Physics and Engineering careers in Medicine

Are you thinking about a career in medicine? There are other interesting science based jobs in medicine than being a doctor. Working in medical physics, engineering and technology will allow you to combine your interests in science and in helping people.

For further information please contact us on:
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CASE STUDIES

Radiotherapy Physicist

Name: Sean Owen
Employer: Hull and East Yorkshire Hospitals NHS Trust Queen’s Centre for Oncology & Haematology
Qualifications: BSc (Hons), MSc, DipIPEM(S)

I always loved studying physics at school and for me it’s opened up many new experiences in my life. When I was in the sixth form I was fortunate enough to win a Royal Air Force flying scholarship. So I studied physics at the University of Liverpool and at the same time continued my flying training with the University Air Squadron. But at the end of the course I felt the military lifestyle wasn’t for me. So instead I decided to build on my physics knowledge and went on to study for a Masters in Medical and Radiation Physics and become a medical physicist.

I now work in a radiotherapy department. When patients have radiation therapy for cancer, it is absolutely vital that they are correctly positioned so that the megavoltage x-ray beams target the tumour, and do as little damage as possible to healthy organs. The accuracy of the dose and duration of radiation is also critical. It’s a combination of complex scientific calculations and solving practical problems, but really it’s all about making sure the patients receive the most accurate and best possible cancer treatments.

I am also involved in research projects and played a role in the multi-million pound decision to upgrade the hospital’s radiotherapy systems. It’s exciting to work in such a challenging environment where I have the ability to put cutting edge technology into practice and make a real difference to people’s lives. I would really recommend my job!

And the flying? I guess medical physics has given me the good salary and the regular hours to continue indulging in my other passion as a hobby.

Trainee Nuclear Medicine Clinical Technologist

Name: Michelle Bradford
Employer: New Cross Hospital, Wolverhampton
Qualifications: A-levels, AVCE in Health and Social Care, NVQ level 2 in Care.

After I finished my A-levels I decided I would rather work than go to university straight away and spent a few years working in a nursing home and a dialysis unit. I loved my job and the interactions with patients, but it wasn’t very mentally stimulating, so I applied for a clinical technologist training course.

I now work in a radiopharmacy where we make radionuclide kits. These are specific radioactive substances we use to inject patients in order to then scan them with a gamma camera. The radioactive substances show up in the target organ on the scan and help to diagnose and treat cancer and other diseases. Quality control of the cameras and dose calibrators is an essential part of the work, as is giving radiation protection advice for the patients. Some procedures involve processing and analysing body fluids after a radionuclide kit has been administered. I work with the latest equipment in a team with doctors, radiopharmacists, physicists, technologists and assistant technologists. The ages of our patients range from babies to the elderly and many are nervous, so helping them understand the procedure and talking to them is important.

I feel proud when a patient takes the time to thank me and tell me that I have made a difference. I love the hands on experience and working with patients. I know that there is so much to learn in this field that I will never get bored as nuclear medicine is developing and expanding constantly.

BE WHERE YOU WANT TO BE

“Once they’re in clinical science or technology, people tend to stay in for the whole of their working lives.”
Derek Pearson, Clinical Director, Medical Physics Directorate, Nottingham City Hospital NHS Trust.
Clinical Engineer

My passions in school were science and engineering but I also wanted to help people and give something back. I chose this career as it seemed a perfect combination of science and engineering and working with people. When I decided to study engineering I encountered some of the old clichés about not being strong enough, engineering being a man's world and all that. But the old arguments and stereotypes of the strong macho engineer just aren’t valid any more. So much is about miniaturisation anyway now.

Although I knew that as an engineer much of my working life would be centred on inanimate objects, I always felt strongly that I wanted to help people and work in teams to solve problems. I also like being around children.

My current job brings all of that together. I work at the Alder Hey Children's Hospital and the Royal Liverpool Hospital, in the electro-diagnostics department where audiology and ophthalmology clinics take place. I do specialised tests on adults, children and babies with hearing and vision problems. The aim is to monitor the small electrical pulses sent between the eye, ear and brain in response to light and sound. Every patient is different. None of the conditions or symptoms is identical which means that there is a technical challenge to ensure the data is as accurate as possible for each patient.

The most rewarding achievement in my career was on Christmas Eve when a 5-year-old girl had had come into the hospital for a hole-in-the heart operation. Normally that’s actually fairly straightforward these days, but something went horribly wrong and the poor child suffered bleeding into the brain and lost all sight, hearing and ability to move. We all thought we were facing a tragedy, but the tests we did revealed a glimmer of hope. The analysis of the tests was probably the most challenging and technically difficult thing I’ve ever done, but it led to the right treatment, and to see her running about again convinced me I’m in the right job!

Medical Design Engineer

My best day at work was when a 4-year-old girl with restricted growth collected the new bike that I had designed for her. Smiles like hers are why I do this job.

Medical engineering is about designing for people – and people are complex. A big part of my job is understanding the needs of people with disabilities so that I can design technology that will help. It’s no good creating the most amazing system in the world if the person it was designed for can’t use it.

I originally trained as a mechanical engineer and in some ways I still am, but during the final year of my degree I began to discover how the human body is designed. I realised that medical engineering presents a much more interesting challenge than working with machines. How many other engineers work with materials that self-optimise their shape and structure like bone does; or have to try to understand how people with dementia think so that the cooker monitor they are designing is useable?

Working with people with dementia has required good relationship skills as well as presenting a technical challenge. While working at BIME I have also designed toilet handles for children with restricted growth; worked with orthopaedic surgeons, gynaecologists and urologists; and presented my work to conferences in the UK and abroad.

I know that my work makes life better for people, and that makes life better for me.
HOW TO…

Become a Medical Physicist or Clinical Engineer

You need to start by choosing A-levels which will get you a place on a degree in physics or engineering. After you graduate you can:

EITHER Apply to the national training scheme for healthcare scientists in the National Health Service. This consists of a three-year training place in the medical physics or clinical engineering department of a hospital where you will also obtain an MSc in healthcare science. Also some medical devices companies take on graduates and provide further training.

OR Continue to study for a Masters degree in Medical Physics or Clinical Engineering at a university and then apply for a job in industry or the NHS or stay in academia to do further research. For the highest level jobs you may need to have a PhD (doctorate).

CASE STUDIES

Lecturer in Medical Physics

Name: Jamie Harle
Employer: University of Liverpool
Qualifications: BSc, MSc, DPhil, Chartered Scientist

When it came to applying to university, I was undecided between a career in medicine or physics. In the end, I chose medical physics as a compromise. I also saw it as a field with lots of exciting future innovation, where better methods of diagnosis and treatment would be developed during my career.

I am now a lecturer in medical physics at the University of Liverpool, responsible for the delivery of several physics courses in radiotherapy and diagnostic imaging. This involves giving lectures, developing learning resources, writing exam papers and providing student support and postgraduate research supervision. I enjoy seeing students progress, achieve their potential and start building careers in a field where you first started them off.

In my work it is important to be meticulous and highly dedicated – Science never sleeps!

The multidisciplinary nature of medical physics means networking and building contacts with scientists in other areas of expertise is essential. When teaching, I try to be patient and clear in my communications and be approachable to my students. It also helps to have a sense of humour and a loud voice!

Magnetic Resonance Product Specialist

Name: Vicki Doyle
Employer: Siemens Medical Solutions, Products and Systems Group
Qualifications: BA (Hons), MA, PhD

When I finished my general physics degree, I knew that I wanted to continue studying physics, but with a particular focus on the medical world. After completing my PhD, I became a post-doctoral researcher at St George’s Hospital before deciding it was time to make a move from research into industry.

I then joined the Imaging and Oncology Systems Group of Siemens Medical Solutions as an MR Product Specialist. My role involves providing technical support in the form of product presentations, tender responses and quotations for the wide variety of advanced MRI systems that Siemens manufacture and install.

This means I usually work closely with our regional sales managers and their customers to ascertain the specific clinical imaging requirements of each individual NHS Trust and to tailor the MR system specifications to meet these requirements. I really like this extremely varied and interesting job, and with the continued research and development in all areas of system design, technology and applications, each day brings new challenges.

MONEY TALKS

Clinical technologists earn on average £23–£36K. The starting salary is £18.5K and you could reach £56K.

Clinical scientists earn an average of £40–60K, starting at £30K after training and rising to a possible £97K.

Become a Clinical Technologist

EITHER Take a Vocational BSc degree in Clinical Technology.

OR Get another type of science degree and then train on the job in the NHS or industry. There are further approved postgraduate courses available.

Become a student member of IPEM:

If you are studying at any level and are interested in the application of physics and engineering to medicine or related biological sciences, you can apply to become a student member of the Institute of Physics and Engineering in Medicine (IPEM). The only stipulation is that you are not in paid employment in clinical science, engineering or technology. IPEM can keep you up to date with training opportunities, the latest developments in the field, and put you in contact with experienced professionals who may be able to help you on your career path.