Membership Criteria for Expert Membership of the ICPM

Contents

Membership Criteria for Expert Membership of the ICPM 2

1. Education 2

2. Clinical Training 3

3. Advanced Experience and Professional Development (PD) 4

Applicants from the European Union, European Economic Area, and Third Countries 4

Translated Educational and Professional qualifications 4

Academic qualifications from overseas 4

Appendix A Application Flowchart 5

Appendix B Application for Undergraduate Equivalence Flowchart 6

Appendix C IOP Core of Physics and Key Expectations for Undergraduate Degrees 7

Appendix C References 10

Membership Criteria for Expert Membership of the ICPM

This document outlines the procedure and criteria for entry to become an ICPM Expert member. The ICPM was awarded National Registration Scheme (NRS) status by the European Federation of Organisations for Medical Physics (EFOMP) at the ECMP in August 2022. The acceptance of the ICPM onto the NRS register was evaluated under criteria as described in EFOMP Policy Statement 6.1 [1], and in the guidelines on national schemes for Continuing Professional Development ([2]), education and training ([3]), and the role, responsibilities, and status of medical physicists and medical physics experts ([4] and [5]).

The admission requirements for the ICPM to become an EFOMP-approved NRS [1] programme place particular emphasis on the content of the associated education and training programmes. This educational stage is a critical component of the national registration scheme as outlined in EFOMP's Policy Statements 6.1 [1]and 12.1 [3]. The ICPM's requirements for membership align with the requirements set out in the publications mentioned above.

1. Education

A Medical Physicist is a person, qualified with a university degree majoring in physics with specialised education and training in the concepts and techniques of applying physics to medicine and healthcare. In accordance with both the "European Guidelines on the Medical Physics Expert" ([6] published as RP174) and EFOMP Policy Statement 12.1 [3], the requirements for entry to the ICPM are:

1) The candidate must hold an Honours Bachelor's Degree in physics or an equivalent [6] closely related field with a strong emphasis on associated mathematics. This degree should be aligned with Level 8 of the National Framework of Qualifications (NFQ) in Ireland, equivalent to Level 6 in the European Qualifications Framework (EQF) [7]
    a) In exceptional circumstances, a candidate whose undergraduate education in physics and associated mathematics was achieved through modular education may be accepted. (Appendix B)
2) The candidate must also have obtained a Master's Degree with a high level of physics and mathematics content. This degree should include the educational components of the core Knowledge, Skills, and Competencies (KSC) [6] required in medical physics, as well as the specialty-specific KSC corresponding to the candidate's clinical training. This degree must meet the Level 9 standard in the NFQ, which corresponds to Level 7 in the EQF [7].

Within the European Credit Transfer and Accumulation System [8] (ECTS) a 'first cycle' (or bachelor's) degree consists of either 180 or 240 ECTS credits. In the Irish National Framework of Qualifications [7] a Bachelor's Degree is 240 ECTS, while across Europe many first cycle degrees are 180 ECTS.

Based on RP 174 [6] the fundamental education level for medical physics professionals is a European Qualification Framework level 6 (NFQ level 8 Bachelor's, 180-240 ECTS [7]) in physics and associated mathematics or equivalent. An equivalent qualification is defined as one in which there is a high level of physics and mathematics, and makes it possible for graduates of other physical sciences (e.g., engineering, biophysics), including theory, practical and research project elements, to enter the field of Medical Physics.

Entry level to the profession of Medical Physics has been set at a minimum of EQF Level 7 (NQF Level 9) in Medical Physics [6]. NQF Level 9 (Master's, 90 ECTS) specialises in the key skills and competences specific to the speciality of Medical Physics, and does not replace or supersede the fundamental knowledge and skills

gained at NQF Level 8. Equivalent qualifications (e.g., Level 9 or 10 Level) with a high level of physics and maths may need additional educational components of the core RP 174 Key Skills and Competencies specific to the medical physics speciality [6].

EFOMP Core Curriculum's for Radiotherapy [9] and Nuclear Medicine [10] require that medical physics experts have at least 180 ECTS in Fundamental Physics and Mathematics combined across Bachelors and Masters education (NQF Level 8 + NQF Level 9). A similar framework is included in the 2026 draft EFOMP Core Curriculum in Diagnostic Radiology. Guidance on fundamental physics and maths curriculums is provided by the Institute of Physics Core of Physics [11]. The updated Institute of Physics degree accreditation framework [12] recognises that while some physics degrees may differ in the extent to which some of these fundamental areas are covered, the Core of Physics is still a general resource to inform teaching of the fundamental areas of physics.

2. Clinical Training

The clinical training requirements for MPE recognition include:

- Structured Clinical Training [6]: Successful completion of an accredited, structured Medical Physics Clinical Training Scheme lasting a minimum of two years full-time within a healthcare institution.
  or
- Equivalent Clinical Training: Completion of equivalent clinical training under the supervision and direction of registered Medical Physics Experts, also lasting at least two years full-time in a clinical environment. This training must involve hands-on experience and the application of medical physics skills under supervision.

This training must encompass the core skills (KSC [6]) for both general medical physics and the chosen specialty. It must provide:

i. Practical experience in a clinically relevant setting.
ii. Continuous supervision to ensure proficiency in skills and competencies.
iii. Feedback and support for the trainee to attain clinical certification.
iv. Knowledge and application of relevant EU and Irish legislation.

To prove the equivalence of training, applicants must submit sufficient documentary evidence, including professional references from at least two referees who are registered with the ICPM or listed on the Register.

Examples of evidence might include international exams, technical assessments, in-house evaluations, and reports on professional competencies.

3. Advanced Experience and Professional Development (PD)

To meet the requirements for advanced experience and professional development, an applicant must have achieved a Level 10 qualification in the NFQ, equivalent to Level 8 in the EQF, in their specific medical physics specialty [6]. This requirement can be met by a minimum of three years of advanced experience and professional development after completing clinical training, with demonstrated competencies and responsibility for patient care.

Applicants must also fulfil Continuous Professional Development (CPD). Documentary evidence of professional development must be submitted during the application process.

Applicants from the European Union, European Economic Area, and Third Countries

Applicants whose clinical training and advanced experience did not include knowledge of Irish legislation and regulatory frameworks must provide additional documentary evidence demonstrating their understanding of these areas. This evidence may include formal training modules or professional development activities specific to the Irish regulatory environment. Such documentation is required for ICPM membership.

It is expected that an applicant who has been awarded MPE status through their country's MPE Registration Scheme will require a 6-months adaption period of experience within the Irish jurisdiction before application. The applicant must provide evidence that their countries MPE scheme aligns with RP 174 [6] (e.g. NRS approved by EFOMP [2]).

Applicants from other areas are expected to have a 1-year adaption period of experience within the Irish jurisdiction before application.

VISA requirements are the responsibility of the applicant. The MPE Register is reserved for MPEs working in Ireland or those who have worked in Ireland and whose registration is still valid.

Translated Educational and Professional qualifications

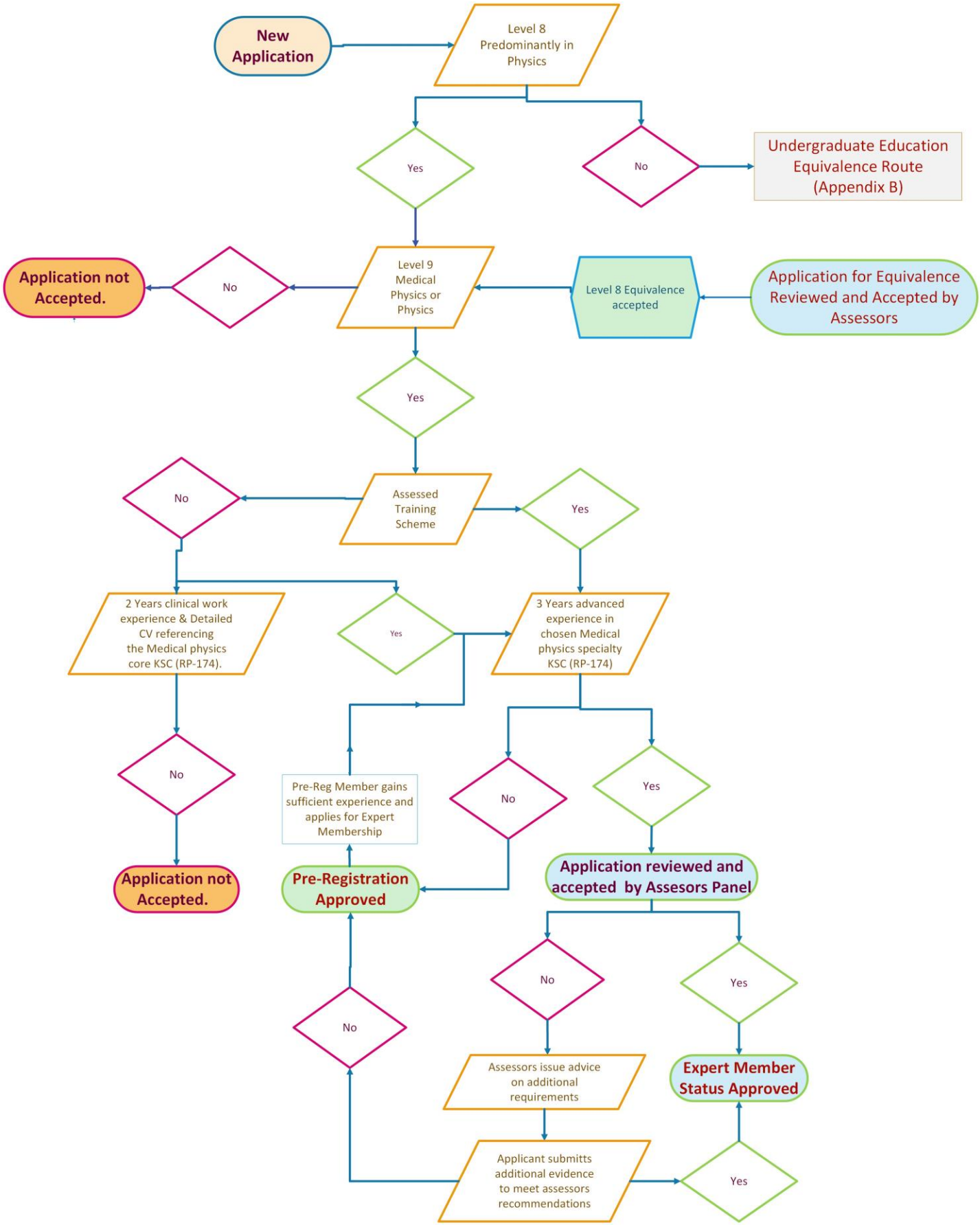
Only certified translations should be accepted.
Only certified originals of academic degrees/ professional qualifications will be accepted.

Academic qualifications from overseas

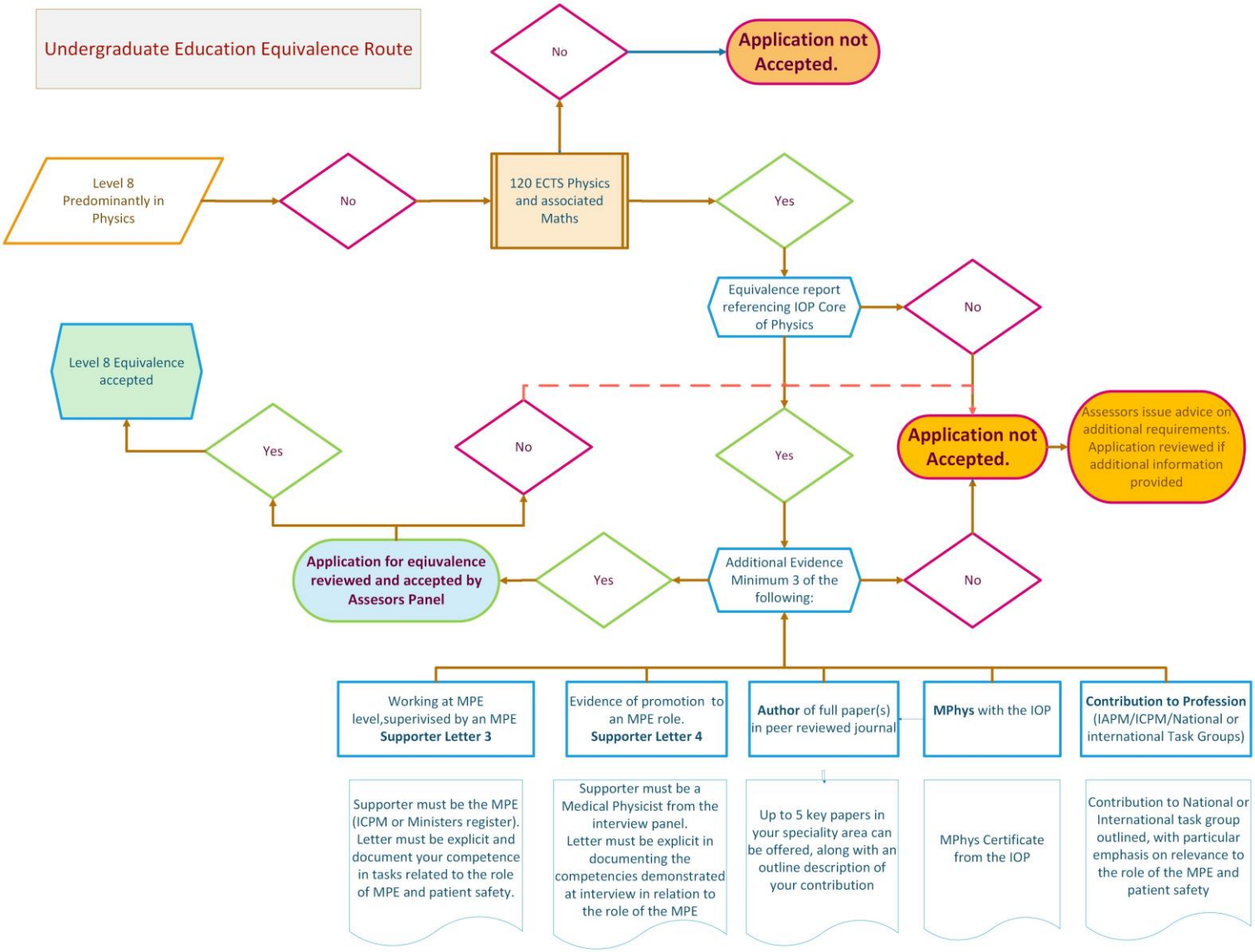
These can be compared to those in Ireland using the NARIC database [13].

Where relevant, proof of proficiency in the English language must be provided by the applicant.

Appendix A Application Flowchart



Appendix B Application for Undergraduate Equivalence Flowchart



Appendix C IOP Core of Physics and Key Expectations for Undergraduate Degrees

IOP Core of Physics [11]		
Core 1	Maths	Trigonometric and hyperbolic functions; complex numbers
		Series expansions, limits and convergence
		Calculus to the level of multiple integrals, solution of linear ordinary and partial differential equations
		Three-dimensional trigonometry
		Vectors to the level of div, grad and curl; divergence theorem and Stokes' theorem
		Matrices to the level of eigenvalues and eigenvectors
		Fourier series and transforms including the convolution theorem
		Probability distributions
Core 2	Mechanics and Relativity	Newton's laws and conservation laws including rotation
		Newtonian gravitation to the level of Kepler's laws
		Special Relativity;Lorentz transformations and the energy-momentum relationship
Core 3	Quantum Physics	Background to quantum mechanics to include:
		Black body radiation
		Photoelectric effect
		Wave-particle duality
		Heisenberg's Uncertainty Principle
		Schrödinger wave equation to include:
		Wave function and its interpretation
		Standard solutions and quantum numbers to the level of the hydrogen atom
		Tunnelling
		First order time independent perturbation theory
		Atomic, nuclear and particle physics to include;
		Quantum structure and spectra of simple atoms
		Nuclear masses and binding energies
		Radioactive decay, fission and fusion
		Pauli exclusion principle, fermions and bosons and elementary particles
		Fundamental forces and the Standard Model
Core 4	Condensed Matter Physics	Mechanical properties of matter to include elasticity and thermal expansion
		Inter-atomic forces and bonding
		Phonons and heat capacity
		Crystal structure and Bragg scattering
		Electron theory of solids to the level of simple band structure
		Semiconductors and doping
		Magnetic properties of matter

Core 5	Oscillations and Waves	Free, damped, forced and coupled oscillations to include resonance and normal modes
		Waves in linear media to the level of group velocity
		Waves on strings, sound waves and electromagnetic waves
		Doppler effect
Core 6	Electromagnetism	Electrostatics and magnetostatics
		DC and AC circuit analysis to the level of complex impedance, transients and resonance
		Gauss, Faraday, Ampère, Lenz and Lorentz laws to the level of their vector expression
		Maxwell's equations and plane electromagnetic wave solution; Poynting vector
		Electromagnetic spectrum
		Polarisation of waves and behaviour at plane interfaces
Core 7	Optics	Geometrical optics to the level of simple optical systems
		Interference and diffraction at single and multiple apertures
		Dispersion by prisms and diffraction gratings
		Optical cavities and laser action
Core 8	Thermodynamics and Statistical Physics	Zeroth, first and second laws of thermodynamics to include:
		Temperature scales, work, internal energy and heat capacity
		Entropy, free energies and the Carnot Cycle
		Changes of state
		Statistical mechanics to include:
		Kinetic theory of gases and the gas laws to the level of Van der Waals equation
		Statistical basis of entropy
		Maxwell-Boltzmann distribution
		Bose-Einstein and Fermi-Dirac distributions
		Density of states and partition function

Standards for Institute of Physics accreditation: Key Expectations for Undergraduate Degrees [12]		
Breadth and Depth of Knowledge	KE1	Evidence that students study the fundamental areas of physics at appropriate times in the course
	KE2	Evidence that students study the application of the fundamental principles to an appropriate selection of areas of physics relevant to the degree title
	KE3	Students can demonstrate that they can apply their physics knowledge across topic boundaries and in unrehearsed contexts
	KE4	Students can demonstrate the ability to use mathematics to model, describe and predict phenomena in the real world
	KE6	Programmes allow students to demonstrate an appreciation of recent developments in physics
Practical Skills	KE8	Programmes provide an experience of the practical nature of physics and equip students with a range of practical skills necessary to plan, execute investigations and analyse data
Investigative and project work	KE9	Programmes must include elements of independent investigative work of an open-ended nature
Physics skills	KE11	Students can demonstrate the ability to formulate and tackle problems in physics
Transferable and professional skills	KE12	Programmes must provide training in a broad range of transferable skills and their use should be demonstrated throughout the programme
	KE13	Students can demonstrate appropriate professional skills

Appendix C References

[1] EFOMP, “European Federation of Organisations for Medical Physics Policy Statement 6.1 Recommended Guidelines on National Registration Schemes for Medical Physicists,” 2016.

[2] EFOMP, “European Federation of Organisations for Medical Physics Policy Statement No. 10.1: Recommended Guidelines on National Schemes for Continuing Professional Development of Medical Physicists,” 2016.

[3] EFOMP, “European Federation of Organisations for Medical Physics Policy Statement 12.1 Recommendations on Medical Physics Education and Training in Europe,” 2014.

[4] EFOMP, “European Federation of Organisations for Medical Physics Policy Statement No. 7.1: The roles, responsibilities and status of the medical physicist including the criteria for the staffing levels in a Medical Physics,” 2016.

[5] EFOMP, “EFOMP Policy Statement 16; The role and competences of medical physicists and medical physics experts under 2013/59/EURATOM,” 2018.

[6] EC, “European Guidelines on Medical Physics Expert Energy. Radiation Protection N° 174,” 2014.

[7] QQI, “The National Framework of Qualifications, Quality and Qualifications Ireland”.

[8] European Commission, “European Higher Education Area, ECTS Users’ Guide,” 2015.

[9] EFOMP, “EFOMP - ESTRO Core Curriculum for Medical Physics Experts in Radiotherapy 3rd Edition,” 2022.

[10] EFOMP, “EFOMP - EANM Core Curriculum for Medical Physics Experts in Nuclear Medicine 2024,” Nuclear Medicine CC_Corrected.pdf, 2024.

[11] Institute of Physics, “The Physics Degree Graduate Skills Base and the Core of Physics,” 2011.

[12] IOP, “Institute of Phyiscs Degree Accreditation Framework,” 2022.

[13] QQI, “NARIC Ireland Foreign Qualifications”.

[14] European Union (Basic Safety Standards for Protection against dangers arising from medical exposure to ionising radiation) regulations 2018, SI 256.

[15] Institute of Physics, “IOP List of Accredited courses, UK and Ireland,” https://www.iop.org/sites/default/files/2023-09/iop-register-of-accredited-courses-issue-39-september-2023.pdf, 2023.

[16] IOMP, “Policy Statement No. 2 Basic Requirements for Education and Training of Medical Physicists IOMP Working Group on Policy Statement No. 21,,” 2010.