



Established in 2004, Swansea University's College of Medicine aims to be an internationally-recognised centre of excellence in research and medical education.

The College of Medicine was established from the former Swansea Clinical School in 2004 and began offering Wales' only course for Graduate Entry Medicine in collaboration with Cardiff University. Now, as a College of Medicine, it also offers a wide range of courses from undergraduate genetics and biochemistry degrees to taught masters in trauma surgery and mass spectrometry as well as postgraduate research opportunities spanning the spectrum of medicine and healthcare under the supervision of some 200 research experts at its Institute of Life Science (ILS).

Welsh Roots - Global Reach

St. David's Medical Foundation is a registered charity dedicated to supporting excellence in research and education at the College of Medicine and its Institute of Life Science (ILS). Its mission is to nurture a generation of committed medical leaders, to enable scientific breakthroughs and to translate discovery into treatment and therapies that will deliver striking advances for the health of Wales and beyond.

With an overarching aspiration to push the boundaries of scientific knowledge and strengthen healthcare delivery for patients and their families, St. David's Medical Foundation has five transformational goals:

- To prevent life-threatening diseases such as cancer
- To fight debilitating diseases such as diabetes
- To promote healthy pregnancy and childhood
- To share culture, expertise and resources with doctors in developing nations
- To create a world-class centre of teaching excellence with the most innovative facilities available

Four-year Graduate Entry Medicine Programme

The Graduate Entry Medicine (GEM) Programme is now a fully independent four-year programme based at the Swansea University campus and the surrounding Health Boards, in particular Abertawe Bro Morgannwg University (ABMU) Health Board. Supported by the Welsh Government, the GEM programme has a core aim to increase the number of doctors working in Wales. The spiral curriculum is integrated, with basic biomedical sciences learned in the context of the clinical setting, with a high



emphasis on clinical and communication skills. Early and regular clinical contact helps students to reinforce 'classroom' learning in the clinical context. This programme of study has been specifically planned for graduates of any discipline, who have acquired study skills and greater life experience than students coming through more traditional routes into medicine. Having studied at university before, graduates are more adaptable and better suited to an accelerated programme of intensive study, bringing a broad background and experience to their studies and, ultimately, professional practice.

Undergraduate and postgraduate degree programmes

As well as the Graduate Entry Medicine Programme, the College of Medicine also offers: BSc Genetics, Medical Genetics, Biochemistry and Medical Biochemistry programmes; Postgraduate Certificate in Separation Sciences, MSc Liquid Chromatography Mass Spectrometry, Trauma Surgery and Trauma Surgery (Military), which embrace the principle surgical disciplines involved in UK

Trauma care and aim to set new standards in this field while also leading into high quality research; MPhil, MD and MCh degrees, which are assessed via a period of supervised research followed by assessment by submission and examination of a thesis; and PhD degrees, which are awarded by the University in recognition of the completion of supervised research, submission and examination of a thesis and an oral examination.

Biomedical and health services research with a strong multi- and interdisciplinary ethos

Research at the College of Medicine is housed in the Institute of Life Science (ILS), pictured here, a purpose-built facility strategically located between the College of Medicine and Singleton Hospital, part of Abertawe Bro Morgannwg University (ABMU) Health Board. Made up of two state-of-the-art buildings, the ILS provides 12000 square metres of contiguous facilities filled with an ever-growing collection of research and technology transfer expertise. The ILS is fully equipped with laboratories, office space, clinical research facilities, medical imaging, business incubation and much more. The newly installed MRI has the potential to enhance both anatomical teaching and anatomical research at Swansea.



The College encourages multidisciplinary working that operates across traditional boundaries with the aim of translating basic research into medical discoveries that have a positive impact on the health and wealth of the nation.

Although relatively young, the College of Medicine has made great strides since its humble beginnings as a Clinical School. It has grown significantly from the small but ambitious team that set it up in 2001 into a 400-strong enterprise of educators, researchers and everything in between.

Anatomy teaching at Swansea

In common with many medical curricula around the world, the GEM curriculum is a spiral curriculum in which biomedical, clinical, behavioural and social sciences are both horizontally and vertically *integrated*. The components of the course are arranged so as to encourage a coherent 'parallel' progressive accumulation of knowledge, practical skills and awareness of professionalism. Students renew and integrate previous learning with current activities.

Anatomy sessions introduce 50+ teachers, and a variety of teaching modalities: 'chalk and talk', models, dissections, video, DVD, PowerPoint presentations and radiological imaging. The anatomy relevant to the week is taught in interactive group sessions, delivered by a multidisciplinary team of



doctors (physicians, surgical specialists, radiologists, pathologists) dentists, health professionals (physiotherapists, speech therapists), medical students and core anatomists. We also encourage peer teaching by previous students or foundation doctors who gain valuable teaching experience. Traditionally anatomy was taught by inexperienced surgical trainees in preparation for their examinations. Students rotate around five stations covering anatomy, imaging, pathological process and surgical intervention of the region in question. The involvement of experienced clinicians ensures an in-depth understanding of the topic to be taught (it is their own area of interest) and emphasis on the clinical relevance of the anatomy, using case histories as relevant narrative. Thus the teaching is patient-focussed (their illnesses and problems) and more interesting for students. Learning is reinforced during Learning Opportunities in a Clinical Setting (LOCS) where students attend clinical sessions (fracture clinic, theatre, and endoscopy) and re-experience their anatomy in a 'real-life' context. Student feedback suggests they enjoy the sessions and clinical colleagues often applaud their knowledge.

Dr Jo Bishop is the Curriculum Director for the GEM programme. In this role Dr Bishop oversees the design, structure and development of the GEM curriculum to ensure educational alignment and adherence to contemporary medical education principles and coverage of the outcomes in *Tomorrows Doctors 2009*. In line with this, the delivery and quality of teaching are monitored as well as the student experience. Dr Bishop is also an Anatomy Lecturer at the College whom with her fellow anatomist colleague Dr Sam Webster devised an integrative anatomy curriculum into the graduate entry programme. Her lectureship was awarded for her innovative teaching programme and her cartilage research portfolio. She gained her degree in Anatomical Science in Cardiff and was funded by a prestigious scholarship with Smith and Nephew to complete her PhD on the biology of the articular cartilage progenitor cells. To date her research work has looked at characterising the progenitor cells found within cartilage and comparing them with stem cells isolated from various structures. She has also collaborated with light therapy companies with the possibility of tissue engineering cartilage; this work is on-going. Now acting as a scientific advisor to Cell therapy Ltd her knowledge of stem cell biology is utilised by developing clinical trials for wound healing. Although active as a supervisor to Lab based PhD students Dr Bishop is primarily working with her medical education colleagues based in Swansea to highlight best practice in management, leadership and teaching. Dr Bishop's links with the Welsh deanery have established a postgraduate training satellite at Swansea for continued training of Welsh graduates. The student surgical society run monthly seminars ensuring that this facility is utilised by both undergraduate and postgraduate students.



Dr Samuel Webster is one of the regular, weekly anatomy teachers in Swansea, involved also in purchasing, directing and developing eLearning tools and materials for anatomy and embryology teaching. He has an anatomy and embryology podcast with Dr De Wreede and a neuroscience podcast with Dr Newton which is used by students outside Swansea as much as by students of the Graduate Entry Medicine programme. Large parts of developing a new anatomy curriculum within a new medicine programme were to direct students clearly in their learning and to provide them with learning tools that allowed them to learn flexibly in terms of time management, background skills and existing knowledge. Dr Webster is co-author of the Embryology at a Glance textbook (with Dr De Wreede) due for publication by Wiley-Blackwell in 2012. The style, content and organisation of this textbook have been influenced by the Swansea Graduate Entry Medicine curriculum and by the demands and feedback on his teaching style from graduate students within the programme. Dr Webster is also working with QR codes, HTML, smartphones and stereoscopic displays to develop new tools to further help students of anatomy and embryology integrate their understanding of 3 dimensional structures. His research on connective tissues has studied the bio stimulatory effects of lasers and other light sources upon chondrocytes and fibroblasts. He previously worked in Professor Archer's group in Cardiff University, looking at implanting chondroprogenitors into an in vitro articular cartilage wound model, and the biology of the articular cartilage wound margin.

One of the major advantages in the anatomy course in Swansea is the involvement of a large number of doctors in this teaching. Over 50 clinicians (as well as physiotherapists, speech therapists, etc.) are actively involved in the delivery of the weekly anatomy sessions. This means that the anatomy teaching is related to situations seen in clinical practice where it is relevant. One of such teachers is Mr Tim Brown (Honorary senior lecturer) who is the lead for Pancreatic Surgery in Wales and heads up the South Wales Pancreatico-biliary Unit. He has been involved in planning and delivering



anatomy teaching since early in the course. He teaches on the anatomy of the upper gastro-intestinal tract and the peritoneum, and combines more formal teaching with the use of prosected specimens, models and DVD/video from surgical procedures. The Swansea Course also uses Learning Opportunities in the Clinical Setting (LOCS) to enable students to attend learning opportunities in the hospital to enhance their learning. Mr Brown encourages students to attend his theatre sessions (or those of his colleagues) where their learning is reinforced by observation of anatomy in patients where its clinical relevance is apparent. Mr Brown is also the Clinical Placement Director for the College of Medicine in Swansea and is responsible for organising the time spent by the medical students in the hospitals in South West Wales. The active involvement of a clinician, who is responsible for delivering the clinical teaching, in the anatomy department, ensures that students understand the importance of anatomy to their future in clinical practice.

Dr Liam McKnight is a general radiologist with an interest in teaching and assessment. He has been involved in the Anatomy Department at Swansea from the beginning (December 2003) as it was agreed that weekly radiology sessions would take place during anatomy teaching with other teaching aids e.g. prosections to teach clinically relevant anatomy. Dr McKnight was keen to improve the teaching experience that he had gained 30 years previously of dissection alone. It was decided that we would use small group tutorials with a clinician and a radiologist each week, with appropriate pathology support, complementing our two Anatomists. Appropriate specialist Radiologists teach the anatomy that they are familiar with each week e.g. neuroradiologists, this also spreads the load amongst busy colleagues and ensures a diverse teaching style following an agreed set of learning objectives. Radiologists look forward to reinforcing the learning of clinically relevant anatomy at all stages of the undergraduate curriculum. It is felt that this increases the ability of foundation doctors to treat patients. Dr Liam McKnight was selected as the best educational trainer of postgraduate doctors in Wales in 2010. His prize was a trip to Harvard to undertake the Harvard Macy *Educational Leadership* course, which combines medical education and leadership run jointly by the Medical and Business schools. Dr McKnight hopes to put into practice everything he experienced into the GEM programme. Dr McKnight was an examiner for the Royal College of Radiologists (RCR) for 5 years and then Chair of the RCR Exam board for a further 5 years. This has given him an excellent background in assessment and he now organises and leads the setting and writing of EMQ exams within GEM. Dr McKnight leads on the teaching of Clinical Radiology in all 4 years of the GEMS course ably supported by a group of enthusiastic radiologists. They run popular Learning opportunities in the Clinical Setting (LOCS) sessions on a weekly basis to demonstrate how crucial modern imaging is in busy Hospitals and also use the time to reinforce the importance of Anatomy.



Dr Phil Newton, a neuroscience lecturer leads the teaching of the basic sciences related to neuroscience and psychiatry as part of the Graduate Entry Medicine Programme at Swansea University. He has developed educational resources including podcasts and self-tests, all collated on a dedicated blog site - <http://newtonsneuroscience.blogspot.com/> . He also blogs on more general neuroscience and psychology issues at <http://www.psychologytoday.com/blog/mouse-man> and disseminates the occasionally useful neuroscience tweet via @newtonsneurosci. Dr Newton is committed to reducing the incidence of neurophobia among medical students. He has been awarded a grant from the Swansea Academy of Learning and Teaching to develop an online resource for the teaching of

basic neuroanatomy. This resource will apply some basic principles from psychology research to reduce the factual overload that intimidates medical students who are new to the subject. Dr Newton's research group, located at the Ernest Gallo Clinic and Research Center in Emeryville, CA USA, is focused on the basic science of addiction and posttraumatic stress disorder. He has a number of publications in this area and he has been awarded research funding from the US National Institutes of Drug Abuse and Department of Defence.

Future plans

To support the on-going development and delivery of its innovative GEM programme, the College has recently appointed a new medical education team which joins the established group of teachers and managers. Together, the expanded leadership team is setting in place a number of initiatives designed to strengthen and build on the links between education, research and practice. As part of this strategy, students will have more opportunities to engage in world-class research during their undergraduate degree, including a specific track in the final year for students interested in biomedical research. These students will work with researchers in the ILS, the wider University and the Health Board and, for some students, will go onto to further study and academic clinical roles. Staffs currently engaged in pedagogical research in anatomy are fully supported to expand their research activities in collaboration with colleagues within and outside the University. Other collaborations include plans for a Surgical Anatomy Postgraduate degree programme with the University of Melbourne.