynthesis System to assess both leaf function and soil gas exchange.	Mr Mike Cole P: (02) 4921 5876 E: Mike.Cole@newcastle.edu.au	Centre for Sustainable Ecosystem Restoration (CSER)	**Biological Sciences**	SELS

36	**Mycorrhiza on weeds from seed bank**	Loss of native soil symbionts is one of the important factors contributing to loss of soil fertility. Generally on clearing the land, vegetation gets destroyed and the associated symbionts die too. Nevertheless some studies have documented that some weeds may be infected by these symbionts and could act as a temporary or long term reservoir for these organisms. Weeds from the seed bank of native soils will be grown in the shadehouse, the roots harvested, preserved, stained and evaluated for the presence of fungal infections that may be symbiotic. This summer scholarship will provide the student skills in shade house cultivation, collecting and processing of biological material, analysing skills in identification of the presence of endomycorhhiza, and learning about the importance of these organisms.	Mr Mike Cole & Dr Carmen Castor P: (02) 4921 5876 E: Mike.Cole@newcastle.edu.au; Carmen.Castor@newcastle.edu.au	Centre for Sustainable Ecosystem Restoration (CSER)	**Biological Sciences**	SELS
37	**Characterisation of the interaction of NusA with RNA polymerase**	NusA is a highly conserved transcription elongation factor from bacteria that is essential for cell viability. It is required to control all aspects of the transcription elongation process. Due to the fact it is highly conserved, essential to bacteria, but absent in higher organisms, the interaction of NusA with RNA polymerase represents an attractive interaction to target in new antibiotic development. This project will build on previous research and involve using DNA mutagenesis to identify the amino acids in NusA required for its interaction with RNA polymerase.	A/Prof Peter Lewis P: (02) 4921 5701 E: Peter.Lewis@newcastle.edu.au	Priority Research Centre for Chemical Biology	**Biological Sciences**	SELS
38	**Comparison of Rho-dependent transcription termination in Gram-positive and –negative bacteria**	The transcription termination factor Rho is an enzyme which binds RNA, RNA polymerase and ATP to terminate transcription. The role of Rho in Gram negative bacteria is well characterised, but nothing is known about this process in Gram positive organisms. This project will involve quantitation of Rho levels in Gram –ve and +ve bacteria, determination of Rho's binding site on RNA polymerase and whether the enzyme is essential for viability in all bacteria.	A/Prof Peter Lewis P: (02) 4921 5701 E: Peter.Lewis@newcastle.edu.au	Priority Research Centre for Chemical Biology	**Biological Sciences**	SELS
39	**Characterisation of the CarD/YdeB transcription factor**	CarD is a recently discovered transcription factor from the causative agent of tuberculosis. It is conserved in several pathogenic bacteria and is required for the regulation of rRNA synthesis. The work in this project will involve the overproduction and purification of CarD for structural and biochemical analysis, generation of a CarD knockout and GFP fusion for further in vivo characterisation of the role of CarD.	A/Prof Peter Lewis P: (02) 4921 5701 E: Peter.Lewis@newcastle.edu.au	Priority Research Centre for Chemical Biology	**Biological Sciences**	SELS

40	**Chromosome segregation in Acinetobacter**	Efficient chromosome segregation is essential for cells to grow and divide correctly. Many antibiotics have targeted this process in bacteria with great success. However, many bacteria are becoming increasingly resistant to antibiotics, and Acinetobacter represent one of the most antibiotic resistant groups of pathogens. Preliminary studies suggest that chromosome segregation in Acinetobacter is different to other bacteria. This project will initiate investigation into chromosome segregation in Acinetobacter with the aim of identifying targets for future antibiotic development.	A/Prof Peter Lewis / Dr Ian Grainge P: (02) 4921 5701 / (02) 4921 7238 E: Peter.Lewis@newcastle.edu.au	Priority Research Centre for Chemical Biology	**Biological Sciences**	SELS
41	**Characterisation of the FtsK DNA translocase of Staphylococus aureus**	FtsK is a protein that links the key processes of bacterial cell division, chromosome segregation and chromosome unlinking. The homologue of FtsK from the important pathogen Staphylococcus aureus lacks the membrane spanning domain of other FtsKs, so may play its role in a slightly different manner. This project will aim to characterise this protein, confirm that it is cytosolic, and that it acts as a DNA translocase.	Dr Ian Grainge P: (02) 4921 7238 E: Ian.Grainge@newcastle.edu.au	Priority Research Centre for Chemical Biology	**Biological Sciences**	SELS
42	**Xer recombination in Staphylococcus aureus**	DNA repair in bacteria with circular chromosomes can lead to a potentially lethal product, a chromosome dimer. This is resolved by a site-specific recombination event catalysed by the XerCD proteins. This project will clone and characterise the XerCD genes from the pathogenic bacterium Staphylococcus aureus, examining DNA binding and catalytic activity.	Dr Ian Grainge P: (02) 4921 7238 E: Ian.Grainge@newcastle.edu.au	Priority Research Centre for Chemical Biology	**Biological Sciences**	SELS
43	**Activation of recombination: the XerD-FtsK interaction**	Xer recombination resolves chromosome dimmers in bacterial cells. These dimers are lethal if unresolved. XerD requires interaction with the C-terminus of FtsK for catalytic activity, and this project will investigate this interaction. Biochemical and crystallographic studies will be combined to understand how activation occurs.	Dr Ian Grainge P: (02) 4921 7238 E: Ian.Grainge@newcastle.edu.au	Priority Research Centre for Chemical Biology	**Biological Sciences**	SELS
44	**Mechanisms of phosphate transfer in Arbuscular Mycorrhizal symbioses**	AM fungi increase access to essential plant nutrients in exchange for up to 20% of plant sugars. Understanding this nutrient exchange is critical to future efforts to maximise AM benefit in agricultural production systems. This project aims to identify a novel phosphate efflux transporter using an innovative yeast screening strategy.	Dr Emily Grace P: (02) 49 21 5725 E: emily.grace@newcastle.edu.au	Plant Science Group	**Biological Sciences**	SELS

45	**Biofuel feedstocks for arid environments I.**	Increasing fuel costs, finite resources and the need to develop more carbon neutral and cleaner fuels have created a need for renewable resources. Sorghum bicolor (Sorghum) is a crop plant adapted to the hot, water limited environments of northern Australia, both as a grain and forage crop. As a result of its rapid growth rate, sorghum is an ideal crop for biofuel production from grain, sugar and biomass accumulation. This project will be encompassed within the two broad strategies: 1. Identification and characterisation of novel cell wall mutants in Sorghum and Arabidopsis. 2. Identification of regulatory mechanisms important in biomass accumulation. The techniques and tools that will be encountered during the project include: ▪ Quantitative expression analysis using RT-qPCR from RNA isolated from plant tissues and organs. ▪ Immunolocalisation of selected proteins. ▪ Functional characterisation of transporters in heterologous systems including yeast mutants and Xenopus oocytes. ▪ FTIR microscopy and GC-MS analyses.	Prof Christopher Grof P: (02) 4921 5858 E: Chris.Grof@newcastle.edu.au	Plant Science Group	**Biological Sciences**	SELS
46	**Biofuel feedstocks for arid environments II.**	Lignocellulosic bioethanol derived from plant biomass will provide a cost effective contribution to environmental sustainability and energy security. *Setaria italica* (foxtail millet) is an ideal genetic model to dissect biomass quality traits. A large number of plants exhibiting broad genetic diversity will be screened using Fourier Transform Infra Red (FTIR) spectral analysis to identify those ecotypes with differing cell wall composition.	Prof Christopher Grof P: (02) 4921 5858 E: Chris.Grof@newcastle.edu.au	Plant Science Group	**Biological Sciences**	SELS
47	**Novel membrane sucrose transporters**	As membrane transport of sucrose is a key determinant of crop yield, a detailed understanding of genes encoding sucrose transporters provides fundamental knowledge towards increasing crop yield. This project aims to identify and functionally characterise novel sucrose transporters utilising a yeast mutant as an innovative positive selection tool.	Prof Christopher Grof P: (02) 4921 5858 E: Chris.Grof@newcastle.edu.au	Plant Science Group	**Biological Sciences**	SELS

48	**Feeding a Hungry World: Manipulating transfer cell development to improve crop yield (several projects available)**	This project will contribute to an on-going study using the model higher plant Arabidopsis thaliana to identify 'master' genes controlling transfer cell development. Transfer cells are important for regulating nutrient transport in plants and consequently identifying novel genes regulating their development will provide new avenues for improving crop yield in agriculturally significant species. Several candidate genes have been identified and this project will use molecular (RT-PCR, gene cloning) and cellular (confocal microscopy) approaches to further characterise the involvement of these genes and their protein products in regulating transfer cell development. The project is ideally suited for a student wanting to gain laboratory experience in contemporary cell and molecular biology research.	A/Prof David McCurdy P: (02) 49 21 5879 E: David.McCurdy@newcastle.edu.au	Plant Science Group	**Biological Sciences**	SELS
49	**Deep sequencing analysis of transfer cell development**	This project will perform RNA-Seq using Illumina-based sequencing to analyse transcriptional changes occurring during induction and wall ingrowth building of transfer cells. The experimental approach will use either transfer cell induction in *Vicia faba* cotyledons and/or phloem parenchyma transfer cells in the model genetic species *Arabidopsis thaliana*. The project would be ideal for a student interested in developing bioinformatics skills and would suit a biology/maths double major.	A/Prof David McCurdy P: (02) 49 21 5879 E: David.McCurdy@newcastle.edu.au	Plant Science Group	**Biological Sciences**	SELS
50	**Sweeter Tomatoes: Molecular analysis of hexose transporters in tomato fruit**	A high priority for the tomato processing industry worldwide is to develop tomato varieties with high levels of fruit sugars. This project will undertake molecular and physiological analyses of existing transgenic tomato plants which accumulate high levels of fruit sugars by over-expression of various sugar transporters. The project is funded by Syngenta, a large UK-based agri-biotechnology company, and will use molecular techniques such as GC/MS to measure fruit sugar levels, real time PCR to measure gene expression, and gene cloning to isolate promoter regions of target genes.	A/Prof David McCurdy P: (02) 49 21 5879 E: David.McCurdy@newcastle.edu.au	Plant Science Group	**Biological Sciences**	SELS
51	**Improving food security: Characterizing genes controlling seed and fruit set**	Seed and fruit are organs of major agronomical importance. We recently identified a key regulatory gene, INVINH1, which controls tomato seed size and fruit sugar level by repressing activity of invertase (e.g. Jin et al 2009 Plant Cell). This project aims to elucidate the molecular & cellular basis underpinning the roles of these genes in seed and fruit set by using gene expression, protein localization and activity assay techniques.	A/Prof Yong-Ling Ruan P: (02) 4921 7958 E: yong-ling.ruan@newcastle.edu.au	Plant Biology Group	**Biological Sciences**	SELS

52	**Manipulating water channel genes for improving drought tolerance of crops**	Building on our recent discoveries on control of sugar and water flux in expanding cells (e.g. Wang et al 2010 Plant Physiology), this project will study the roles of novel water channel genes in the control of water movement in plant cells and design innovative approaches to increase drought tolerance of crops. A combination of molecular, cellular and physiological approaches will be utilized to address relevant questions.	A/Prof Yong-Ling Ruan P: (02) 4921 7958 E: yong-ling.ruan@newcastle.edu.au	Plant Biology Group	**Biological Sciences**	SELS
53	**Solid – Liquid Interfaces in Dye Solar Cells.**	It is clear that burning fossil fuels is not sustainable in the long term. The Dye Solar Cells (DSC) is a cheap and versatile technology for large scale production of solar cells. The basic element of a DSC is a assembly of titanium dioxide nanoparticles about 20 nm diameter, well connected to their neighbours. As TiO_2 only absorbs a small fraction of the solar energy, dye molecules are attached to the TiO_2 surface to harvest a greater portion of solar light. This project will characterise the structure of the solid – liquid interfaces within the DSC, which will lead to the new DSC designs with increased energy conversion efficiencies.	Dr Rob Atkin P: (02) 49217107 E: Rob.Atkin@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE)	**Chemistry**	SELS
54	**Effect of Electrode potential on Ionic Liquid Interfacial Structure**	Interest in ionic liquid (IL) based electrochemistry increased markedly around the year 2000, primarily as a consequence of ILs often wide electrochemical windows. Until now atomic force microscope (AFM) experiments have only been conducted at the open circuit potential (OCP), but we have recently modified our AFM cell to allow force curves to be obtained as a function of potential. As the magnitude of the potential is increased the strength with which IL ions are bound to the surface also increases, which will affect a variety of electrochemical processes, including electrodeposition, batteries and capacitors. Experiments planed for this topic will examine interfacial forces as a function of potential across the whole electrochemical window, which will reveal how IL interfacial structure evolves with potential. The effect of dissolved solutes (particularly ions) on interfacial properties will also be examined, allowing mechanisms for tuning interfacial structure to optimise electrochemical performance to be determined.	Dr Rob Atkin P: (02) 49217107 E: Rob.Atkin@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE)	**Chemistry**	SELS

55	**Ionic Liquid Lubricants**	The use of ILs as lubricants was first proposed in 2001 and since then about 80 articles have appeared on the topic, the majority describing macroscopic measurements. Strong ion adsorption at solid surfaces and robust physicochemical properties, in particular negligible vapour pressure, could lead to high end lubrication applications, such as in electronics or high vacuum environments where ILs could be used without significant product loss. The tendency for ILs to adsorb and spontaneously arrange into interfacial layers results in a coating of ions at the solid interface. In an article published last year we reported that particles suspended in a protic IL were stable to aggregation but settled six times faster than predicted by the Stokes equation, and suggested that the same interfacial IL structure that imparts stability could have a lubricating effect. This project will measure friction as a function of cation alkyl chain length, after which the cation and anion species will be varied.	Dr Rob Atkin P: (02) 49217107 E: Rob.Atkin@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE)	**Chemistry**	SELS
56	**Nanostructures in Ionic Liquids**	Ionic liquids are molten salts, which means they are salts in a liquid phase, not simply salts dissolved in water. Surfactant molecules dissolve in ionic liquids and can self assemble into nanostructures like micelles, liquid crystals and microemulsions, just like they do in water. This project will examine various surfactant structures in ionic liquids. Our aim is to use surfactant templating of glass-forming ionic liquids as a way of designing and creating permanent high surface area structures from microemulsions and liquid crystals. These materials could be used in catalytic or separation technologies.	Dr Rob Atkin P: (02) 49217107 E: Rob.Atkin@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE)	**Chemistry**	SELS
57	**Water-based Conducting Polymers for Organic Solar Cells (up to 2 projects)**	Students within the Centre for Organic Electronics have developed a new system of aqueous conducting polymers for use in solar cells based on colloidal nanoparticles (less than 100nm diameter). We are currently in the process of using these materials to develop a commercially viable renewable energy platform. The interested student(s) will be part of a large (>10 students) research team working together with this aim and have the opportunity to contribute significantly to ongoing research. The proposed project will investigate a number of different conducting polymer systems used for solar cell fabrication to conclude their suitability for this method of fabrication. In the course of the project the student will develop skills in the production and characterisation of conducting nanoparticles and in the fabrication and characterisation of solar cells.	Dr Warwick Belcher P: (02) 4921 5468 E: Warwick.Belcher@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE)	**Chemistry**	SELS

58	**The Use of Flow Chemistry to Prepare Porphyrin Derivatives**	A series of porphyrins will be prepared as potential recognition elements for environmentally important gases such as NO_2, SO_2, CO and CO_2. A growing number of literature studies have shown that a wide range of porphyrin complexes, both free-base and metalloporphyrins, show substantial changes to their UV-Vis absorption spectrum upon exposure to even trace amounts of these and other gases. A series of simple tetra-arylporphyrins (TAPs), both free-base and metallated, will be prepared using the Flow Chemistry apparatus available in chemistry for inclusion in the fabrication of OTFT devices for assessment as gas sensors. Flow chemistry is ideally suited to the rapid production of a large library of derivatised porphyrins allowing an array of porphyrin to be developed. By utilising such an array of porphyrin materials and OTFTs a gas sensing "nose" will be developed for the detection of gases such as NO_2, SO_2, CO and CO_2.	Dr Warwick Belcher P: (02) 4921 5468 E: Warwick.Belcher@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE)	**Chemistry**	SELS
59	**Preparation and Assessment of Recognition Elements for Explosives Sensors**	The student will prepare a series of molecular recognition materials for assessment for inclusion in the organic gate electrode of OTFTs as the recognition elements in transistor-based sensors. A series of recognition elements will be synthesised based on the 1,3,5-tris (3-(methylamino)pyridiniumyl)-2,4,6-triethylbenzene (TMAPT) hexafluorophosphate salt. These "venus flytrap"-like tripodal molecules have been shown to be excellent anion binders, can be easily synthetically modified and show selectivity and sensitivity to a range of anionic analytes. The three fold symmetry of the binding sites in the TMAPT series of molecules is perfectly arranged for strong selective binding to neutral molecules with the same symmetry of functionality. Amongst these potential target molecules trinitrotoluene (TNT) is an obvious target of importance. A range of TMAPT derivatives will be prepared and assessed as recognition elements for TNT with the goal of a transistor-based explosives sensor.	Dr Warwick Belcher P: (02) 4921 5468 E: Warwick.Belcher@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE)	**Chemistry**	SELS
60	**Surfactant and polymer adsorption**	Surfactant and/or polymer coated interfaces are present in the use of everyday formulations from shampoo to paint. A new quartz crystal microbalance instrument will be used to investigate the adsorption of surfactant and polymer molecules at the solid/liquid interface in an effort to develop a sophisticated understanding of the adsorption mechanism and subsequent interfacial behaviour in a variety of solvents (aqueous, non-aqueous, ionic liquids). This project will be co-supervised by Dr Rob Atkin.	A/Prof Erica Wanless P: (02) 4921 8846 E: Erica.Wanless@newcastle.edu.au	Advanced Synthetic Materials Group	**Chemistry**	SELS

61	**Direct observation of bubble coalescence using high-speed video imaging**	Colloidal particles can be used to stabilise foams in the absence of any surfactant by adsorbing in close-packed particulate monolayers at the air-water interface. We are investigating the mechanism of bubble coalescence using high speed video at up to 3500 frames per second in order to understand the role of particles at the interfaces of coalescing bubbles. Such coalescence processes are important wherever there are bubbles from champagne to mineral separation by froth flotation. In addition we have recently installed an important new instrument capable of complementary simultaneous measurement of interfacial elasticity and surface tension. You will use one or both techniques to directly observe particle-stabilised bubbles and their coalescence	A/Prof Erica Wanless P: (02) 4921 8846 E: Erica.Wanless@newcastle.edu.au	Priority Research Centre for Advanced Particle Processing and Transport	**Chemistry**	SELS
62	**Smart polymeric coatings**	Polymer films can radically change the surface of a material while leaving the bulk properties of the material in tact. The polymer surface coating controls the interaction with other objects through nanoscale forces. We will construct the next-generation of polymer films that contain an inbuilt molecular-scale switch from attractive to repulsive interactions, offering a means for dictating macroscopic character such as the wettability, adhesion or friction of a surface. Academic and industrial interest in these coatings is increasing rapidly, for potential application as low-friction coatings for confined parts or rheology modifiers. You will join the group effort aimed studying these smart polymer coatings and perform state-of-the-art surface characterisation that will ultimately determine their use!.	A/Prof Erica Wanless P: (02) 4921 8846 E: Erica.Wanless@newcastle.edu.au	Priority Research Centre for Advanced Particle Processing and Transport	**Chemistry**	SELS
63	**Stability and activity of silicate entrapped enzymes**	A novel method has been developed to entrap enzymes within silicate structures under neutral conditions for biosensor and biocatalysis applications. However, increased physical stability and activity of the enzyme-containing silicate samples is required for the product to be viable for storage and use at room temperature. This project will investigate the effect of using stabilising chemicals such as different polymers, electrolytes and chemical environments to promote enzyme activity and decrease enzyme denaturation caused by environmental factors such as temperature, pH and attack by proteolytic enzymes and microbes. In this project you will learn a variety of techniques with transferable skills in the areas of biochemistry, surface chemistry and nanotechnology. The skills learnt in this project will be applicable to a number of research areas and will allow you to gain invaluable practical experience.	Dr Frances Neville P: (02) 49216458 E: Frances.Neville@newcastle.edu.au	Priority Research Centre for Advanced Particle Processing and Transport	**Chemistry**	SELS

64	**Poly(N-isopropylacrylamide) Based Molecularly Imprinted Polymers**	This project will focus on the evaluation of the recognition capability of poly(N-isopropylacrylamide) copolymers. (PNIPAAM) is a thermoresponsive polymer and is characterised by a lower critical solution temperature (LCST). Below its LCST, PNIPAAM is water-soluble; above its LCST, it is water-insoluble. The LCST of PNIPAAM can be controlled by co-polymerisation. PNIPAAM copolymers can be imparted with molecular recognition sites which can be capable of selectively binding a water-soluble target molecule simply by using the target molecule as template at temperatures below the LCST and preserving the target imprints at temperatures higher than the LCST.	Dr Clovia Holdsworth P: (02) 4921 5481 E: Clovia.Holdsworth@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE) Advanced Synthetic Materials Group	**Chemistry**	SELS
65	**Investigation of the Mechanism of Imprinting: Kinetics of the Formation of Imprints**	Recent studies have shown that the formation of molecular imprints is affected by temperature, solvents and polymer composition, and that the imprinting effect can sometimes be missed due to the high binding capacity (though superficial) of its non-imprinted equivalent (NIP). Most of the reported evidence deals with the beginning - presynthetic studies (i.e. molecular modelling and spectroscopic studies) and the end - binding performance of the MIPs and NIPs, but no evidence has been gathered during the early stages of the formation of imprints (i.e. within 12 hours of polymerisation). This study proposes to investigate the early stages of MIP formation with the aim to understand the effect of the template on the polymer structure and the kinetics of template-monomer association and will involve: (a) molecular modelling using Spartan, (b) NMR experiments, (c) free radical polymerisation and (d) quantitation and species identification by GC or LC MS.	Dr Clovia Holdsworth P: (02) 4921 5481 E: Clovia.Holdsworth@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE) Advanced Synthetic Materials Group	**Chemistry**	SELS
66	**Star Polymeric Films**	A research focus of my group is the synthesis of star polymers for molecular imprinting applications. Star polymers can be imbued with a molecular imprinted core capable of recognising the template target and linear polymeric arms that controls the solubility (or processability) of the polymer. Our group has successfully prepared star polymeric particles by controlled radical polymerisation. We would like to use these materials to prepare polymeric films. Thus, this project will focus on the preparation of star polymeric films (from already synthesised star polymeric particles) and their characterisation. It is anticipated that star molecularly imprinted polymers would be available for further study in December for the preparation of star molecularly imprinted films.	Dr Clovia Holdsworth P: (02) 4921 5481 E: Clovia.Holdsworth@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE) Advanced Synthetic Materials Group	**Chemistry**	SELS

67	**Establish the long-term (1000 years) natural variability of East Coast Lows**	East Coast Lows (ECL) are complex weather systems that travel parallel to the east coast of Australia from south-east Queensland to Victoria. They can cause significant storm damage to both the natural system and human infrastructure (e.g. the Pasha Bulker storm). The historical records over the past century show that the magnitude and frequency of ECLs is linked to decadal-scale variability in the climate system. This project will use insights into the mechanisms that drive climate variability in Australia to produce a time-series of ECL frequency and intensity over (a) the last century using instrumental records and (b) the last 1000 years using proxy data based on palaeo reconstructions. The project will provide the basis for risk assessment of extreme ECL events both under natural and anthropogenic climate change.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au	Environmental and Climate Change Research Group	**Earth Sciences; and Environmental Science & Management**	SELS
68	**Research into the use of Worms in Mitigating Greenhouse Gas Emissions from Dairy Farms.**	The recently carried Carbon Farming Initiative (CFI) of the Australian Federal Government is a response to the political realities that make agriculture a 'no-go' area as far as outright carbon taxation applies while acknowledging that agriculture itself represents around 17% of the nation's total greenhouse gas outputs. The CFI offers a voluntary scheme to farmers in which carbon credits may be earned through greenhouse gas mitigation projects in line with Australia's undertakings through the Kyoto Protocol. Such credits would be tradable both within Australia and overseas as such markets become operational. Consequently, farmers may obtain significant earnings capacity through such measures. However, in order to qualify any proposed methodology must be rigorously scientifically tested, peer reviewed and largely proven and the methodology itself must be monitored in an on-going manner to further prove the actual savings in order for the payments/credits to be secured. A project is available in collaboration with a small, non-profit company located in Sydney's south west which has worked on waste reduction measures for many years including worm farming. Many of the worms they grow are fed cow manure and they have noted the capacity of worms to reduce the impact of manure as a greenhouse gas emitter. The research project would aim to test and quantify these claims with a view to determining whether worm farming represents a viable greenhouse gas mitigation strategy.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au	Environmental and Climate Change Research Group	**Earth Sciences; and Environmental Science & Management**	SELS

70	**Defining 'east coast' climate**	The area of land between the tablelands and the coast of NSW and southern Queensland is home to more than nine million people. A variety of high impact weather events occur in this area, generating damaging winds, flooding, hail, heavy seas and swell. Rainfall during these weather events also plays a critical role in our State's water supply, filling dams and supplying base flows for inland river systems and groundwater recharge. However, the climatic processes in this part of Australia are the least well-understood in terms of climate change and its impacts. This project will identify the drivers of climatic variability in the 'east coast region and highlight differences between the 'east coast' and other areas of Australia. The project will form the basis for addressing the gaps in our knowledge relating to the impacts of climate variability and change along the 'east coast'. This is necessary to develop informed and robust planning and adaptation strategies to ensure the sustainability of this heavily populated region.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au	Environmental and Climate Change Research Group	**Earth Sciences; and Environmental Science & Management**	SELS
71	**Characterising southern hemisphere dry epochs and their causal processes**	This project aims to firstly catalogue the location, duration and severity of dry epochs in the Southern Hemisphere. This will involve a literature review and analysis of both instrumental and pre-instrumental (paleo) records. Secondly, the climatic drivers of the identified dry epochs will be investigated with the ultimate objective being to put the current southeast Australian drought into context and to more realistically quantify drought risk so more robust adaptation strategies can be developed.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au	Environmental and Climate Change Research Group	**Earth Sciences; and Environmental Science & Management**	SELS
72	**Relationships between increased metabolic rate and demands on food resources in aquatic invertebrates**	This project could be conducted with marine or freshwater invertebrates and has the potential for using chemical stressors and/or increased temperature associated with climate change as the driver for metabolic change. The basic question is 'Do animals with elevated metabolic rates eat more and so impose greater pressure on available food resources?"	Prof Joe Bidwell P: (02) 4921 5853 E: joseph.bidwell@newcastle.edu.au	Environmental Water Science Research Group	**Environmental Science and Management**	SELS

73	**Surveys of the freshwater mussel fauna and associations of mussel assemblages with other freshwater invertebrates in the Hunter River catchment**	Freshwater mussels are among the most endangered aquatic species on a global scale and there is an urgent need to develop indicators of habitat condition that can be used to rapidly evaluate the health of river reaches that support mussel assemblages. Surveys of aquatic insects have been used extensively to evaluate water quality and this group has the potential to serve as early indicators of changing water quality that could impact freshwater mussel survival. In this field-based project, surveys of both mussels and aquatic insects will be undertaken in select rivers of the Hunter-Central Rivers catchment. The specific objective will be to determine if there are specific aquatic insect taxa that are consistently associated with healthy freshwater mussel assemblages and if other landscape-level factors also influence where mussels occur in rivers.	Prof Joe Bidwell P: (02) 4921 5853 E: joseph.bidwell@newcastle.edu.au	Environmental Water Science Research Group	**Environmental Science and Management**	SELS
74	**Characterizing the cost of resistance to chemical stressors in invertebrates from a chronically-contaminated field site**	Human activities have lead to a number of chronically-contaminated terrestrial and aquatic habitats in Australia. A key question related to these sites is what the long-term effect of exposure to the existing chemical residues has had on resident organisms. This project will focus on a contaminated site in either NSW (e.g. Cockle Creek, Lake Macquarie) or farther afield (e.g. Port Pirie, South Australia) and use both laboratory and field techniques to determine if aquatic invertebrates from the site exhibit resistance to chemical stressors and if this resistance has an energetic cost as determined by metabolic rate.	Prof Joe Bidwell P: (02) 4921 5853 E: joseph.bidwell@newcastle.edu.au	Environmental Water Science Research Group	**Environmental Science and Management**	SELS
75	**Indian mynah, *Acridotheres tristis*, population control and oral contraceptives (Ourimbah or Callaghan)**	Indian mynahs are an introduced highly invasive bird species that has become so abundant in the last two decades that it has the potential to pose a threat to native bird species, particularly in the competition for tree hollows for nesting. Current population control practices involve labour- and time-intensive trapping programs. The present project will aim to design the necessary behavioural and anatomical tests to explore the effects of an oral contraceptive chemical commonly used in several other avian species, but not tested to date on the Indian mynah.	Dr Andrea Griffin (both Callaghan and Ourimbah) P: (02) 4921 7161 E: Andrea.Griffin@newcastle.edu.au Prof John Rodger P: 0419 211 071 (Mobile) E: John.Rodger@newcastle.edu.au Dr Carmen McCartney (Co-supervisor) P: (02) 4921 5614 E: Carmen.Mccartney@newcastle.edu.au	Neuroscience Group / Priority Research Centre for Brain and Mental Health Research Environmental Biology & Biotechnology Group	**Environmental Science and Management**	SELS

76	**Behavioural and physiological correlates of ecological invasion: resource use in the Indian mynah (Ourimbah or Callaghan)**	Why do some species become highly successful ecological invaders, while other species go extinct? Various hypotheses have been tested using a literature-based large-scale species comparative approach, but rarely experimentally at an individual species level. Our research program uses the Indian mynah, a songbird and highly successful ecological invader, as a model system to identify which behaviours allow this avian species to expand faster than any other native Australian bird species. This project will study mynahs in the lab and in the field to identify which food resources are key to mynah success and which habitats are most suitable to mynah expansion.	Dr Andrea Griffin (both Callaghan and Ourimbah) P: (02) 4921 7161 E: Andrea.Griffin@newcastle.edu.au Dr Geoff MacFarlane (Co-supervisor) P: (02) 4921 7858 E: Geoff.macfarlane@newcastle.edu.au	Neuroscience Group / Priority Research Centre for Brain and Mental Health Research	**Environmental Science and Management**	SELS
77	**Assessment of General Circulation Model's (GCMs) ability to realistically simulate local and large-scale drivers of natural climate variability in southeast Australia**	Since the release of the IPCC 4th Assessment Report research has been directed at evaluating the ability of GCMs to simulate the present/historical climate in an attempt to identify the GCMs that are best for the region/application of interest. At present, most metrics used to assess the ability of GCMs to simulate climate variables (such as rainfall, temperate etc.) are based on seasonal and annual time scales. However monthly, seasonal, or longer averages can hide biases or systematic errors. This project aims to investigate the potential of an alternate GCM assessment technique which seeks to identify the GCMs that successfully simulate the major local and large-scale climate drivers known to be important for southeast Australia. We already know which GCMs do a particularly poor job at simulating El Niño-Southern Oscillation (ENSO), but what about the other drivers known to influence southeast Australia (e.g. Indian Ocean Dipole, Southern Annular Mode, Interdecadal Pacific Oscillation, Sub-Tropical Ridge, ENSO Modoki etc)?	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au Dr Danielle Verdon-Kidd E: danielle.verdon@newcastle.edu.au	Environmental and Climate Change Research Group	**Environmental Science and Management**	SELS
78	**Characterising southern hemisphere dry epochs and their causal processes**	This project aims to firstly catalogue the location, duration and severity of dry epochs in the Southern Hemisphere. This will involve a literature review and analysis of both instrumental and pre-instrumental (paleo) records. Secondly, the climatic drivers of the identified dry epochs will be investigated with the ultimate objective being to put the current southeast Australian drought into context and to more realistically quantify drought risk so more robust adaptation strategies can be developed.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au	Environmental and Climate Change Research Group	**Environmental Science and Management**	SELS

79	**Characterising southern hemisphere wet epochs and their causal processes**	This project aims to firstly catalogue the location, duration and severity of wet epochs in the Southern Hemisphere. This will involve a literature review and analysis of both instrumental and pre-instrumental (paleo) records. Secondly, the climatic drivers of the identified wet epochs will be investigated with the ultimate objective being to put recent flood events in QLD and NSW into context and to more realistically quantify flood risk so more robust adaptation strategies can be developed.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au	Environmental and Climate Change Research Group	**Environmental Science and Management**	SELS
80	**Characterising Victorian bushfire risk and its causal processes**	This project aims to firstly catalogue the location, duration and severity of bushfires in southeast Australia, specifically Victoria. This will involve a literature review and analysis of both instrumental and pre-instrumental (paleo) records. Secondly, the climatic drivers of the identified bushfires will be investigated with the ultimate objective being to put the recent "Black Saturday" Victorian bushfires into context and to more realistically quantify bushfire risk so more robust adaptation strategies can be developed.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au Dr Danielle Verdon-Kidd E: danielle.verdon@newcastle.edu.au	Environmental and Climate Change Research Group	**Environmental Science and Management**	SELS
81	**East Coast Lows and the Newcastle Pasha Bulker Storm**	The June 2007 Pasha Bulker storm was one of the most significant meteorological events in Australia's history. It was the 4th largest general insurance loss since insurance records were started in 1968. The storm consisted of three distinct impacts (1) flash flooding in the urban area of Newcastle on the 8 June (about 1 in 100 year return period) (2) more general flooding on the Hunter River 3 days later and (3) high winds and wave heights, the worst in the Newcastle-Sydney region since the "Sygna" storm in 1974. Both the Pasha Bulker and Sygna storms were the result of an East Coast Low (ECL). ECLs are the cause of most major flood events on the East Australian Coastal strip. The context for the June 2007 ECL and the resulting storm will be provided. How big was it historically? Where and when have similar ECL occurred before, and how frequently? What are the "typical" impacts associated with ECLs and was the June 2007 ECL "typical"? What is the likely trend of ECL intensity and frequency with climate change? What is the likelihood of similar events occurring elsewhere in Australia?	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au Dr Danielle Verdon-Kidd E: danielle.verdon@newcastle.edu.au	Environmental and Climate Change Research Group	**Environmental Science and Management**	SELS

82	**Establish the long-term (1000 years) natural variability of East Coast Lows**	East Coast Lows (ECL) are complex weather systems that travel parallel to the east coast of Australia from south-east Queensland to Victoria. They can cause significant storm damage to both the natural system and human infrastructure (e.g. the Pasha Bulker storm). The historical records over the past century show that the magnitude and frequency of ECLs is linked to decadal-scale variability in the climate system. This project will use insights into the mechanisms that drive climate variability in Australia to produce a time-series of ECL frequency and intensity over (a) the last century using instrumental records and (b) the last 1000 years using proxy data based on palaeo reconstructions. The project will provide the basis for risk assessment of extreme ECL events both under natural and anthropogenic climate change.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au Dr Danielle Verdon-Kidd E: danielle.verdon@newcastle.edu.au	Environmental and Climate Change Research Group	**Environmental Science and Management**	SELS
83	**Defining 'east coast' climate**	The area of land between the tablelands and the coast of NSW and southern Queensland is home to more than nine million people. A variety of high impact weather events occur in this area, generating damaging winds, flooding, hail, heavy seas and swell. Rainfall during these weather events also plays a critical role in our State's water supply, filling dams and supplying base flows for inland river systems and groundwater recharge. However, the climatic processes in this part of Australia are the least well-understood in terms of climate change and its impacts. This project will identify the drivers of climatic variability in the 'east coast region and highlight differences between the 'east coast' and other areas of Australia. The project will form the basis for addressing the gaps in our knowledge relating to the impacts of climate variability and change along the 'east coast'. This is necessary to develop informed and robust planning and adaptation strategies to ensure the sustainability of this heavily populated region.	Dr Anthony Kiem P: (02) 4921 8656 E: anthony.kiem@newcastle.edu.au Dr Danielle Verdon-Kidd E: danielle.verdon@newcastle.edu.au	Environmental and Climate Change Research Group	**Environmental Science and Management**	SELS

84	**Effects of estrogenic compounds on native molluscs**	Estrogenic compounds are a subset of endocrine disrupting chemicals which mimic the female sex hormone estrogen. Such compounds are present in sewage effluent and are discharged into our own local aquatic waterways via sewage treatment effluents. We are interested in how estrogenic compounds influence the production of the female egg yolk protein vitellogenin, and using this as a biomarker of exposure in real field situations. We are also interested in the "gender-bending" properties of estrogenic compounds and how estrogens may facilitate sex change, turning males into females in aquatic organisms. There are possibilities for honours students conducting studies both in the field and at the Fisheries Research Station at Port Stephens investigating effects of estrogens on molluscs, including the native commercial, edible species, the Sydney Rock oyster. Such a project would provide both experience in lab and field work and also working within an industry context.	Dr Geoff MacFarlane P: (02) 4921 7858 E: Geoff.macfarlane@newcastle.edu.au Dr Richard Yu P: (02) 4921 6990 E: Richard.Yu@newcastle.edu.au	Environmental Water Science Research Group	**Environmental Science and Management**	SELS
85	**Assessment of the bioaccumulation of lead in chicken eggs from residential backyards in the vicinity of a disused Lead/Zinc smelter**	Lead is a widely occurring environmental contaminant. In humans, it acts as a potent neurotoxin and is of particular concern during childhood development. The primary exposure pathway is via ingestion of contaminated soil or dust, but with increases in urban farming, exposure via home-grown produce is an increasing concern. The purpose of this study is to investigate the potential for lead accumulation from soil into chicken eggs produced in urban backyard chicken coops. The metal content of eggs, soil and chicken feed will be measured in 30 backyard coops across the Lake Macquarie and Newcastle regions and a survey of household consumption habits will enable estimation of lead exposure via home-grown eggs.	Dr Geoff MacFarlane P: (02) 4921 7858 E: Geoff.macfarlane@newcastle.edu.au Dr Emily Grace P: (02) 4921 5725 E: Emily.Grace@newcastle.edu.au	Environmental Biology and Biotechnology Group	**Environmental Science and Management**	SELS
86	**Population dynamics of the green and golden bell frog in the Lower Hunter**	This project will investigate factors such as survival, recruitment and movement that determine population dynamics in the endangered green and golden bell frog. The prospective student will join a large and dedicated team working on understanding this species ecology locally and will gain experience in numerous survey methods for amphibians and tadpoles, animal handling, capture, swabbing for disease as well as body size measurements. There is the potential for good students to transition into related honours projects.	Prof Michael Mahony P: (02) 4921 5721 E: Michael.Mahony@newcastle.edu.au Michelle Stockwell, Research Associate E: Michelle.Stockwell@newcastle.edu.au	Environmental Biology and Biotechnology Group	**Environmental Science and Management**	SELS

87	**Distribution of the green and golden bell frog throughout the Hunter Region**	This project will investigate the distribution and abundance of the now endangered green and golden bell frog throughout its former range in the Hunter Region in an attempt to better understand the extent of this species decline. The prospective student will join a large and dedicated team working on understanding this species ecology locally and will get the opportunity to travel widely, visiting numerous field sites. The student will gain experience in amphibian survey methods as well as animal capture, handling, swabbing for disease and body size measurements. There is the potential for good students to transition into related honours projects.	Prof Michael Mahony P: (02) 4921 5721 E: Michael.Mahony@newcastle.edu.au Michelle Stockwell, Research Associate E: Michelle.Stockwell@newcastle.edu.au	Environmental Biology and Biotechnology Group	**Environmental Science and Management**	SELS
88	**Habitat use patterns of the green and golden bell frog in the Lower Hunter**	This project will investigate how the endangered green and golden bell frog utilises its habitat for use in habitat creation and restoration projects. The prospective student will join a large and dedicated team working on understanding this species ecology locally and will gain experience in amphibian and habitat survey methods as well as animal capture, handling, swabbing and water quality measurements. There is the potential for good students to transition into related honours projects.	Prof Michael Mahony P: (02) 4921 5721 E: Michael.Mahony@newcastle.edu.au Michelle Stockwell, Research Associate E: Michelle.Stockwell@newcastle.edu.au	Environmental Biology and Biotechnology Group	**Environmental Science and Management**	SELS
89	**Cryptic invader: green alga *Codium fragile* ssp. tomentosoides in NSW**	*Codium fragile* ssp. tomentosoides is one of the most invasive algae, and its introduction to NSW can have serious environmental implications. Due to its similarity to the native subspecies (tasmanicum and novae-zelandiae), the introduction is likely go undetected until the alga is well established. This study will undertake the first quantitative assessment of the invasion by non-native *C. fragile* in NSW and document its distribution and abundance along rocky shores and estuaries of the state. This will help to identify the degree of infestation and to assess potential damage to the environment.	Dr Maria Schreider P: (02) 4348 4228 E: Maria.Schreider@newcastle.edu.au	Sustainable Use of Coasts & Catchments Group	**Environmental Science and Management**	SELS

90	**A comparison of Drought Indices – which one is best for Australia?**	With drought being such a large problem faced so often in Australia, it is crucial that a sufficient method be developed to effectively monitor the various categoriesand stages of drought. The current system employed in Australia to classify and monitor drought-affected areas (primarily agricultural drought) is the Rainfall Decile System, however there are a number of problems associated with this method, highlighting the need to apply alternative techniques. Therefore, the aim of this project is to review and assess the applicability of existing methods and indices (developed in the USA and Europe) for monitoring drought in Australia that will include, but are not limited to, the Palmer Drought Severity Index, Crop Moisture Index, Byram-Keetch Drought Index, Antecedent Precipitation Index, Standardised Precipitation Index, Total Water Deficit, Rainfall Anomaly Index and the Rainfall Decile System.	Dr Danielle Verdon-Kidd E: danielle.verdon@newcastle.edu.au	Environmental and Climate Change Research Group	**Environmental Science and Management**	SELS
91	**Urban and Regional Studies**	Project to advance knowledge in the area of social, cultural or political aspects of urban and regional studies.	Dr Kathy Mee P: (02) 4921 6451 E: Kathy.Mee@newcastle.edu.au	Centre for Urban and Regional Studies	**Geography & Environmental Studies**	SELS
92	**Urban and Regional Studies**	Project to advance knowledge in the area of social, cultural or political aspects of urban and regional studies.	Dr Lesley Instone P: (02) 4921 6637 E: Lesley.instone@newcastle.edu.au	Centre for Urban and Regional Studies	**Geography & Environmental Studies**	SELS
93	**Urban and Regional Studies**	Project to advance knowledge in the area of social, cultural or political aspects of urban and regional studies.	Dr Meg Sherval P: (02) 4921 6809 E: Meg.sherval@newcastle.edu.au	Centre for Urban and Regional Studies	**Geography & Environmental Studies**	SELS
94	**Urban and Regional Studies**	Project to advance knowledge in the area of social, cultural or political aspects of urban and regional studies.	Dr Paul Hodge & Dr Sarah Wright P: (02) 4921 7157 E: paul.hodge@newcastle.edu.au; sarah.wright@newcastle.edu.au	Centre for Urban and Regional Studies	**Geography & Environmental Studies**	SELS
95	**Urban and Regional Studies**	Project to advance knowledge in the area of social, economic or political aspects of urban and regional studies.	Associate Professor Jenny Cameron P: (02) 4921 5095 E: Jenny.Cameron@newcastle.edu.au	Centre for Urban and Regional Studies	**Geography & Environmental Studies**	SELS
96	**Urban and Regional Studies**	Project to advance knowledge in the area of social, cultural, economic or political aspects of urban and regional studies.	Professor Pauline M^{c}Guirk P: (02) 4921 7157 E: Pauline.mcguirk@newcastle.edu.au	Centre for Urban and Regional Studies	**Geography & Environmental Studies**	SELS

School of Mathematical & Physical Sciences:

No.	TITLE OF RESEARCH TOPIC	DESCRIPTION OF RESEARCH PROJECT	PRINCIPAL SUPERVISOR CONTACT DETAILS	RESEARCH GROUP/CENTRE	DISCIPLINE	SCHOOL
97	**Mathematics**	Summer project to advance knowledge in an area of interest in Operations Research. Please arrange a topic and supervisor for a potential project prior to submission of your application	Professor Natashia Boland P: 02) 4921 6717 E: Natashia.Boland@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS
98	**Mathematics**	Summer project to advance knowledge in an area of interest in Mathematics, particularly number theory, analysis or computational mathematics.	Laureate Professor Jonathan Borwein P: (02) 4921 5535 E: jon.borwein@gmail.com	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS
99	**Mathematics**	Summer project to advance knowledge in an area of interest in Operations Resarch, in particular, advance knowledge in integer programming and discrete optimisation by using and extending state-of-the-art technologies and algorithms to solve large scale problems in logistics, transportation, network design, energy and healthcare. Please arrange a topic and supervisor for a potential project prior to submission of your application.	Dr Faramroze Engineer P: (02) 49216683 E: Faramroze.Engineer@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS
100	**Colour image processing with the quaternionic Fourier transform**	Recent developments in harmonic analysis and Clifford analysis (a higher dimensional version of complex analysis), particularly the construction of "quaternionic" Fourier transforms and related tools such a quaternionic wavelet transforms, have led to the possibility of improved treatment of colour images, particularly compression. This project is aimed at the production of software for the implementation of these techniques, and will require strong analytical and programming skills.	Dr Jeff Hogan P: (02) 4921 7235 E: jeff.hogan@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS

No.	TITLE OF RESEARCH TOPIC	DESCRIPTION OF RESEARCH PROJECT	PRINCIPAL SUPERVISOR CONTACT DETAILS	RESEARCH GROUP/CENTRE	DISCIPLINE	SCHOOL
101	**Numerical Analysis**	Summer project to advance knowledge in an area of interest in numerical analysis. Please arrange a topic and supervisor for a potential project prior to submission of your application	Dr Bishnu Lamichhane P: (02) 49215529 E: Bishnu.Lamichhane@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS
102	**Mathematics**	Summer project to advance knowledge in an area of interest in linear or nonlinear analysis. Please discuss potential projects prior to submission of your application	A/Prof Brailey Sims P: (02) 49215540; M: 0404554154 E: brailey.sims@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS
103	**Dynamic Assortment and Pricing under Demand Learning**	Retailers, from high-end fashion stores to day-to-day groceries, face the common challenge of optimally deciding what product range to offer and what prices to set; known as assortment and pricing management. New trends in business, like mass customization and emerging markets, force retailers to encounter situations where size of the market, as an important parameter of the demand function is not well known in advance. In this project, we would like to provide mathematical models for on-line learning using Bayesian updates and dynamic programming. The model should be able to develop managerial insights about this process, which can increase the retailers' efficiency and profitability and enable them to offer lower prices and better services.	Dr Masoud Talebian P:(02) 4921 5525 E: Masoud.Talebian@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS
104	**Integer programming theory, algorithms, and applications**	Project to advance knowledge in an area of interest in optimization, in particular, integer programming and discrete optimisation, using state-of-the-art techniques. Please arrange a topic for a potential project with me prior to submission of your application.	Dr Hamish Waterer P: (02) 4921 5951 E: hamish.waterer@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS

No.	TITLE OF RESEARCH TOPIC	DESCRIPTION OF RESEARCH PROJECT	PRINCIPAL SUPERVISOR CONTACT DETAILS	RESEARCH GROUP/CENTRE	DISCIPLINE	SCHOOL
105	**Mathematics**	Symmetry groups of structures, such as the group of rotations of a sphere for example, encapsulate important features of the structures. Investigation of symmetry groups of relational structures, such as combinatorial graphs and in particular infinite trees, is currently at the cutting edge of research in this area. This summer project will advance knowledge of this subject.	Prof George Willis P: (02) 4921 5666 E: George.Willis@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS
106	**Mathematics**	Summer project to advance knowledge in an area of interest in Mathematics, for instance, number theory and special functions.	A/Prof Wadim Zudilin P: (02) 4921 5530 E: Wadim.Zudilin@newcastle.edu.au	Priority Research Centre for Computer Assisted Research in Mathematics and its Applications (CARMA)	**Mathematics**	MAPS
107	**Physics**	Summer project to advance knowledge in an area of interest in Physics or Photonics. Please arrange a topic and supervisor for a potential project prior to submission of your application.	Dr John Furst P: (02) 4348 4117 E: John.Furst@newcastle.edu.au	Surface and Nanoscience Group	**Physics**	MAPS
108	**Chiral Devices**	Creating devices which can separate identical pharmaceutical drugs is of utmost importance. This project will provide the student with experience in the creation of chemical devices as well as two days Neutron beamtime, on the platypus line at the OPAL reactor.	Dr Michael Gladys P: (02) 49216081 E: michael.gladys@newcastle.edu.au	Surface and Nanoscience Group	**Physics**	MAPS
109	**Methanol Fuel Technology**	Direct Methanol Fuel cell's are a alternative fuel source for hydrogen for general energy use in the transport industry. Data has been taken from the Elettra synchrotron on one such device. This project will give the student experience in analysing XPS data from one of the world's leading research facilities.	Dr Michael Gladys P: (02) 49216081 E: michael.gladys@newcastle.edu.au	Surface and Nanoscience Group	**Physics**	MAPS
110	**Modelling CO reactions on Iridium**	Data was taken using Low Energy Electron Microscopy in Italy on on the oxidation of CO on new clean burn car catayst. This project will involve modelling this data using an existing computer code.	Dr Michael Gladys P: (02) 49216081 E: michael.gladys@newcastle.edu.au	Surface and Nanoscience Group	**Physics**	MAPS

111	**Dosimetry imaging based dosimetry for arc-IMRT treatment**	We have developed a method to determine the 3D distribution of delivered dose during arc-IMRT, an advanced radiation therapy treatment where a linear accelerator rotates around the patient continuously delivering a beam targeted to the tumour. We record images during rotation and use these to reconstruct at 3D dose in a virtual phantom. This project would perform dosimetric measurements using EBT2 film within real phantoms to compare to the reconstructed data. This would lead to clinical implementation of this technique at the Calvary Mater Newcastle for patient treatments.	A/Prof Peter Greer P: (02) 4921 1892 E: peter.greer@newcastle.edu.au	Priority Research Centre for Information Based Medicine Medical Physics Research Group	**Physics**	MAPS
112	**A "best-of-both-worlds" imager for radiation therapy**	In modern radiation therapy highly modulated beams of radiation are used to kill cancer cells while sparing normal tissues. Of critical importance is both accurate targeting via imaging and accurate dose delivery via dosimetry. We have developed a novel design for an imaging system that performs extremely well for dosimetry when the optical signal from the phosphor layer is blocked and extremely well for imaging when the optical signal from the phosphor is passed. The aim of this project is to simulate methods to adapt this design to perform as a dual-mode imager. Methods to alternately block or pass the optical signal from the imager phosphor layer will be investigated. Experiments will be performed with the imager to test the methods.	A/Prof Peter Greer P: (02) 4921 1892 E: peter.greer@newcastle.edu.au	Priority Research Centre for Information Based Medicine Medical Physics Research Group	**Physics**	MAPS
113	**Verification of accuracy of advanced radiation treatments in multi-centre clinical trials**	Multi-centre clinical trials are used to determine how effective new treatments are by comparison to conventional treatments. Currently there is no way to determine if each participating centre accurately delivers the treatments which is needed to ensure that the trial results are meaningful. We have developed a method to do this by using imaging systems that are present on all treatment linear accelerator systems. The images from each centre of their delivery would be sent to us for analysis of accuracy. This project would develop methods to analyse these images and collate results for various centres. The student would be based within radiation oncology at the Calvary Mater Newcastle and site visits to other centres may be made.	A/Prof Peter Greer P: (02) 4921 1892 E: peter.greer@newcastle.edu.au	Priority Research Centre for Information Based Medicine Medical Physics Research Group	**Physics**	MAPS

114	**Surface Plasmons in Metal Nanostructures**	Surface plasmons are collective excitations of valance electrons that propagate along a surface. They are currently of enormous technological interest for applications such as single molecule detection, sub-wavelength optics and even tumour therapy. Surface plasmons can be generated by light or by fast electrons. There are clear connections between the two types of excitations because both can be represented by time-varying electric fields. However the time and spatial dependence of these fields is distinctly different. The aim of this project is due explore the classical electrodynamics calculations for these excitations to determine the connections and differences between the two types of excitations.	Dr Vicki Keast P: (02) 4921 6653 E: vicki.keast@newcastle.edu.au	Surface & Nanoscience	**Physics**	MAPS
115	**Calculating optical properties from first principles**	Predicting and understanding the optical properties of materials from first principles can be considered as one of the “last frontiers” in solid state physics. Whilst many other properties of materials, such as mechanical and electronic properties are very well described by fundamental quantum mechanical methods, optical properties often remain poorly described. The reason for this lies in the fact that the optical properties are related to the excited electron states within the material, where the complex response of the electrons to the incident light, including the response of the other electrons must be included. This project will use the latest generation of computer codes to perform such calculations. A variety of metals, semiconductors and insulators will be examined and the applicability of the different levels of approximation to each of these types of materials will be examined.	Dr Vicki Keast P: (02) 4921 6653 E: vicki.keast@newcastle.edu.au	Surface & Nanoscience	**Physics**	MAPS
116	**Why Don’t Girls Do Physics?**	Many other fields have overcome the traditional gender imbalances and yet the number of girls choosing to study physics at the secondary and tertiary level remains stagnant. This project will question and explore the nature of physics itself, in the context of gender interests and preference.	Dr Vicki Keast P: (02) 4921 6653 E: vicki.keast@newcastle.edu.au	Surface and Nanoscience	**Physics**	MAPS
117	**Diffusion in Samples returned from the NASA Genesis Mission**	In the NASA Genesis mission a spacecraft orbited the sun for 3 years, collecting atoms given off by the sun into silicon wafers. The spacecraft returned to Earth and we are now analysing the wafers. The atoms implanted into wafers have however diffused from their expected positions. We will measure the diffusion in Genesis and implant standards using the secondary ion mass spectrometer in the Physics department.	Prof Bruce King P: (02) 4921 5548 E: bruce.king@newcastle.edu.au	Surface and Nanoscience	**Physics**	MAPS

118	**Plasma wave signatures of geomagnetic substorms**	Geomagnetic substorms resulting in auroral displays are some of the most spectacular sights in nature. The auroras are one manifestation of extremely energetic events in geospace that result in the production of plasma waves. This project will use data from arrays of ground-based magnetometers and VLF radio sounders to examine the properties of these waves and hence determine how the waves are generated.	Prof Fred Menk P: (02) 4921 2007 E: fred.menk@newcastle.edu.au	Centre for Space Physics	**Physics**	MAPS
119	**Effect of magnetic fields on global climate**	Everyone is aware of intense discussion on anthropogenic influences on global climate. Some years ago it was proposed that global cloud formation is correlated with cosmic ray fluxes, which in turn are connected with the open solar flux. This project will investigate whether there is a possible relationship between global temperature and the interplanetary and terrestrial magnetic fields, which would modulate cosmic ray fluxes.	Prof Fred Menk P: (02) 4921 2007 E: fred.menk@newcastle.edu.au	Centre for Space Physics	**Physics**	MAPS
120	**Does the Sun affect GPS signals?**	Solar flares and coronal mass ejections cause a variety of space weather effects that may impact on technological systems. This project will investigate whether satellite-to-ground GPS signals are adversely affected by these phenomena. This is particularly important given society's increasing reliance on the GPS system for timing and navigation, and the fact that the next solar maximum will occur in 2-3 years.	Prof Fred Menk P: (02) 4921 2007 E: fred.menk@newcastle.edu.au	Centre for Space Physics	**Physics**	MAPS
121	**The Ionospheric Alfven Resonator**	The Earth's ionosphere acts as a resonant cavity for electromagnetic plasma waves. This project will involve numerically solving the time dependent Maxwell wave equations to explore the properties of this cavity. The model is unique in combining realistic descriptions of the conductivity and geomagnetic field.	Dr Murray Sciffer P: (02) 4921 5800 E: murray.sciffer@newcastle.edu.au	Centre for Space Physics	**Physics**	MAPS
122	**FoF2 effect on ULF wave observations**	The aims of this project is to establish if the F2 regions electron concentration is important in the damping the ULF waves or if the damping is associated with seasonal, global changes in particle densities in the coupled ionosphere-plasmasphere system. The use of existing models of Ultra Low Frequency (ULF) wave in the earth's Ionosphere will be used to estimate the effect of ionospheric conductivities on the amplitude of these wave observed at the ground.	Dr Murray Sciffer / Prof Fred menk P: (02) 4921 5800 E: murray.sciffer@newcastle.edu.au	Centre for Space Physics	**Physics**	MAPS

123	**Mathematical modelling of physical systems**	Mathematical modeling of physical system is increasingly becoming an integral part of understanding a wide variety of physical phenomena. There are a wide range of mathematical modeling techniques which are applied to solve such problems. The aim of this project is to model a given physical process using a particular mathematical technique. Where possible the model results should be validated by "real world" observations. Examples of the physical processes which could be examined are particle-particle interactions, wave-particle interactions, EM waves, fluid dynamics etc	Dr Murray Sciffer P: (02) 4921 5800 E: murray.sciffer@newcastle.edu.au	Centre for Space Physics	**Physics**	MAPS
124	**Design your own Space Physics Project**	The Centre for Space Physics has research interests in both the computer simulation and analysis of experimental data from HF radar, satellites and other ground based detectors. The data are mostly measurements of fields (electric and magnetic), particles and optical emissions (e.g. ultraviolet images of the aurora from space). If you have an interest in near-Earth space science and would like to explore a particular interest then come and see us.	Dr Murray Sciffer / A/Prof Colin Waters P: (02) 4921 5800 E: murray.sciffer@newcastle.edu.au	Centre for Space Physics	**Physics**	MAPS
125	**Physics**	Summer project to advance knowledge in an area of interest in Physics or Photonics. Please arrange a topic and supervisor for a potential project prior to submission of your application.	Dr Xiaojing Zhou P: (02) 4921 6732 E: Xiaojing.Zhou@newcastle.edu.au	Priority Research Centre for Organic Electronics (PRCOE)	**Physics**	MAPS
126	**Categorical data analysis**	Summer project to advance knowledge in the application of categorical data analysis. Please arrange a topic and supervisor for a potential project prior to submission of your application.	A/Prof Eric Beh P: (02) 4921 5113 E: Eric.Beh@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS
127	**Statistical methods in climate change research**	This project will develop statistical theory and methods for climate research in any of the following areas: time series clustering; combining time series; wavelet methods; functional data analysis in time and space; meta analysis for global studies; synchronization mathematics; trajectory analysis using Bayesian and non Bayesian mixture analysis; transition state methods and Bayesian hierarchical methods.	Prof Irene Hudson P: (02) 4921 6402 E: Irene.Hudson@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS

128	**Bioinformatics and Chem-informatics in Drug Discovery**	This project will develop novel Bayesian and non Bayesian methods (mixture, artificial intelligence and support vector machines) for classification and create new indicators of molecular ligand binding for drug discovery. The theory will be tested on calpain inhibitors for cataract treatment. The mathematical tools and new indicators developed will provide alternatives to diagnostics currently used in molecular libraries, and aim to provide better prediction and less false positives and negatives in drug evaluation. This research is part of an ongoing collaboration with the University of Cambridge, UK, the University of Adelaide, and GKSS, Berlin.	Prof Irene Hudson P: (02) 4921 6402 E: Irene.Hudson@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS
129	**Using movements to uncover mental processes**	There are well-established mathematical theories of the cognitions underlying simple choices, but discriminating between the most sophisticated competing theories is difficult, given existing data. A new source of data might help constrain the theories and shed light on what happens in the moments before a choice is made. One new method uses data measured from movements - an observer makes a decision and simultaneously reaches their arm toward a target. This project will involve integrating data from movement-based experiments with cutting-edge theories of decision making and related statistical theory (wavelets, survival methods, transition state approaches, dynamic mixture models).	Prof Irene Hudson P: (02) 4921 6402 E: Irene.Hudson@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS
130	**Sleep Research: Fatigue modelling algorithms for railway drivers**	This project involves the development of multivariate Bayesian mixture and other multivariate time series methods to classify railway drivers' sleep/duty/wake/break profiles. Methods will accommodate time series of highly disparate lengths across drivers, and of high dimension. This research is part of a CRC Rail Innovation Grant funded project, and a collaboration with the University of SA, Centre for Sleep Research.	Prof Irene Hudson P: (02) 4921 6402 E: Irene.Hudson@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS
131	**Statistical surveillance methods in climate and health:**	The field of health informatics, a discipline at the juncture of information science, computer science, and health care has experienced a tremendous growth in tandem with the development of new computational and e-technologies. This project will explore and develop spatial and temporal and also mixture statistical methods for surveillance studies, as applicable to topological climate maps, and to the surveillance of health, disease and injury. Data will be available from the School of Medicine and Public Health, the School of Health Sciences (Faculty of Health) and the WHO.	Prof Irene Hudson P: (02) 4921 6402 E: Irene.Hudson@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS

132	**Modelling Trajectories: Longitudinal and Time Series methods:**	This project will explore/ develop a theoretical framework for joint modelling of multivariate profiles (trajectories) over time. The methods will be tested and applied to datasets, based on NHMRC funded research - in collaboration with investigators at the University of Newcastle and the University of Adelaide. The student can choose the data set. This project offers choice of areas of application in stroke research, neuro-physiological and/or psychometric research.	Prof Irene Hudson P: (02) 4921 6402 E: Irene.Hudson@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS
133	**Spatial patterns of disadvantage**	The spatial pattern of disadvantage shows different features at different geographic levels. This project will consider the role of geographic level, particularly the effects of different types of boundaries, and investigate social statistics of areas in the Hunter region. This project would ideally suit a student with a background in both statistics and geography.	Dr Robert King P: (02) 4921 5548 E: Robert.King@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS
134	**Image analysis for Robot soccer:**	This project involves work with the University of Newcastle's robot soccer team, the NUBots. The robots find where they are on the field (localise) using information from the picture taken by the camera in their head. This project will work on improving the image analysis module.	Dr Robert King P: (02) 4921 5548 E: Robert.King@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS
135	**Statistics**	Summer project to advance knowledge in an area of interest in Statistics. Please arrange a topic and supervisor for a potential project prior to submission of your application.	Dr Elizabeth Stojanovski P: (02) 4921 5346 E: Elizabeth.Stojanovski@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS
136	**Statistics**	Summer project in an area of Bayesian Statistics.	Dr Frank Tuyl P: (02) 4921 8854 E: Frank.Tuyl@newcastle.edu.au	Statistics Research Group	**Statistics**	MAPS

School of Psychology:

No.	TITLE OF RESEARCH TOPIC	DESCRIPTION OF RESEARCH PROJECT	PRINCIPAL SUPERVISOR CONTACT DETAILS	RESEARCH GROUP/CENTRE	DISCIPLINE	SCHOOL
137	**Addressing smoking and other health risk behaviours for people with mental illness**	Smoking and rates of other health risk behaviours are higher for people with a mental illness than for the general community, and morbidity and mortality associated with a range of chronic diseases are higher as a consequence. A collaborative, cross-disciplinary project will be undertaken, in conjunction with Hunter New England Health, which will examine the 'determinants' of these inequities in health risk, including the role of health care providers, health care services and other 'system' factors, and may involve contributing to developing and trialling interventions to effect change.	A/Prof Jenny Bowman P: (02) 4921 5958 E: jenny.bowman@newcastle.edu.au	Clinical & Health Psychology Group Priority Research Centre for Health Behaviour Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
138	**Changing 'SNAP' health risk behaviours (Smoking, Nutrition, Alcohol, Physical Activity) for population groups at risk**	Effectively addressing the SNAP risk factors at a population level (or for high risk groups) provides the potential to substantively reduce rates of our most common and fatal chronic diseases - including cardiovascular disease, respiratory disease, diabetes and many cancers. Collaborative, cross-disciplinary projects will be undertaken, in conjunction with Hunter New England Health, which will explore the determinants of behaviour change for SNAP risk factors - including a consideration of individual, societal and systems influences - as well as developing and trialling interventions to effect change.	A/Prof Jenny Bowman P: (02) 4921 5958 E: jenny.bowman@newcastle.edu.au	Clinical & Health Psychology Group Priority Research Centre for Health Behaviour Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
139	**Attitudes to sexuality, relationships and child-rearing: A study of people with genetic disorders**	People with intellectual disabilities experience the same range of sexual needs and desires as other people. However, they experience many difficulties meeting their needs. In particular it has been found that not only do many people with intellectual disabilities have lower levels of sexual knowledge and experience but they also meet more negative attitudes to sex, relationships and to having children. For people with genetic disorders, the specificity of these problems are largely unexplored, they are likely to experience similar issues to people with intellectual disabilities of familial or idiopathic origin but their experience may be even more complex due to the possibility of	Dr Linda Campbell (02) 02 4349 4490 E: linda.e.campbell@newcastle.edu.au Ourimbah or Callaghan	Clinical & Health Research group Neuroscience research group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC

		passing on their genetic disorder to their children. The attitudes of family, health workers and others in the community toward the sexuality of individuals with genetic disorders have the potential to influence opportunities for normalised life experiences in the area of sexuality, relationships and childbearing for people with genetic disorders. The study will investigate attitudes but also knowledge toward sexuality, relationships and childbearing among people with genetic disorders held by their families, among health professionals involved in the care of people with genetic disorders and in the general community. Related projects; can be designed to suit Hons/Masters or Prof Doc student				
140	**Resilience in children with chronic illness (PhD project)**	The developmental trajectory of children with chronic illness due to genetic disorders vastly differs between individuals, with some children meeting cognitive developmental milestones and displaying positive behavioural and psychosocial characteristics. While others demonstrate cognitive deficits along with behavioural and psychosocial disturbances. One reason for this variation in the developmental trajectory of children with chronic illness may be the presence of protective factors. Protective factors are identified as factors that enable the successful engagement of risk (Rutter, 1987). For the most part previous literature has focused on investigating protective factors in areas where children are faced with environmental adversity (poverty, violence, family discord and parental substance abuse) (Wyman, 2003; Wyman, Cowan, Work, & Kerley, 1993), however there is a paucity of literature investigating factors that protect the developmental trajectory of children affected by early life genetic and biological chronic illness. Related projects can be designed to suit Hons/Masters or Prof Doc student.	Dr Linda Campbell (02) 02 43494490 E: linda.e.campbell@newcastle.edu.au Ourimbah or Callaghan	Clinical & Health Research group Neuroscience research group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
141	**Is a man going to the doctor following his partner having a miscarriage a measure of depression?**	Following a female partner's miscarriage there is a measured increase in men's attendance to their GP for minor health matters. This research explores the possibility that this behaviour may be indicative of depression, we will examine data that has measured depressive symptoms in men following their partner's miscarriage and will explore wither GP attendance can be used as a warning sign of psychological distress.	Rev Dr Martin P. Johnson P: (02) 4921 8864	Clinical & Health Psychology Group Priority Research Centre for Health Behaviour	**Psychology**	PSYC

142	**Impact of media health campaigns on health behaviour change**	Despite millions of dollars spent annually on media health campaigns annually, they have little, if any, positive outcomes in terms of behaviour change. Our research is trying to understand theoretically why many health campaigns typically fail by looking at the psychological impact of graphic health media campaigns and whether they help or hinder individuals understand health risk and consequences of their behaviour.	Rev Dr Martin P. Johnson P: (02) 4921 8864	Clinical & Health Psychology Group Priority Research Centre for Health Behaviour	**Psychology**	PSYC
143	**A Modern Take on a Textbook Classic: Hick's Law**	When people have to make decisions, they take longer if there are more alternatives to choose between. The slow-down is almost always the same, no matter what kinds of decisions are being made. This regularity seems to describe something fundamental about decision-making, so it has been known as "Hick's Law" for more than 50 years. Despite being written about in every introductory textbook, there are no really good theories for why Hick's Law arises. You will join an ongoing project in my lab that tests new limits for Hick's Law, using simple experiments, and you will also develop mathematical theories for the law.	Dr Scott Brown P: (02) 4921 5760 E: Scott.Brown@newcastle.edu.au W: http://www.newcl.org/?q=node/50	Human Experimental and Applied Dynamics (HEAD)	**Psychology**	PSYC
144	**Fast, or Careful? Law**	When making decisions, we are constantly faced with the need to trade speed for accuracy: we can make lots of decisions quickly, but with lots of errors; or we can make a few decisions slowly and accurately. There are comprehensive cognitive theories for how this tradeoff occurs, and these theories have been well accepted by the scientific community for decades. However, some of the basic assumptions of those theories have never been tested – we will conduct experiments to find out which assumptions hold up to closer scrutiny, and we will use this information to better develop the comprehensive theories. There is also scope in this project to examine interesting applications of decision theory, such as in aging or clinical populations.	Dr Scott Brown P: (02) 4921 5760 E: Scott.Brown@newcastle.edu.au W: http://www.newcl.org/?q=node/50	Human Experimental and Applied Dynamics (HEAD)	**Psychology**	PSYC

145	**Cognitive Psychology: 'Hot Hand' in computer games.**	The 'Hot Hand' phenomenon in basketball (Kahneman & Tversky), or other sports, refers to one's ability to make a successful shot after a sequence of successful shots, compared to her or his chances of making the next shot after unsuccessful shot(s). Presumably, high confidence after a successful trial improves performance on subsequent trial(s). We shall test if the 'Hot Hand' phenomenon exists in computer games, and focus on whether or not gamers are willing to take higher risks after successful trials.	Dr Ami Eidels P: (02) 4921 7089 E: Ami.Eidels@newcastle.edu.au	Human Experimental and Applied Dynamics (HEAD)	**Psychology**	PSYC
146	**Cognitive Psychology: Are human faces special?**	People are extremely efficient in recognizing other peoples' faces. We can recognize a familiar face from distance, in dim light, and even if the face is partially occluded. Contemporary theories of face processing argue that faces are special because different facial features (eyes, nose, mouth) are combined together to create a 'holistic' experience. We shall test this assertion using the well-known Garner paradigm.	Dr Ami Eidels P: (02) 4921 7089 E: Ami.Eidels@newcastle.edu.au	Human Experimental and Applied Dynamics (HEAD)	**Psychology**	PSYC
147	**Cognitive Psychology: Challenging the automaticity account of the Stroop phenomenon.**	In a Stroop task, participants are presented with colour names printed in colour and are asked to indicate the print colour, while ignoring the word. People are often slower in naming the colour of incongruent displays (such as the word GREEN printed in red) compared to naming the colour of congruent displays (RED printed in red). Presumably, this slowdown in performance (termed the Stroop effect) is due to the automatic nature of reading: when presented with words, people cannot ignore the words, which in turn slow them down on incongruent trials. We shall to challenge this account and show that reading is not inevitable.	Dr Ami Eidels P: (02) 4921 7089 E: Ami.Eidels@newcastle.edu.au	Human Experimental and Applied Dynamics (HEAD)	**Psychology**	PSYC
148	**A learning outlook to the fear and categorization of ethnic others**	Intergroup anxiety (the anxiety experienced during anticipated or actual interactions with individuals of other ethnicity) and intergroup categorization (the act of mentally separating us from them along ethnic dividers) are powerful predictors of intergroup prejudice and discriminatory behaviour in society. The present project takes a systematic approach to explore the extent to which intergroup anxiety, as well as out-group categorization processes, can be modified through both direct experience of an aversive interaction with ethnic faces, and observation of another person's (the 'demonstrator') aversive experience. The	Dr Stefania Paolini P: (02) 4921 5938 E: stefania.paolini@newcastle.edu.au Dr Andrea Griffin P: (02) 4921 7161 or (02) 4348 4393 E: Andrea.Griffin@newcastle.edu.au (both Callaghan and Ourimbah campuses)	Social Psychology Laboratory Human Experimental and Applied Dynamics (HEAD) Priority Research Centre for Brain	**Psychology**	PSYC

		student will work under the supervision of a researcher in learning and cognition (Dr Griffin) and a researcher in social psychology (Dr Paolini), both internationally recognized experts in their fields and learn to use state-of-the art technology to manipulate direct and observational aversive learning, assess ethnic categorization of human faces, and measure psychophysiological responses of arousal. This exciting new line of research has the potential to inform the design of individual-level treatments of anxiety and stereotype reduction, as well as group-level intervention programs aiming to reduce racial tension in society.		and Mental Health Research		
149	**Investigating why intergroup interactions can be detrimental to the relations between rival social groups**	Fifty years ago, an influential social psychologist proposed that face-to-face interactions, or 'contact', between individuals of potentially rival groups may reduce prejudice, discrimination, and conflict and lead to more harmonious intergroup relations (Allport, 1954). Since then, this idea has inspired desegregation policies in Australia and around the world. Recent reviews of the intergroup contact literature have confirmed that intergroup contact typically improves intergroup relations. This optimistic view of the future, however, is at odds with a sharp increase in intergroup conflict that our multicultural society is experiencing. In the proposed research, we aim to clarify why intergroup conflict continues to be a key social issue in Australia and abroad despite increased contact between social groups. In particular, we use a variety of social psychological research methods (experiments, field-studies, surveys) and look into a variety of intergroup settings (inter-ethnic, inter-generational, cross-gender, etc. relations) to address the following critical questions: ▪ Does negative contact with outgroup members make people more aware of their respective group memberships than positive contact and does it have a greater long-lasting impact on group attitudes? ▪ Why and when might negative intergroup contact have a disproportionate impact on intergroup relations?	Dr Stefania Paolini P: (02) 4921 5938 E: stefania.paolini@newcastle.edu.au	Social Psychology Laboratory Human Experimental and Applied Dynamics (HEAD) Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC

150	**Relationship Between Spatial Understanding and 3D Design**	Please contact Ken to discuss the details of the research project.	Mr Ken Sutton P: 02 49216361 E: Ken.Sutton@newcastle.edu.au	Human Experimental And Applied Dynamics Group	**Psychology**	PSYC
151	**Identifying Practice Effect and its Impact on Learning in a Graphical Communication Environment**	Please contact Ken to discuss the details of the research project.	Mr Ken Sutton P: 02 49216361 E: Ken.Sutton@newcastle.edu.au	Human Experimental And Applied Dynamics Group	**Psychology**	PSYC
152	**Rhythmic Brain Activity and perception of rapidly changing sounds.**	Natural sounds are transient in nature, containing rapid temporal variations in frequency, amplitude of the sound envelope. These transients carry important information necessary for accurate perception of speech, music and other environmental sounds. This research program seeks to better understand the neural basis of perception of the temporal (or time-dependent) characteristics of sound by examining the relationship between brain electrical responses (EEG/ERP methods) and perceptual sensitivity (psychoacoustic/psychophysical methods) to temporal variations in sound. Full training will be given in undertaking research using advanced techniques that provide measures of brain electrical activity and auditory perception.	Dr Bill Budd P: (02) 4348 4135 E: Bill.Budd@newcastle.edu.au (Ourimbah Campus)	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
153	**Brain mechanisms in binaural hearing**	One of the most remarkable features of auditory perception is our ability to very small detect differences in the timing of sound arriving at each ear. This sensitivity to timing of sounds is an order of magnitude more precise than any other sensory modality and underlies our ability to localise sounds in space as well as to accurately perceive sounds in noisy environments. This research seeks to better understand the role of the auditory brain in the representation and analysis of binaural information using measures of brain electrical activity (EEG/ERP) and psychoacoustic methods. Full training will be given in undertaking research using advanced techniques that provide measures of brain electrical activity and binaural hearing.	Dr Bill Budd P: (02) 4348 4135 E: Bill.Budd@newcastle.edu.au (Ourimbah Campus)	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC

154	**Neuroplasticity in brain regions underlying our sense of touch.**	Previous EEG studies have shown that entrained neuroelectric activity of the brain to prolonged or rapidly repeated tactile (somatosensory) stimulation is associated with dramatic changes in rhythmic activity of the brain. Recent research has shown that this response is not fixed but modifies progressively and reversibly over short periods of time (seconds to minutes). This suggests that this measure of EEG activity may provide an important index of brain plasticity with applications in to clinical populations such as stroke. This research programs seeks to extend our understanding of neuroplasticity of brain functions with a view to providing and accurate measure of this important process. Full training will be given in undertaking research using advanced techniques that provide measures of brain electrical activity and perceptual measures of our sensitivity to tactile stimulation (touch).	Dr Bill Budd P: (02) 4348 4135 E: Bill.Budd@newcastle.edu.au (Ourimbah Campus)	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
155	**The human face as an evolved signalling system.**	Human faces convey a wide range of information about identity, age, sex, health, fertility, etc. and movements of the face operate as complex social signals. The summer scholarship student will help to run a project investigating non-verbal dynamic signalling in a variety of social contexts - the way people's facial movements communicate a wealth of subtle information to their social partners. You will help to run participants in the study and to analyse the resulting video footage. Given that we currently know very little about what kinds of signals are conveyed in these contexts, there is an opportunity for you to make a significant intellectual contribution to the project.	Dr Darren Burke P: (02) 4348 4158 E: Darren.Burke@newcastle.edu.au (Ourimbah campus ONLY)	Neuroscience Group Human Experimental And Applied Dynamics Group	**Psychology**	PSYC
156	**Indian Mynahs: Assessing their impact and developing a behavioural management plan**	Indian Mynahs are an introduced species that are now widespread in many parts of urban Australia. Although they are frequently assumed to have a negative impact on native birds, and they are subject to a well-established (but not very successful) eradication program, there are actually very few studies examining their impact, and none that have tried to develop alternative, more humane, management strategies. The student working on this project will help to gather data on birds in the field (setting up movement-sensitive video cameras and experimental nest boxes), help to run experiments with captive birds examining nest box preferences, and help to analyse video footage of birds interacting with native species.	Dr Darren Burke P: (02) 4348 4158 E: Darren.Burke@newcastle.edu.au (Ourimbah campus ONLY)	Neuroscience Group Human Experimental And Applied Dynamics Group	**Psychology**	PSYC

157	**Exploring the minds of nonhumans: episodic memory in the Indian mynah.**	Exciting new advances in the study of nonhuman minds, notably in birds, have revealed the existence of complex cognitive abilities that extend well beyond those expected from basic associative learning mechanisms. These include capabilities like the ability to recall past events and to plan for future ones ('mental time travel'), to extract information from a given learning situation and apply it to novel situations, and to recall information about specific past events ('where, when, what (WWW) memory' also known as episodic memory).The student working on this project will have the opportunity to begin piloting experimental designs to test the existence of episodic memory in an exotic songbird and vocal mimic, the Indian mynah.	Dr Andrea Griffin P: (02) 4921 7161 or (02) 4348 4393 E: Andrea.Griffin@newcastle.edu.au (both Callaghan and Ourimbah campuses)	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology (Cognitive and Learning Psychology)**	PSYC
158	**Brain, behaviour and ecology in the Indian mynah**	Why do some species have bigger brains than others? Do big brains confer greater intelligence? Do some environments select for greater intelligence? Indian mynahs, an exotic songbird, and vocal mimic, exhibit problem-solving abilities that rival some of Australia's crow species, generally thought to represent the pinnacle of bird intelligence. Together with published brain data indicating than mynahs have larger brains than would be predicted by their body size, these findings point to the mynah as a unique system in which to explore the relationship between intelligence, ecology and brain size. The student on this project will become involved in ongoing research on brain-ecology-cognition relationships in mynahs. The student will acquire experience in behavioural testing and/or in preparing and examining brain slices, recognizing a variety of brain structures in the avian brain, and collecting quantitative measures of brain size and neuronal densities.	Dr Andrea Griffin P: (02) 4921 7161 or (02) 4348 4393 E: Andrea.Griffin@newcastle.edu.au (both Callaghan and Ourimbah campuses)	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology (Cognitive and Learning Psychology)**	PSYC

159	**Behavioural and physiological correlates of ecological invasion: resource use in the Indian mynah**	Why do some species become highly successful ecological invaders, while other species go extinct? Various hypotheses have been proposed and most often tested using a literature-based large-scale species comparative approach, but rarely experimentally at an individual species level. Our research program uses the Indian mynah, an exotic songbird and highly successful ecological invader, as a model system to identify which behaviours allow some avian species to expand their populations faster than all other native Australian bird species. Summer scholarship students will have the opportunity to study mynahs in the lab or in the field and to design methods to explore which food resources are key to mynah success and which habitats are most suitable to mynah expansion.	Principal Supervisor: Dr Andrea Griffin P: (02) 4921 7161 or (02) 4348 4393 E: Andrea.Griffin@newcastle.edu.au (both Callaghan and Ourimbah campuses) Co-supervisor: Dr Geoff MacFarlane P: (02) 4921 7858 E: Geoff.Macfarlane@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research Environmental Biology & Biotechnology Group	**Psychology (Cognitive and Learning Psychology)** **Biological Sciences**	PSYC
160	**Vocal and motor mimicry in the Indian mynah**	The Indian mynah is an exotic songbird, and vocal mimic, which means that it can learn to imitate the vocalizations of other species, including humans. The mynah also has an outstanding ability to display innovative behaviour when foraging for food, and to learn from watching the behaviour of other mynahs in a group. Students involved in this project will have the opportunity to design and conduct behavioural work on social earning and to explore whether this ability is correlated with an ability to imitate sounds.	Principal Supervisor: Dr Andrea Griffin P: (02) 4921 7161 or (02) 4348 4393 E: Andrea.Griffin@newcastle.edu.au (both Callaghan and Ourimbah campuses) Co-supervisor: Dr David Guez P: (02) 4921 7161 E: David.Guez@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology (Cognitive and Learning Psychology)**	PSYC
161	**Extinction and Habituation**	Extinction and Habituation appeared to be extremely simple and distinct mechanisms. Habituation is one of the non-associative forms of learning and extinction necessitates associative learning to take place before it can occur. However, if we take a close look, the procedures that give rise to the two and the behavioural consequences of the two are identical: the animal stop responding to a given stimulus. Using pharmacological tools we will explore the underlying mechanism that give rise to these phenomena and see if they are indeed identical.	Dr David Guez P: (02) 4921 7161 E: David.Guez@newcastle.edu.au	Neuroscience Group	**Psychology**	PSYC

162	**Perinatal programming of health and disease** ***Project 1:*** **Role of early life infection in schizophrenia and cognitive alterations in working memory.**	**Early life programming of heath and Disease.** The research focus of the laboratory is the role of early life events in the programming of development. Over the past 15 years our laboratory has been addressing the impact of maternal and neonatal factors on fetal development and subsequent susceptibility to pathology in later life. Utilising a variety of animal and human models, we have been working towards providing a perinatal etiology for chronic pain, anxiety, schizophrenia, and irritable bowel syndrome. Whilst appearing diverse, these disorders all appear to have common links to infection in early life. We are also focusing on the possible epigenetic pathways that transmit such predispositions from one generation to the next non-genomically. We currently have projects available for Summer , Honours and PHD scholarships in the following areas: ***Project 1*** **Role of early life infection in schizophrenia and cognitive alterations in working memory.** There is a long history relating viral exposure during pregnancy to the onset of schizophrenia in later life. This project is investigating the relationship between infection in early life and the development of schizophrenia and cognitive alterations in later life in an animal model. The student on this project will work with an animal model to record brain wave activity.	Associate Professor Deb Hodgson Laboratory of Neuroimmunology P: (02) 4921 6701 E: Deborah.Hodgson@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
163	**Perinatal programming of health and disease** ***Project 2*** **Role of early life infection on predisposition to psychopathology**	**Early life programming of heath and Disease:** ***Project 2*** **Role of early life infection on predisposition to psychopathology** Previously, we have demonstrated early life exposure to bacteria results in an increased propensity for adult onset anxiety using a rat model. This project will examine what transgenerational implications such a predisposition may hold. In other words could infection in early life induce anxiety in one generation that is then transmitted to subsequent generations. The student working on this project will be to investigate the impact of early life infection on later life reproductive behaviour and on the transgenerational impact of early life infection on behaviour.	Associate Professor Deb Hodgson Laboratory of Neuroimmunology P: (02) 4921 6701 E: Deborah.Hodgson@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC

164	**Perinatal programming of health and disease** ***Project 3*** **Does the early life environment predispose to drug use in adulthood**	**Early life programming of heath and Disease:** ***Project 3*** **Does the early life environment predispose to drug use in adulthood** In this project we are using an animal model to investigate the possibility that early life stress or early life exposure to cannabis can increase the likelihood of drug taking behaviour in adulthood. This project will be investigated using a rodent model of addiction. Animals will be exposed to mild stress early in life and we will assess the relationship to later drug seeking behaviour. We will also be assessing the impact on the brain and will be examining immunohistochemically changes to brain structure and brain signalling pathways.	Associate Professor Deb Hodgson Laboratory of Neuroimmunology P: (02) 4921 6701 E: Deborah.Hodgson@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
165	**Perinatal programming of health and disease** ***Project 4*** **Developing new approaches to assist the brain recover from inflammation and inflammation induced damage**	**Early life programming of heath and Disease:** ***Project 4*** **Developing new approaches to assist the brain recover from inflammation and inflammation induced damage** Inflammation within the brain (neuro-inflammation) can result from prolonged levels of psychological stress, depression, stroke or cardiovascular disease. Importantly, neuro-inflammation can produce significant changes in mood and cognitive function that make recovery from these conditions more difficult. The objective of this research project is to examine, at both the behavioural and biological levels, a variety of practical strategies to combat neuroinflammation. The ultimate objective of this work is to develop strategies that can be used clinically to improve recovery. This project will be investigated using a rodent model of neuroinflammation	Associate Professor Deb Hodgson Laboratory of Neuroimmunology P: (02) 4921 6701 E: Deborah.Hodgson@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
166	**Perinatal programming of health and disease** ***Project 5*** **Taming the brains immune system**	**Early life programming of heath and Disease:** ***Project 5*** **Taming the brains immune system** Within the brain a specialized network of cells referred to as microglia protects the brain from insult. The function of this network, however, can be profoundly disrupted by many frequently encountered environmental challenges such as injury and infection. It has now been shown that disrupting microglial activities can make us feel fatigued, flat, and socially	Associate Professor Deb Hodgson Laboratory of Neuroimmunology P: (02) 4921 6701 E: Deborah.Hodgson@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC

		disengaged. The objective of this project is to examine pharmacological and behavioural strategies that may increase the resilience of the microglial network, with the objective of using these approaches to assist in the treatment of psychopathology. This project will be investigated using a rodent model				
167	**Developmental pathways of cognitive control: Interaction between structure and function.**	Our research program aims at understanding the cognitive and neural architecture of executive control processes. We use a range of paradigms that allow us to examine the role of voluntary mechanisms vs contextual factors that affect the way we control our intentions and actions. Our program integrates across behavioural and neuroimaging methods such as event-related potentials (ERP), and functional magnetic resonance imaging (fMRI) in order to develop integrative models of cognitive control. Executive function varies across the lifespan. There are improvements in cognitive control over childhood and adolescence and a progressive decline with normal ageing. Our work examines patterns of cognitive control across the lifespan.	Associate Professor Frini Karayanidis P: (02) 4921 5457 E: Frini.Karayanidis@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
168	**Recovery from mild ischaemic stroke – the effect of white matter lesions on cognitive and motor control**	White matter lesions (WML) are common in the aging brain and generally occur without any overt clinical symptoms. Yet recent research suggests that WML are linked to cognitive deficits associated with cerebrovascular disease. The degree to which WML in healthy aging represents age-related change or a precursor to the development of vascular dementia remains unclear. The current research program implements cognitive and motor control paradigms developed by our research team to map the pattern of control deficits associated with WML in patients with minor ischaemic stroke and normally aging persons who show no evidence of dementia. This work will lead to targeted interventions to reduce to impact of WMLs on cognitive and motor function and prolong healthy aging. This work is conducted in collaboration with the Stroke Research Program of the Priority Research Centre for Brain and Mental Health and the Hunter and New England Imaging Service.	Associate Professor Frini Karayanidis P: (02) 4921 5457 E: Frini.Karayanidis@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC

169	**Cognitive flexibility: Adapting to change in an ever-changing world**	Cognitive flexibility is the ability to flexibly adjust behaviour to meet changing demands. This ability matures in young adulthood and declines in old age, a pattern associated with poor decision-making in adolescents and difficulty in maintaining independence in old adults. This project aims to map age-related and individual variation in the ability to flexibly adjust behaviour to meet changing demands in our environment. We examine the relationship between age-related changes in brain structure, behavioural and brain activity measures of cognitive flexibility and measures of cognitive and emotional decision-making.	Associate Professor Frini Karayanidis P: (02) 4921 5457 E: Frini.Karayanidis@newcastle.edu.au	Neuroscience Group Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
170	**Vision Science**	**Mechanisms Underlying Myopia (Short-Sightedness)** Myopia (short-sightedness) occurs when the eyeball is too big, and is caused by visual blur experienced during development. The signal is processed within the eye and creates a cascade of changes within the neurons in the retina of the eye to affect changes in eye growth. Myopia also causes retinal detachment and retinal degeneration and is a leading cause of blindness. We have developed a mammalian model in which eyes wearing spectacles, compensate for the imposed blur by becoming long- or short-sighted. Various projects are available. Examples include: (1) Testing new contact lenses aimed at reversing myopia; (2) Using pharmacological interventions which target the pathways underlying myopia; (3) Studying the effect of luminance on protecting the eye from developing myopia; (4) Tracking the molecular biology underlying myopia; or (5) Optical modelling. The project will be shaped depending on student background and ability. Students from Psychology, Physics, Life Sciences, Biosciences or Engineering are welcome to apply.	Dr Sally McFadden P: (02) 4921 5634 E: Sally.McFadden@newcastle.edu.au	Visual Sciences Laboratory: Priority Research Centre in Brain and Mental Health Research	**Psychology**	PSYC

171	**Fixing faulty filters: The building blocks of psychosis**	Antipsychotic medications are the principal treatment for schizophrenia. The primary action of most antipsychotic medications is to reduce levels of the chemical dopamine in a brain region called the striatum. The dopaminergic system is critical to our ability to engage in goal-directed activity, to learn and to process the relevance of events in relation to context. The primary functional consequence of the medication-induced change in dopamine is to correct a breakdown in the process by which salience or importance is attributed to events. Correcting salience-coding equates to fixing a "faulty filter" that influences whether events become candidates for the focus of our attention. Recent conceptualisations view abnormal dopamine levels as a secondary consequence of a primary problem in the glutamatergic chemical system. Glutamate is a chemical critical to the acquisition and expression of learning. Problems in glutamate and dopamine in striatal and prefrontal regions of the brain are considered central to core treatment-resistant cognitive deficits observed in schizophrenia. This stream of research involves the development of protocols using measures of brain activity to test the cognitive processes, mental illness and the pharmacology of the systems associated with how the brain automatically filters relevance in the environment.	Dr Juanita Todd P: (02) 4921 5977 E: Juanita.Todd@newcastle.edu.au	Neuroscience Group / Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC
172	**Nicotine and Cognition in Schizophrenia**	Whilst nicotine use is declining in the general population (25-30%), it remains very high in individuals with schizophrenia (70-90%). Two hypotheses put forward to explain the high rates of nicotine use in schizophrenia include a focus on self-medication and addiction vulnerability. We are conducting studies to further explore some of the unique effects of nicotine on cognitive abilities in this group.	Dr Juanita Todd P: (02) 4921 5977 E: Juanita.Todd@newcastle.edu.au	Neuroscience Group / Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC

173	**Brain asymmetry in processing the time cues in sound**	As we age, many individuals with intact audiograms (normal hearing sensitivity) will experience difficulty hearing speech in noisy environments. One hypothesis for why this occurs is that there is a decline in the ability to track important temporal/timing cue in the speech signal. We have demonstrated that persons with very good temporal processing ability show asymmetry in how the brain responds to these time cues. Persons with poor temporal processing do not show this asymmetry. Similarly, this asymmetry reverses in good temporal processors in noisy listening environments but again, no asymmetry is seen in poor temporal processors. Studies will be conducted to further explore this ability-related asymmetry using electrophysiological, psychophysical and/or neurocognitive measures and it's importance to groups with impaired temporal and speech processing abilities.	Dr Juanita Todd P: (02) 4921 5977 E: Juanita.Todd@newcastle.edu.au	Neuroscience Group / Priority Research Centre for Brain and Mental Health Research	**Psychology**	PSYC