

# The BSc Physics, Medical Physics and Radiation Protection at the University of Malta - a success story in attracting young people to the Radiation Protection professions

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# Short History of the Programme

# 'Real World' Situation

- In many countries in the world medical physics and radiation protection face a problem of low human resources.
- University Masters programmes in these areas face an acute shortage of entrants owing to the:
  - irregular number of physics/engineering graduates
  - low popularity of two year masters programmes (many students are simply not willing to forgo 2 years salary whilst doing a Masters; moreover Masters programmes often come at a fee and there is no student stipend)
- Under such conditions, it is difficult for radiation protection and medical physics services to develop.



# The Challenge

A new educational curricular structure needed to be developed that:

- Ensures that the potential stock of entrants to these professions would be independent of the erratic student numbers in physics/engineering
- *Addresses the paradox of having to reduce Masters programmes to a single year at a time when the knowledge-skills-competences required for modern medical-physics and radiation-protection practice are expanding rapidly owing to the increasing breadth and complexity of modern medical device technology*
- Ensures that students have a strong basis in physics, mathematics, measurement skills and analytical and problem-solving skills
- Address the shortcomings of the present model of medical physics education **particularly the low levels of medical science, early hospital experience, soft skills (communication, leadership, etc)**
- That is low cost
- And very importantly - be attractive to students



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# Our Solution

- We opted for:
  - A **4-year inter-faculty Bachelor** in **Physics, Medical Physics and Radiation Protection** that combines physics, medical physics and radiation protection in a single programme
  - followed by a **single year Masters** programme in Medical Physics (and Medical Radiation Protection)
- Essential characteristics of the Bachelor programme are:
  - The physics/mathematics/statistics/ICT component is still strong to ensure a strong scientific foundation, analytical and problem solving skills
  - The medical science / medical-physics / radiation-protection components are sufficiently comprehensive to permit the reduction of the Masters in Medical Physics (and Medical Radiation Protection) from two years to one

# Structure of the BSc Physics, Medical Physics and Radiation Protection

Year	Physics Mathematics Statistics ICT	Anatomy Physiology Pathology	Medical Physics Radiation Protection	Hospital Clinical Practice	Research, Soft skills, Ethics Legislation, Professional Issues
Year 4	**		*****	112 h	***
Year 3	***	*	****	112 h	*
Year 2	****	**	**	112 h	*
Year 1	****	****	*		*

Programme overview:

<https://www.um.edu.mt/courses/overview/UBSCHPMRFT-2020-1-O>

Full curriculum with study unit learning outcomes:

<https://www.um.edu.mt/courses/programme/UBSCHPMRFT-2020-1-O>

# Summer School

Since physics/mathematics students don't have pre-university biology, we provide a relaxed **online summer school in human biology in the summer** before the start of the programme – and the physics/mathematics students simply love it!



# Results (previously reported)

- This innovative curricular experiment was a great success – many students
- Most attractive features of the programme:
  - The combination of pure and applied physics,
  - The inter-faculty nature of the programme where students share lectures with both physics and healthcare professions students
  - The hospital-based clinical practicals (336 hours spread over three years)
  - Inclusion of not only medical radiation protection but also industrial, nuclear, environmental
- Because of the solid undergraduate background in MP/RP, we could make the MSc Medical Physics more comprehensive and have included also **advanced Radiation Protection of all three traditional specialties of Medical Physics** (and also machine learning, pattern recognition, advanced signal and image processing, physiological measurement hence increasing the career choices of our graduates)



# An Update

- Good news! - the first cohort will be graduating in a few weeks!
- The critical outcomes:
  - We have our first 11 graduates – no problems with human resources anymore!
  - We are producing **a new breed of medical physicists/radiation protection professionals who are at ease in the hospital environment from day one**. These students are much more enthusiastic towards radiation protection and medical physics (9 out of 11 have already applied for the Masters)
  - We look forward to a more meaningful Masters experience starting October 2023 as given their background students can place whatever they learn in its clinical context

# Improvements

- Include also a dissertation from the Faculty of Science to strengthen the physics/maths even further
- Maths for MP and RP – e.g., Monte Carlo methods, mathematics of medical imaging
- Develop our Erasmus+ programme further



# Difficulties from the student side

- Having to deal with three very different ethoses - attitude of academic and administrative staff in the two faculties is very different (one hard science, other caring professions) and in addition there's the ethos of the hospital staff
- We have solved this in the following ways:
  - Meetings with HoDs and administrators of *both* departments at the beginning of the their first year (personal radiation monitor, hospital security tag, health assessment)
  - I have a set up my time-table such that I have at least one hour of lecture time per week with them throughout the programme so that I can tackle problems as they arise
  - I have an open door policy
  - Through group and individual discussions, I work on toughening up the personal psychological resilience of the students

# Clinical Practicals

- The doable approach: at the moment students are divided into small groups of 4 - 5 students, rotate in different specialties and **experience whatever is happening at the time mostly via job shadowing**. Though this is sufficient at Bachelor's level, we would like the practicals to become more structured and include more hands-on experiences.
- Not all people they meet in the hospital are enthusiastic and share our wider positive vision of the radiation protection / medical physics professions.
- Solution: ongoing discussions on leadership, future vision and development of the professions, the nature of large organizations, organizational politics, medical physics / radiation protection in the wider society ....

# Thank you for your attention!

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