BSc (Hons) Physics, Medical Physics & Radiation Protection

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The most sophisticated Physics based equipment in the country is not in physics labs – it’s in our hospitals!
Diagnostic and Interventional Radiology
(looking inside the body without opening up)
X-Ray Systems
Rotating open CT scanner
http://www.youtube.com/watch?v=qUk8__QV_c4
Magnetic Resonance Imaging (MRI)
- Magnetic field used is 1.5 - 3T (3T is 60,000 times the Earth’s magnetic field which is 50 microtesla).
- Uses a superconducting magnet in liquid helium.
Angiography
Nuclear Medicine
(use of radiotracers to check whether an organ is functioning properly or otherwise)
Gamma Camera and SPECT
Positron Emission Tomography (PET)

Study the workings of the brain!
Hybrid Systems

PET / CT

PET / MRI

L'Università ta' Malta
EUROPEAN SOCIAL FUND
MPE
MEDRAPET
EUTE MPE-RX
SEVENTH FRAMEWORK PROGRAMME
EFOMP
Radiation Oncology - Radiotherapy

(elminating cancer using x-ray, electron or proton beam beams or radioactive sources)
Linear Accelerators (X-ray and electron beams)
Proton Accelerator (Cyclotron) Based Therapy

Hopefully we have this sometime in the future!!
Brachytherapy
Some of the most sophisticated software in the country – in our hospitals!
3D Visualization Software
Radiotherapy Planning
PROFESSIONS:
MEDICAL PHYSICIST & RADIATION PROTECTION EXPERT
Role of Medical Physicists in Hospitals

- Hospitals are full of high tech medical equipment which is all physics based.
- Medical equipment is a major investment of the health care system – one MRI unit costs from 1.5 - 2 million euro! Health care industry third largest industry worldwide.
- Yet healthcare professionals have insufficient knowledge of physics to use the equipment to its full capacity - and the situation is getting worse as the technology is expanding much faster than the education – this is a paradox!
- Consequences:
  - We only use a fraction of the capabilities of these medical devices
  - health of patients suffers
  - Worker and patient safety issues
- This is why Medical Physicists are so important!
An essential part of the mission of the Medical Physicist is to act as a ‘knowledge transfer bridge’ between medical equipment providers / equipment research literature and the medical and healthcare professions.
• Medical Physicists ensure that hospitals buy the right equipment, make sure the equipment works properly, that it is *adjusted to the needs of local patients*, teach health care professionals how to make full use of the technical capabilities of the equipment, give advice on patient / worker safety issues, prepare instructions for the use of the equipment, *help introduce new technologies*, research proper use of equipment....

• The Medical Physicist is a Clinical Scientific Expert in the use of *medical equipment* and appropriate use of *physical agents* (x-rays, ultrasound, RF, lasers....) in medicine

• It’s a healthcare profession like medical doctors, dentists, pharmacists, nurses... *protected and regulated by law (requiring a warrant to practice)*

• Very IMP: Medical Physicists are required by EU law! *(EU Directive 2013/59/EURATOM)*

• Both scientific and social value – your input saves lives daily!

• Needs intelligent and responsible individuals – *interesting work – never becomes boring - many opportunities for further development!*
Roles and Responsibilities, Education and Training Requirements for Clinically Qualified Medical Physicists

Medical Physics for Patient Benefit
The Journey of an Ionization Chamber

The IAEA celebrates the International Day of Medical Physics
7 November 2018
Dosimetry and Medical Physics

Medical Physics is the application of physics to medicine. It uses physics concepts and procedures in the prevention, diagnosis, and treatment of disease. Medical Physics fulfils an important role in medicine, in biology and medical research, and in the optimisation of certain health related activities. Medical Physics includes areas such as Radiotherapy physics, Diagnostic Radiology physics, Nuclear Medicine Physics, and Radiation Protection. Diagnostic Radiology and Nuclear Medicine are often grouped in what is termed as "Diagnostic Imaging", although there are therapeutic aspects of Nuclear Medicine associated with Radiation Therapy. Other areas of interest in...
European Guidelines on the Medical Physics Expert


Our MSc Medical Physics was the first in Europe following these recommendations!
EFOMP Policy Statement on Education & Training of Medical Physicists in Europe

Our MSc Medical Physics was the first in Europe at followed these recommendations!

Developing future leaders for the profession in Europe
BSc(Hons) Physics, Medical Physics & Radiation Protection

One of the most innovative Physics based degrees world-wide!

INTERFACULTY degree to maximize career opportunities - Faculty of Science & Faculty of Health Sciences - opens the door to careers in:

- all areas of Physics
- as a hospital Medical Physicist and Medical Physics Expert (a warranted health care profession enshrined in EU Directive 2013/59/EURATOM)
- Radiation Protection Expert
- medical device industry
- medical device sales and marketing
- physics teacher - university lecturer
- Research etc

You will learn about:

- Physics: Mechanics, Relativity, Nuclear and Particle, Atomic, Solid State...
- Medical Physics in Diagnostic and Interventional Radiology and Dentistry: X-radiography, Fluoroscopy, computerized-tomography (CT) scanning, magnetic resonance imaging (MRI), ultrasound imaging - physics methods used to ‘see’ structures inside the body without opening up the body!
- Medical Physics in Nuclear Medicine where physics methods are used to check whether body organs are functioning properly!
- Medical Physics in Radiation Oncology (Radiotherapy) where physics methods are used to kill cancer!
- Radiation Protection where physics methods are used to protect medical and industrial workers and the general public from the possible undesirable effects of radiation.
Join us if you would like to:

• Use your physics knowledge for solving real-world challenges in improving the health and well-being of people
• Learn about some of the most sophisticated equipment and software used in clinical medicine - experience their use directly through hospital placements
• Be at the forefront of developments in physics and medical technology
• Learn how medical technology is used to take care of your health and that of your family and friends
• Use your physics knowledge to drive technology to ensure accurate diagnosis and therapy and save lives!
An all-inclusive multi-disciplinary programme with study units in:

Physics, Medical Physics, Radiation Protection, Mathematics, Statistics, Anatomy, Physiology, Management, ICT, experimental and non-experimental research, clinical practice...

For more info on Medical Physics and Radiation Protection go to:

- European Federation of Organizations for Medical Physics
  www.efomp.eu
- International Organization for Medical Physics
  www.iomp.org
- American Association of Physicists in Medicine
  www.aapm.org
- IAEA Medical Physics
  https://humanhealth.iaea.org/HHW/MedicalPhysics/index.html
- Institute of Physics and Engineering in Medicine
  www.ipem.ac.uk
- Malta Association of Medical Physicists
  www.mamp.org.mt

Special course requirements: Either (i) a pass at Advanced Level at Grade C or better in Physics together with a pass at Intermediate Level at Grade C or better in Pure Mathematics; or (ii) a pass at Advanced Level at Grade C or better in Pure Mathematics together with a pass at Intermediate Level at Grade C or better in Physics.

For more information, latest updates and/or appointment contact feel free to write to:

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carmel.j.caruana@um.edu.mt
And just in case you thought Medical Physics was only for people!

https://www.wired.com/2013/10/ct-scan-car-crash/
Summer School – Summer 2019

Sessions will be in the Maths and Physics building room MP216

Wednesday 26 Jun 2019 - 09:00 to 12:00
Wednesday 03 Jul 2019 - 09:00 to 12:00
Wednesday 10 Jul 2019 - 09:00 to 12:00
Wednesday 17 Jul 2019 - 09:00 to 12:00
Wednesday 24 Jul 2019 - 09:00 to 12:00
Wednesday 31 Jul 2019 - 09:00 to 12:00
Thank you for your attention!
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