University of Essex

Sports and Exercise Science

Staff

Dr Matthew Taylor is Admissions Tutor for Sports and Exercise Science and a Lecturer in biomechanics. His current research interests are gait, falls and sports biomechanics. In falls research he is collaborating with Colchester Hospital University NHS Foundation Trust in developing the use of the Nintendo Wii and other activities promoting gaming systems in falls prevention training programmes. His research in sports biomechanics is investigating the biomechanics of sprinting by the world's fastest man – Usain Bolt.

Dr Jo Barton is a Lecturer in Sports and Exercise Science, the first year organiser and Fellow of the Higher Education Academy. She is the leading researcher of the Green Exercise research programme and her research activities and associated publications focus on the role of the exercise environment and the synergistic health benefits of engaging in physical activities in green spaces. She has also been involved in studies targeting vulnerable groups to explore the potential therapeutic benefits of nature-based activities.

Dr Valerie Gladwell is Curriculum Director and a Senior Lecturer in Sports Science. She has been lecturing at the University since 2000. Her research explores workplace health and Green Exercise. She has had two major grants in the area of Green Exercise including a three-year fellowship. She is passionate about science communication and knowledge exchange and has been involved in numerous sport science outreach projects, including being part of the team behind the Wellcome Trust's £5 million Olympic In the Zone project.

Dave Parry, applied sports scientist, has over ten years of coaching experience in a range of sports as well as fitness coaching for athletes participating in various sports. Part of British Triathlon's World Class coaching team from 2001 to 2009, Dave has coached junior and senior athletes onto Great Britain elite teams at sprint, Olympic and long distance, as well as many amateur athletes. Dave is currently studying for a doctorate with particular interests in the psychology and neuroscience of emotion generation and its role in the regulation of maximal exercise.

Welcome

Welcome to the University of Essex Centre for Sports and Exercise Science.

Here at Essex we invite you to be part of a vibrant sports science community; at its core is the Human Performance Unit, which applies the latest science to yield practical benefits for local sportspeople and the university's teams.

However, sports and exercise science is not just about the elite. At Essex we are actively developing new ways of using exercise to improve human health, from promoting Green Exercise to using the Nintendo Wii in the rehabilitation of elderly falls patients.

At the Centre for Sports and Exercise Science our research informs our teaching and our teaching drives our research ideas. We do not just teach what other people tell us. We find out what is new and use that knowledge to inform teaching.

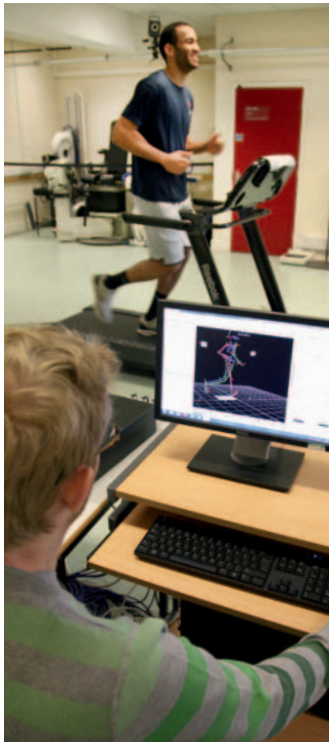
We want our students to enjoy their time at Essex and come out with the best possible degree and a range of transferable skills that will set you up for life.

Our laboratory facilities are excellent, boasting state-of-the-art equipment, enabling us to provide the hands-on practical experiences that will equip you with a range of professional skills. Our degree courses have a national reputation for scientific rigour and the excellence of our teaching was recognised by a top score in the last quality assurance audit. So, as you can see, the argument for choosing Essex is overwhelming!

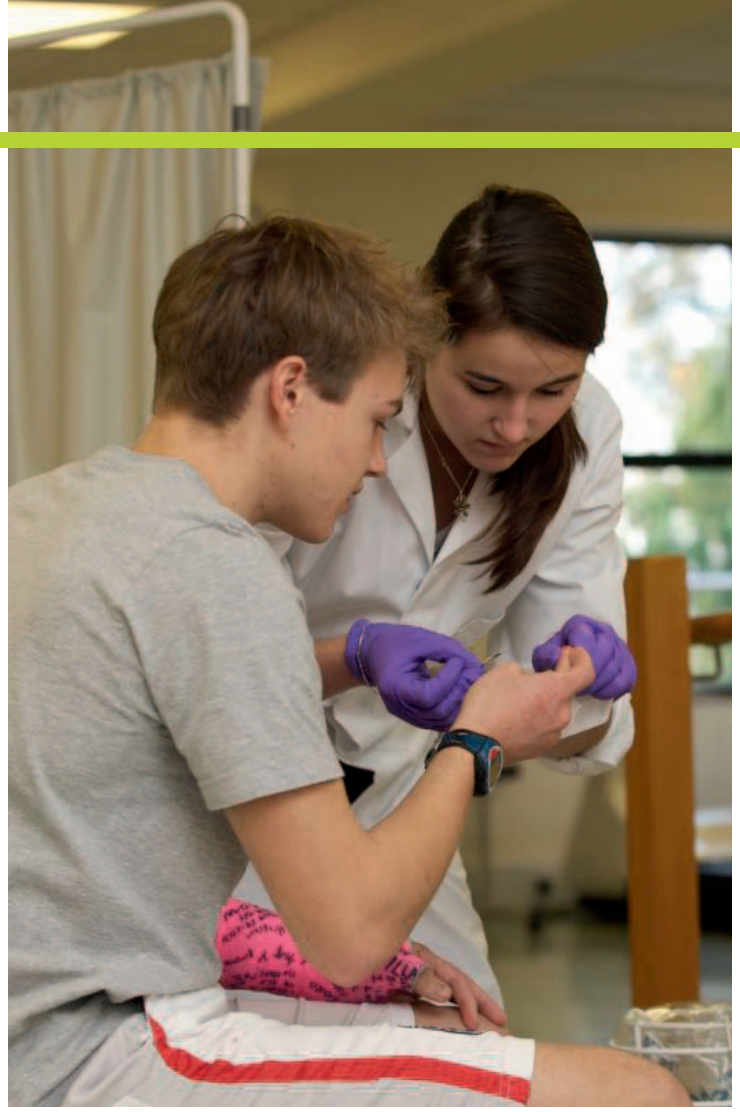
With best wishes

Professor Chris Cooper
Director, Centre for Sports and Exercise Science

"Our degree courses have a national reputation for scientific rigour and the excellence of our teaching was recognised by a top score in the last quality assurance audit."



Roy Nwachukwu in the Human Performance Unit



Senior Lecturer Dr Murray Griffin is a co-author of a text book seen as an essential tool for any sports and exercise science student.

Sport and Exercise Science: An Introduction provides a broad-based foundation in the major areas that underpin the scientific study of sport and exercise science, therefore helping undergraduate students to develop a sound understanding of human anatomy, physiology, nutrition, metabolism, biomechanics and psychology related to sport, exercise and health.

Having all three central areas in one place, this text book provides students with a one-stop-shop to access fundamental information on sports science.

"I chose to study at Essex because of the course content and the excellent facilities. I always liked how welcoming the campus was and I felt immediately at home – something which is very important.

The Centre for Sports and Exercise Science has a team of hard-working and knowledgeable staff – a combination which results in engaging and interesting lectures. My lecturers are active researchers within their fields, meaning I am always up-to-date with new theories and developments.

Since studying at Essex, I have enjoyed running my own research projects which have been interesting and fulfilling experiences where I have been able to contribute to developments within sports and exercise science."

Sophie Carter, third-year BSc Sports and Exercise Science student

Excellence in education

"Our courses are delivered by internationally-recognised leaders in research, as well as experts from our Human Performance Unit, who share their real-world experiences of sport and exercise science. We deliver a premium scientific degree with an emphasis on skill development and employability."

Dr Valerie Gladwell, Curriculum Director for Sport and Exercise Science

Courses

Our courses focus on the core disciplines of physiology, psychology, biomechanics and nutrition, whilst also recognising the increasing contribution of genetics, molecular and cell biology to our understanding of human performance and health. Practical work provides you with the professional and scientific skills needed to conduct your own final year research project.

You can choose to do a work-related learning option in your second year and there are sometimes opportunities to get valuable work experience within our Human Performance Unit through our University's frontrunners scheme.

- BSc Sports and Exercise Science – 3 years
- BSc Sports and Exercise Science with year abroad – 4 years
- BSc Sports Therapy – 3 years

At Essex, the emphasis is on the 'science' in sports and exercise science.

Oxygen uptake during exercise testing

BSc Sports and Exercise Science is endorsed by The British Association of Sport and Exercise Sciences and graduates are eligible to be listed on the Skills Active register of exercise professionals.

For further details of our courses please visit our website.

www.essex.ac.uk/bs/research/centres_and_groups/ses/

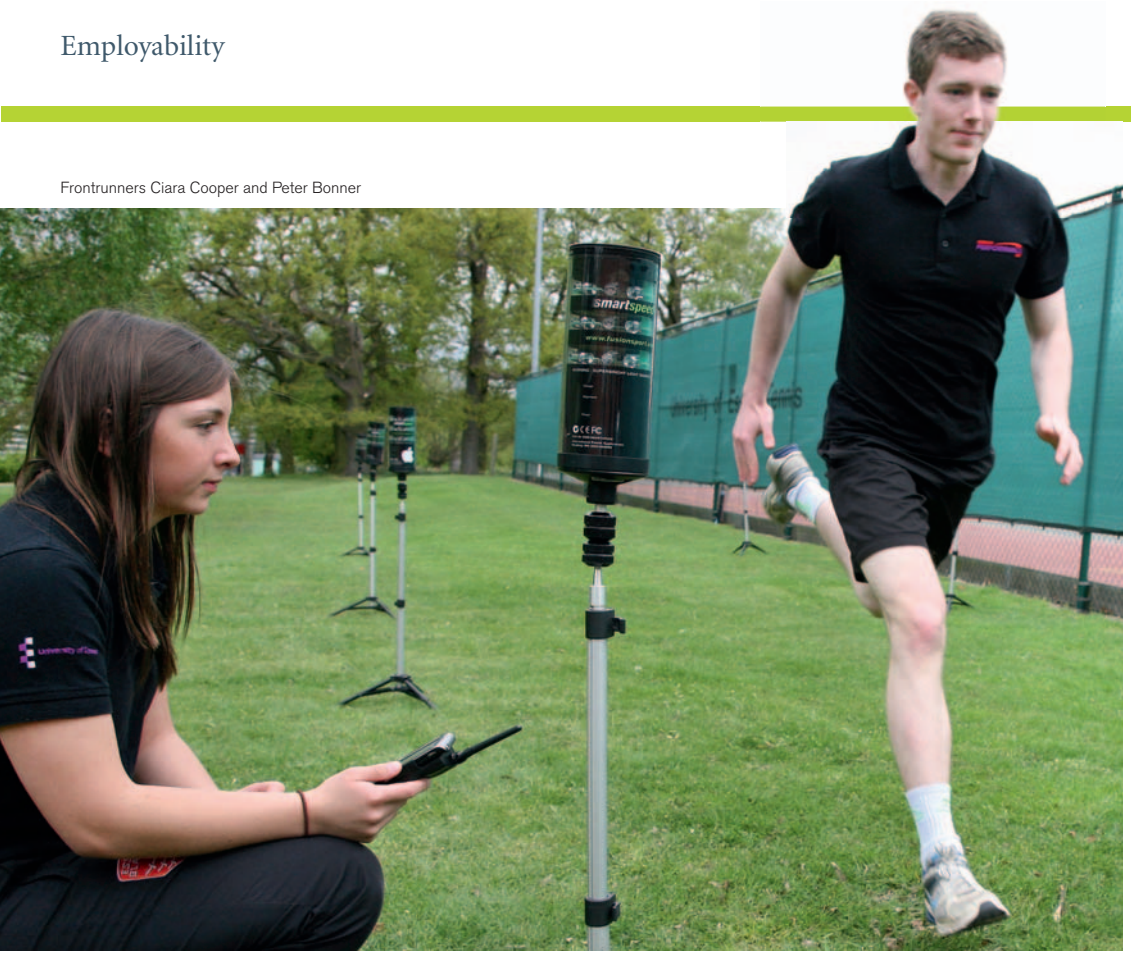
Dr Dominic Micklewright conducts research to understand more about the causes of fatigue in athletes and the behavioural strategies they employ to perform at their best. His work mainly focuses on psychophysiological antecedents of fatigue and effort regulation.

Another part of his research has been understanding the basis of effort regulation, particularly how children learn to pace themselves.

Facilities

The state-of-the-art laboratory and teaching facilities provide everything you need to achieve a high-quality education. Our extensive facilities include a biomechanics laboratory that houses a three-dimensional motion analysis system and a physiology laboratory which houses numerous ergometers and online gas analysers.

Frontrunners Ciara Cooper and Peter Bonner



> "My degree gave me the essential skills and qualification that I needed to be accepted onto the MSc Physiotherapy programme also at Essex."
>
> Danielle Bean, BSc Sport and Exercise Science '11

Frontrunners

"Working as a frontrunner in the Human Performance Unit has given me the chance to put all the theory I have learnt as part of my course into practice.

I have also been able to learn a wide range of testing skills which will make me more employable after I graduate."

Ciara Cooper, Third-year Sports and Exercise Science student

"As a frontrunner Plus student, I have spent two years working at the Human Performance Unit where I have had the chance of working with a wide range of athletes – from Iron Man competitors and Olympic walkers to cyclists and swimmers.

As a frontrunner post is a paid role, working in a professional environment, I have gained excellent employability skills which will definitely help me after I leave university."

Peter Bonner, Third-year Sport and Exercise Science student

Having the edge in the jobs market

The sport, fitness, health, education and leisure sectors are currently very successful and provide a variety of careers for sports and exercise science graduates.

However, there is a big difference between teaching students to get a qualification in sports science and them gaining employment. At Essex, our employability provision enables students to be competitive in the job market by developing skills in numeracy, information technology, communication and time management, which are important to all employers. All students develop an employability portfolio which reflects everything from their attendance at workshops on CV and supporting letter writing to career action planning and interview technique.

We hold an annual careers conference where both past students and future employers give talks on how to get (and to keep) a job. We advertise a wide range of employment and internship opportunities on our Facebook page. All students have the opportunity to gain work experience in their second year and all final year students get a mock job interview given by external employers.

Typical career destinations include healthcare, teaching, and the health and fitness industries or postgraduate study.

Essex gave me the practical skills in a lab and field environment and a broad theoretical basis of sport science knowledge – from sports nutrition to exercise physiology. I also got the chance to get work experience within sport and health settings.

My current job is the Academy Head of Sport Science and Conditioning at Colchester United Football Club. My degree provided me with the knowledge and practical skills which I can now apply in my current job to enhance player sporting performance.

Annika Broster, BSc Sport and Exercise Science '07 MSD Sport Science '13

Final-year project students investigating power output in a maximal cycling (Wingate) test

Cool running

Usain Bolt is the fastest man on Earth, but how does he do it? Dr Matthew Taylor, Lecturer in Biomechanics at the University of Essex, has some of the answers.

Few of us would disagree with the assessment that Usain Bolt is a phenomenal athlete. What Dr Matthew Taylor has done is to give us a better understanding of why Bolt achieves such amazing results.

Dr Taylor has now written three papers with Professor Ralph Beneke, formerly at Essex, and now Director of the Institute for Sports Science and Motology at the University of Marburg.

Using statistics collected during Bolt's world record run of 9.58s in 2009 in Berlin, they have created a mathematical model – the first hypothesis for how Bolt runs. The answer, they found, is linked to Bolt's height and his step length which results in significantly longer time his foot is on the ground.

"Over 100m," explained Dr Taylor, "sprinters Bolt has run against, such as Tyson Gay and Asafa Powell – but earlier runners, too – take about 45 steps. Bolt takes 41. This allows him to cover a greater distance with each step, which in turn means he spends significantly more time on the ground – what we call 'stance time'….this is unusual. We think that allows him to generate force over a longer time frame – and as he lands his leg is less stiff, which possibly allows him to store and then release some energy as he leaves the ground again, ultimately resulting in optimal performance."

Dr Taylor was clear about where he would like to go next with his research. "There is very little published work which actually looks at elite athletes in competition when they are running at their maximal speeds.

"The fastest speed a sprinter runs in a lab setting is around nine metres per second. Bolt's fastest speed over 100m is about 12.5m per second. No-one really knows the biomechanics of someone running at that speed. However our work has certainly shed some light on the biomechanics of the fastest men on Earth."

> "Our work has certainly shed some light on the biomechanics of the fastest men on Earth."

Leading the way on Green Exercise

Essex academics are leading the way in research into the benefits of Green Exercise, with their findings about the benefits of just a small 'dose of nature' improving mental well-being making headlines across the world.

At the University of Essex we have been researching the concept of Green Exercise for over ten years, and are world leaders in the field.

Our Green Exercise research team consists of experts in the areas of exercise physiology, psychology, public health, environmental sustainability, community engagement and behaviour change.

We examine where, when and why Green Exercise brings health and well-being benefits. We aim to understand who can benefit the most from Green Exercise and how it can be used as a means to drive behavioural change. Our team use many different techniques to explore the mechanisms underpinning the psychological and physical benefits of Green Exercise both in the laboratory and in the field.

The Green Exercise research team works closely with many external organisations to evaluate nature-based projects on a national and community level.

We are also working in the application of Green Exercise as a therapeutic intervention (Green Care) to promote health and well-being outcomes for vulnerable groups.

Our research has far reaching implications for both public health and environmental agenda at a local, national and international level.

The Green Exercise research team at Essex has undertaken a variety of research projects examining the mental and physical health benefits of activities in natural settings. Funding from this research includes a £278,000 grant from the Economic and Social Research Council and a British Heart Foundation studentship.

This research has taken place with people from all walks of life, including children and young people, schools, adults, people with mental or physical illness, individuals with learning difficulties, the homeless, refugees and asylum seekers.

A variety of methods have been used to evaluate the effects of Green Exercise including questionnaires to measure self-esteem and physiological measures such as cortisol and heart rate variability.

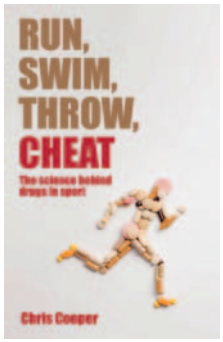
Green Exercise research team includes, from left: Dr Valerie Gladwell, Dr Jo Barton and Dr Carly Wood.

Work in the community

As part of our research, we work with a number of organisations in the evaluation of their community projects.

These projects are all focused on the use of natural environments and Green Exercise to facilitate health and well-being within communities. The community projects target people from all walks of life including adults, children and young people and vulnerable groups, such as those with mental or physical illness and people with learning difficulties.

Catching the cheats



Run, Swim, Throw, Cheat, a new book by Professor Chris Cooper, examines the science behind drugs in sport. In this extract, he looks at how athletes try to stay one step ahead of 'doping' tests.

In several sports not only is cheating endemic, but the cheats go to extraordinary lengths to avoid being caught.

This has resulted in the World Anti-Doping Agency (WADA) having perhaps the most draconian enforcement rules of any private organisation, or indeed many governments. The WADA code requires elite athletes to give notice of their location on a chosen one-hour period each day, seven days a week, both in and out of season.

Missing three tests is equivalent to being convicted of doping and a ban ensues. Walking away from the testers is equivalent to being guilty. In recent years English footballer Rio Ferdinand and World and Olympic 400m athletics champion, Christine Ohoroghou, have both fallen foul of these rules and received bans despite not failing any drug tests.

As well as having to reveal where they are on holiday, athletes also have their privacy intruded upon during more intimate events.

When a urine sample is taken there must be a chaperone. This is necessary because athletes have a long history of trying to pass off other people's 'clean' urine samples as their own.

Initially the attempts were primitive. Cyclists kept clean urine in a plastic bulb under their arm with a rubber tube running down inside their sleeve. When a sample was needed they just unstoppered the cork at the end. This worked fine until there was a blockage in the tube; the resultant physical inspection led to the disqualification of the 1978 Tour de France leader, Michel Pollentier.

Later attempts included an artificial penis called The Whizzinator.

As we have learnt from the Lance Armstrong case, it is very rare to find an athlete admitting to doping until there is no alternative. Even then the excuses are many and varied. Perhaps the most famous was that of Dennis Mitchell, the US sprinter who unsuccessfully claimed in 1998 that his abnormally high positive test for testosterone was because he had five bottles of beer and sex four times the night before the test as it was his wife's birthday and "she deserved a treat". The latest weapon in the anti-drugs war is repeated testing of an athlete's blood throughout the season to determine indirect evidence of doping. These 'biological passports' have been introduced in cycling and athletics. However, there is evidence that cyclists have modified their doping regime in response. The trick to fool the current biological passport seems to be to dope little and often, rather than in the one large dose that leads to suspicious spikes in blood parameters.

The war continues.

How twenty-first century living is ruining our children's health

Research at Essex made headlines around the world after it uncovered a worrying fall in children's fitness levels.

The increasingly poor levels of child fitness rates are seen by many health analysts as a ticking time bomb. It means Dr Gavin Sandercock's ongoing research into the worrying decrease in child fitness and strength levels could not be more relevant.

The importance of this research at Essex was underlined when it was cited by the then Chief Medical Officer Sir Liam Donaldson in his 2009 report where he urged the Government to launch a pilot scheme to monitor children's fitness, as a precursor to a national fitness monitoring programme.

When Dr Sandercock, a Senior Lecturer in Clinical Physiology, realised back in 2006 there was an urgent need for up-to-date, relevant research into children's fitness he set up the East of England Healthy Hearts Study.

This means the University of Essex now boasts the largest assessment of physical fitness in British 10-16-year-olds.

Six years after its inception, the Healthy Hearts Study has transformed our understanding of factors which predict whether children are likely to be physically fit.

To find out just how fit British children are today, Dr Sandercock and his team compared current data with the data they obtained in 1998. They tested fitness using the shuttle-run (bleep) test and found that UK children's fitness had dropped at twice the globally-reported rate.

Further studies have linked falling children's fitness levels to a number of factors including 'screen time' , breakfast eating habits, how they travelled to school, parental activity levels and where they lived.

"We hope that by showing people how fitness is associated with simple activities like active commuting, eating breakfast and reducing TV we can stop, or even help to reverse the declines we have seen," explained Dr Sandercock.

Key findings on children's health uncovered by Dr Gavin Sandercock and his team include:

- Children's fitness levels in the UK are falling at twice the average global rate, regardless of obesity. Fitness is falling at about four per cent per decade among youngsters globally; the UK rate is eight per cent.
- Children are becoming weaker. In the past ten years The strength of ten-year-old children has dropped by 26 per cent.
- Boys who walk to school are 20 per cent more likely to be fit compared with those using motorised transport, and girls who walked were 30 per cent more likely to be fit.
- Children who skip breakfast are less active than those who eat it and nearly twice as likely to be obese.
- Children with one physically active parent are 50 per cent more likely to be fit.

"Simple, lifestyle changes like cycling to school and eating breakfast are key to help get our children back to the health levels they were ten years ago."

Dr Gavin Sandercock

Exer-gaming – a new approach to recovery

The Nintendo Wii Fit can prove an effective method of helping to improve the mobility of elderly people who are at risk of falling, according to sports and exercise science researchers at Essex.

With falls costing the NHS nearly £1 billion every year in terms of inpatient admissions and long-term care costs, it is a real health issue.

The research by academics at Essex found that the Nintendo Wii Fit can prove an effective method of helping to improve the mobility of elderly people who are at risk of falling. The Wii Fit is a great research tool for this as it has a game which focuses on balance, is fun to use, records people's progress and gives a visual feedback to how they are doing.

There are a number of reasons why some elderly people fall – from frailty and lack of confidence to lack of practice moving about and other mobility issues. However, the knock-on effect can lead to them feeling anxious and less likely to move about, which can have a negative effect on their quality of life and make them feel depressed.

The research found recurrent fallers not only found the Wii fun to use, but they improved their flexibility and functional mobility after using it, compared to patients who did not. The research, led by Dr Murray Griffin, pictured top left, and Dr Matthew Taylor monitored patients taking part in a falls prevention exercise group at Colchester General Hospital and found that even a short duration of Wii play can provide an effective additional method to support standard rehabilitation methods.

The project was the first of its kind to establish the effectiveness of the Wii by incorporating it into an established clinical physiotherapy programme.

"One of the biggest problems with many types of physiotherapy aftercare is getting people to do the exercises," added Dr Griffin. "But as many people think the Wii is fun, we are hoping more people will do the exercises.

"If compliance goes up it can have a positive effect on incidences of falling. In fact, some patients after they have completed Wii training have gone on to buy their own Wii and exercise at home."

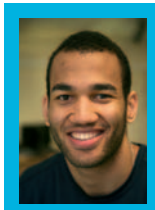
When researchers compared the energy expenditure of Wii-based therapy compared to traditional therapy they found Wii therapy was significantly less energetic than traditional therapy, suggesting that Wii training may benefit frailer patients.

> "It is all about improving their quality of life and wellbeing so they have more confidence."
>
> Dr Murray Griffin

Pushing athletes to their sporting potential

From complete beginners to seasoned professionals, training alone or as part of a team, the Human Performance Unit (HPU) can provide a tailor-made sports science testing programme.

The HPU offers the opportunity for students to get the chance to work with real athletes as they work towards their sporting potential. The extensive expertise within the HPU team means they can cater for all sports science needs and help athletes achieve peak performance. The HPU works with numerous triathletes, cyclists, runners, professional football teams, swimming clubs and a range of other sports.



"I play basketball for the Norwegian national team. The HPU program has been excellent. I get a personalised schedule for nutrition which has put me in the best position possible to perform day-in and day-out on the court."

Roy Nwachukwu
Essex sport scholarship student

From recreational to elite

Sports and Exercise Science students have the opportunity to get paid work in the HPU, as part of the University's frontrunner scheme. You will gain invaluable experience delivering sports science advice and testing to our clients, who range from athletes looking to get fit, through to elite and professional sportspeople. Our recent clients have included professional football and cricket clubs, Ironman triathletes, cyclists and national basketball teams.

The HPU provides a full range of support including laboratory and field testing, body composition analysis, nutrition analysis and advice, fitness coaching advice, and 3D motion capture analysis bike fitting. By being involved in the delivery of these services you gain new insight into the practical application of sports science that complements your degree studies, as well as gaining skills that will give you a head start to a possible future career in applied sports science.

3D motion capture bike fitting offered at the HPU

Schools sessions

The HPU delivers practical and theory sports science sessions for a large number of schools and colleges from within the eastern region.

As a frontrunner work experience student you will be able to gain experience of delivering educational sessions, as well as enhancing your presentation skills - sought-after attributes for those graduates seeking to pursue a career in teaching after graduation.

www.humanperformanceunit.co.uk

For further details about the Centre for Sports and Exercise Science, please visit:

▶ www.essex.ac.uk/bs

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