DHSC / SGHSCD / DHNI Syllabus for Medical Physics Experts

A) Underpinning Knowledge for Medical Physics Experts

DH No.	Topic	Depth	Sub-topics
A1	**Basic atomic and nuclear physics**	**BU**	▪ Atomic structure and composition of the nucleus ▪ Stable and unstable isotopes, activity ▪ Types of radioactive decay ▪ Nuclear fission ▪ Half life and decay constants ▪ Radioactive equilibria ▪ The effects of time, distance and shielding ▪ Generation of x-rays ▪ Excitation and ionisation ▪ Quantities and units
A2	**Basic biology**	**BU**	▪ Gross anatomy and physiology relevant to imaging and therapy using ionising radiation
A3	**Interaction of radiation with matter**	**BU**	▪ Attenuation ▪ Scattering and absorption ▪ Charged particles, photons and neutrons ▪ Types of nuclear reactions ▪ Induced radioactivity
A4	**Biological effects of radiation**	**BU**	▪ Deterministic biological effects of ionising radiation ▪ Stochastic biological effects of ionising radiation ▪ The dose–response relationship ▪ Effects of whole body irradiation ▪ Effects of partial body irradiation ▪ Quantities and units

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DH No.	Topic	Depth	Sub-topics
A5	**Basis of radiation protection standards**	**BU**	▪ Linear hypothesis for stochastic effects ▪ Threshold for tissue reactions ▪ Epidemiological studies
A6	**ICRP principles**	**BU**	▪ Justification of practices ▪ Optimisation of exposures ▪ Dose Limits
A7	**Legal and regulatory basis**		
A7a	**International legislation**	**GA**	▪ International recommendations and conventions (IAEA, ICRP, ICRU, WHO, UNSCEAR) ▪ EC Directive 2013/59/Euratom
A7b	**National legislation and regulations which apply to medical exposures**		
	IRMER	**DU**	▪ The requirements of IRMER and its practical implementation ▪ The role of the MPE ▪ Statutory and non-statutory guidance ▪ The role of the competent authority(ies)
	Other	**BU**	▪ Any other legislation directly relevant to medical exposures ▪ Any replacement legislation, as appropriate.
A7c	**National legislation and regulations relating to working with ionising radiation**	**GA**	▪ Key national legislation and regulations (including competent authorities) ▪ Legislative framework in the UK ▪ UK Regulatory bodies and regulatory system ▪ Knowledge of the main requirements of the following legislation and principles and guidance including: ▪ The Ionising Radiations Regulations 2017 and associated guidance

DH No.	Topic	Depth	Sub-topics
			-Designation of areas -Local rules and contingency plans -Classification of workers -Reporting of equipment failures -Duties of employees -The role of the RPA and RPS ▪ The Environmental Permitting Regulations 2016 (EPR16)/The Environmental Authorisations (Scotland) Regulations 2018 (EASR18)/The Radioactive Substances Act 1993 (RSA93), exemptions from EPR16/EASR18/RSA93 and associated guidance - The role of the RWA ▪ The Justification of Practices Involving Ionising Radiations Regulations 2004 Including any amendment or replacement legislation, if appropriate.
A7d	**Other relevant legislation**	**GA**	For example: - Human Medicines Regulations 2012 and amendments - Regulations relating to ethical approval for research exposures - General health and safety regulations
A8	**Good Clinical/Scientific Practice**	**GA**	
A9	**Liaison with other radiation protection professionals**	**BU**	Liaison with other radiation protection experts, for example: ▪ the RPA regarding facility design and reporting of exposures much greater than intended due to equipment faults ▪ the RWA regarding management of radioactive waste

DH No.	Topic	Depth	Sub-topics
A10	**Other exposures using medical radiological equipment**	**GA**	▪ Use of medical radiological equipment for undertaking non-clinical exposures, for example: ▪ For legal purposes ▪ For sports assessment ▪ Well-person/asymptomatic assessment
A11	**Emerging technologies**	**GA**	

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DHSC No.	Topic	Depth	Sub-topics
A12	**Diagnostic Radiology**	**GA**	▪ Clinical uses of x-ray imaging ▪ Fundamentals of x-ray imaging ▪ Fundamentals of image acquisition, storage and display ▪ Standardised interventional techniques ▪ Specialised techniques, e.g. vascular imaging ▪ Use of contrast media ▪ National screening programmes ▪ ICT interconnectivity and data integrity
A13	**Radiotherapy**	**GA**	▪ Clinical uses of radiotherapy, including use in benign disease and palliative exposures ▪ Fundamentals of radiotherapy, e.g. available equipment/sources, treatment planning ▪ Radiobiological aspects for radiotherapy ▪ ICT interconnectivity and data integrity
A14	**Nuclear Medicine**	**GA**	▪ Clinical uses of nuclear medicine ▪ Fundamentals of diagnostic use ▪ Fundamentals of therapeutic use ▪ Fundamentals of image acquisition, storage and display ▪ ICT interconnectivity and data integrity ▪ Preparation, dispensing and administration of radiopharmaceuticals

DH No.	Topic	Depth

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DH No.	Topic	Depth
A15	**Equipment Management**	
A15a	**Specification and evaluation of medical radiological equipment**	**DU**
A15b	**Acceptance and commissioning of medical radiological equipment**	**DU**
A15c	**Quality assurance**	**DU**
A16	**Dosimetry**	
A16a	**Dosimetric quantities**	**DU**
A16b	**Dose assurance**	**DU**
A16c	**Organ dosimetry techniques**	**DU**
A16d	**Determination and communication of risk to the patient or subject**	**DU**
A17	**Medical Exposure Optimisation**	
A17a	***Imaging performance required to achieve desired objective***	***BU***
A17b	**Technical performance and clinical applications**	**DU**
A17c	**Management of risks to individuals undergoing medical exposures**	**DU**

B) Practical Competence and Workplace Experience

Topic	DHSC No.	Sub-topics
Medical Exposure Regulations	B1.1	Requirements of IRMER and practical implementation in the workplace
	B1.2	The role of the MPE
Medical Radiological Equipment Management	B2.1	Specification and evaluation
	B2.2	Acceptance and commissioning
	B2.3	Quality assurance
Dosimetry	B3.1	Dosimetric quantities
	B3.2	Dose assurance
	B3.3	Organ dosimetry techniques
	B3.4	Determination and communication of the risk of detriment to individuals
Medical Exposure Optimisation	*B4.1*	*Imaging performance required to achieve desired imaging, diagnostic or treatment objective*
	B4.2	Technical performance and clinical applications
	B4.3	Management of risks to individuals undergoing medical exposures