

**COMPETENCES REQUIRED FOR APPLICANTS
TO ATTAIN STATE REGISTRATION AS CLINICAL SCIENTISTS**

SPECIALTY :

**MEDICAL PHYSICS &
CLINICAL ENGINEERING**



This document comprises a discipline-specific version of the general competence document and provides additional guidance as to how to complete the general document, Appendix 1 of the Guidelines, that you must submit with your application.

Remember that the aim of the process is for the candidate to satisfy the assessor that he or she has the appropriate basic qualifications and length of experience for issue of the Certificate of Attainment, and that the training programme/period of supervised practice has enabled the candidate to achieve the basic level of competence required for registration as a clinical scientist.

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GENERIC COMPETENCES		SPECIFIC COMPETENCES
HPC Standards of Proficiency Code – Clinical Scientist	1-SCIENTIFIC	Be able to demonstrate the rigorous application of scientific methods in his/her experience to date
3a.1	<ul style="list-style-type: none"> understanding the science that underpins the specialty (modality) and the broader aspects of medicine and clinical practice 	<ul style="list-style-type: none"> perform and advise on more complex procedures, measurements and calibrations critically appraise current procedures, applications and strategies within a particular discipline demonstrate an awareness and understanding of new developments and techniques specify, evaluate and commission an item of equipment, system or facility and produce protocols for its safe and effective introduction into service design and supervise construction of equipment not commercially available undertake research and development programmes using a range of skills to enable critical review of literature, formulation of hypothesis design and conduct of appropriate experiments and critical appraisal and dissemination of results
3a.1	<ul style="list-style-type: none"> demonstrating a strong base of knowledge appropriate to the specialty and to the investigations and therapeutic options available 	
2b.1	<ul style="list-style-type: none"> experience of searching for knowledge, critical appraisal of information and integration into the knowledge base 	
2b.4	<ul style="list-style-type: none"> ability to apply knowledge to problems associated with the routine provision, and development, of the service 	
2a.1	<ul style="list-style-type: none"> ability to identify the clinical decision which the test/intervention will inform 	
2a.3, 2c.1	<ul style="list-style-type: none"> ability to make judgements on the effectiveness of procedures 	
2a.2	<ul style="list-style-type: none"> application of the knowledge base to the specialty (modality) and to the range of procedures/investigations available 	
<i>Achievement of:</i>	<ul style="list-style-type: none"> an understanding of the physics, engineering and life sciences employed in the practice of Medical Physics and Clinical Engineering develop research skills and expertise to be able to identify problems, formulate hypotheses and develop experimental plans to resolve problems the ability to search the literature effectively and critically 	
<i>Achieved through:</i>	<ul style="list-style-type: none"> a structured taught element (e.g. an IPEM accredited MSc, lecture courses) and participation in appropriate (or equivalent) IPEM training programmes participation in local research meetings and national scientific meetings, and evidence of supervised and collaborative research initiatives, having the potential to contribute to PhD material the presentation of research and development of a standard suitable for publication 	
<i>Assessed by:</i>	<ul style="list-style-type: none"> the locally IPEM-nominated PATR co-ordinator and IPEM PATR assessor, or ACS-nominated supervisor and assessors (assuming that the IPEM postgraduate diploma is already obtained) 	

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	GENERIC COMPETENCES	SPECIFIC COMPETENCES
HPC Standards of Proficiency Code – Clinical Scientist	2-CLINICAL	Be able to demonstrate the following relevant to the contribution of his/her specialty to patient care:
2a.4, 2b.2, 2c.1	<ul style="list-style-type: none"> ability to provide interpretation of data and a diagnostic (therapeutic) opinion, including any further action to be taken by the individual directly responsible for the care of the patient 	<ul style="list-style-type: none"> understand the significance of diagnostic results and other data and be able to advise on the application of diagnostic or therapeutic techniques maintain an up-to-date knowledge of clinical practice within a particular discipline design, introduce and evaluate new or improved methods used in diagnosis, treatment and rehabilitation
2b.3, 3a.1	<ul style="list-style-type: none"> understanding of the wider clinical situation relevant to the patients presenting to his/her specialty 	
2b.3	<ul style="list-style-type: none"> ability to develop/devise an investigation strategy taking into account the complete clinical picture 	
1a.5, 3a.2	<ul style="list-style-type: none"> understanding of the clinical applications of his/her specialty and the consequences of decisions made upon his/her actions/advice 	
3a.2	<ul style="list-style-type: none"> awareness of the evidence base that underpins the use of the procedures employed by the service 	
<i>Achievement of:</i>	<ul style="list-style-type: none"> an understanding of normal physiology and anatomy and the pathology and mechanisms of disease an understanding of disease processes in areas relevant to the particular discipline standards of appearance, personal hygiene and behaviour that engender the trust and respect of patients and clinical colleagues an understanding of medical ethics as it applies to Medical Physics and Clinical Engineering 	
<i>Achieved through:</i>	<ul style="list-style-type: none"> a structured taught element (e.g. an IPEM accredited MSc, lecture courses) and participation in appropriate (or equivalent) IPEM training programmes participation in local research meetings and national scientific meetings, and evidence of supervised and collaborative research initiatives, having the potential to contribute to PhD material attendance at clinical meetings, grand rounds and clinical audit meetings self-endeavour (literature awareness) under tutelage of an appropriate supervisor 	
<i>Assessed by:</i>	<ul style="list-style-type: none"> the locally IPEM-nominated PATR co-ordinator and IPEM PATR assessor, or ACS-nominated supervisor and assessors (assuming that the IPEM postgraduate diploma is already obtained) 	

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GENERIC COMPETENCES		SPECIFIC COMPETENCES
HPC Standards of Proficiency Code – Clinical Scientist	3-TECHNICAL	Be able to demonstrate the following, relevant to the modality or area of specialisation in which he/she wishes to be recognised
3a.2	<ul style="list-style-type: none"> understanding of the principles associated with a range of techniques employed in the modality 	<p>interpret and apply current legislation, codes of practice, guidance notes and related documents appropriate to a particular discipline</p> <p>interpret and apply appropriate standards, in particular British and European standards</p> <p>organise and conduct appropriate audits and surveys and demonstrate the consequence of such procedures</p> <ul style="list-style-type: none"> review and analyse the results of quality control procedures and demonstrate an ability to discuss with others the findings, implications and actions required. take appropriate action in the case of incidents and accidents analyse and advise on health and safety issues within a particular discipline
2b.4	<ul style="list-style-type: none"> knowledge of the standards of practice expected from these techniques 	
2b.4	<ul style="list-style-type: none"> experience of performing these techniques 	
2b.4	<ul style="list-style-type: none"> the ability to solve problems that might arise during the routine application of these techniques (troubleshooting) 	
2c.1, 2c.2	<ul style="list-style-type: none"> understanding of the principles of quality control and quality assurance 	
2c.1, 2c.2	<ul style="list-style-type: none"> experience of the use of quality control and quality assurance techniques including restorative action when performance deteriorates 	
<i>Achievement of:</i>	<ul style="list-style-type: none"> an understanding of, and ability to apply, the principles and practice of Health and Safety at work to his/her own activities an understanding of, and ability to apply, the principles of quality assurance to his/her own work an ability to explain to others the outcome of QC processes and to implement the findings 	
<i>Achieved through:</i>	<ul style="list-style-type: none"> a structured taught element (e.g. an IPEM accredited MSc, lecture courses) and participation in appropriate (or equivalent) IPEM training programmes participation in local research meetings and national scientific meetings, and evidence of supervised and collaborative research initiatives, having the potential to contribute to PhD material self-endeavour (literature awareness) under tutelage of an appropriate supervisor practical instruction at bench level and participation in locally organised health and safety courses 	
<i>Assessed by:</i>	<ul style="list-style-type: none"> the locally IPEM-nominated PATR co-ordinator and IPEM PATR assessor, or ACS-nominated supervisor and assessors (assuming that the IPEM postgraduate diploma is already obtained) 	

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	GENERIC COMPETENCES	SPECIFIC COMPETENCES
HPC Standards of Proficiency Code – Clinical Scientist	4-RESEARCH AND DEVELOPMENT	Be able to demonstrate a training in research which should include:
2b.1	<ul style="list-style-type: none"> ability to read and critically appraise the literature 	<ul style="list-style-type: none"> a critical assessment of recent literature in candidate’s specialties carry out research projects as part of both the MSc and PATR which are presented both in the style of a postgraduate project report and a scientific paper oral presentation of project results to a group of peers either locally or at a national meeting
2b.1	<ul style="list-style-type: none"> ability to develop the aims and objectives associated with a project 	
2b.1	<ul style="list-style-type: none"> ability to develop an experimental protocol to meet the aims and objectives in a way that provides reliable and robust data (i.e. free of bias) 	
2b.1	<ul style="list-style-type: none"> ability to perform the required experimental work ability to produce and present the results (including statistical analysis) 	
2b.1	<ul style="list-style-type: none"> ability to critically appraise results in the light of existing knowledge and the hypothesis developed and to formulate further research questions 	
1b.4, 2b.1	<ul style="list-style-type: none"> ability to present data and provide a critical appraisal to an audience of peers – both spoken and written 	
<i>Achievement of:</i>	<ul style="list-style-type: none"> present material effectively through reports, presentation and seminars communicate scientific material effectively to professional colleagues 	
<i>Achieved through:</i>	<ul style="list-style-type: none"> participation in local research meetings and national scientific meetings, and evidence of supervised and collaborative research initiatives, having the potential to contribute to PhD material self-endeavour (literature awareness) under tutelage of an appropriate supervisor 	
<i>Assessed by:</i>	<ul style="list-style-type: none"> the locally IPEM-nominated PATR co-ordinator and IPEM PATR assessor, or ACS-nominated supervisor and assessors (assuming that the IPEM postgraduate diploma is already obtained) 	

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GENERIC COMPETENCES		SPECIFIC COMPETENCES	
HPC Standards of Proficiency Code – Clinical Scientist	5-COMMUNICATION	Be able to communicate in both the written and spoken media to colleagues, peers and patients:	
1a.6	<ul style="list-style-type: none"> ability to assess a situation and act accordingly when representing the specialty 	<ul style="list-style-type: none"> present material effectively in scientific publications and lectures contribute at a professional level to clinical teams demonstrate an ability to communicate and explain complex or sensitive issues to patients, relatives and staff demonstrate an involvement in the training, supervision and education of other staff 	
1a.6	<ul style="list-style-type: none"> ability to respond to enquiries regarding the service provided when dealing with clinical colleagues 		
1a.2, 1b.1, 1b.3	<ul style="list-style-type: none"> ability to communicate with patients, carers and relatives, the public and other healthcare professionals as appropriate 		
1b.3, 1b.4	<ul style="list-style-type: none"> ability to communicate the outcome of problem solving and research and development activities 		
2b.1	<ul style="list-style-type: none"> evidence of presentation of scientific material at meetings and in the literature 		
<i>Achievement of:</i>	<ul style="list-style-type: none"> communicate effectively with clinical and professional colleagues understanding and practising the principles of confidentiality present material effectively through reports, presentation and seminars discuss appropriately with patients, procedures being undertaken demonstrate an ability to work within a team 		
<i>Achieved through:</i>	<ul style="list-style-type: none"> a structured taught element (e.g. an IPEM accredited MSc, lecture courses) and participation in appropriate (or equivalent) IPEM training programmes participation in local research meetings and national scientific meetings, and evidence of supervised and collaborative research initiatives, having the potential to contribute to PhD material peer reviewed publications 		
<i>Assessed by:</i>	<ul style="list-style-type: none"> the locally IPEM-nominated PATR co-ordinator and IPEM PATR assessor, or ACS-nominated supervisor and assessors (assuming that the IPEM postgraduate diploma is already obtained) 		

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HPC Standards of Proficiency Code – Clinical Scientist	6-PROBLEM SOLVING	Be able to deal with the unexpected and thus be able:	
2a.2	<ul style="list-style-type: none"> to assess a situation 	<ul style="list-style-type: none"> utilise knowledge base of training to formulate a solution to a subject specific problem demonstrate the ability to assess the problem and prioritise actions to resolve it demonstrate an ability to communicate intended actions to people involved in or affected by the problem 	
1a.6, 2b.1	<ul style="list-style-type: none"> determine the nature and severity of the problem 		
1a.6, 2b.1	<ul style="list-style-type: none"> call upon the required knowledge and experience to deal with the problem 		
1a.6, 2b.1	<ul style="list-style-type: none"> initiate resolution of the problem 		
1a.6	<ul style="list-style-type: none"> demonstrate personal initiative 		
<i>Achievement of:</i>	<ul style="list-style-type: none"> ability to tackle problems in a structured and pragmatic way taking account of associated safety issues discuss appropriately with co-workers and patients, steps being undertaken to resolve problems 		
<i>Achieved through:</i>	<ul style="list-style-type: none"> on-the-job assessment of response to day-to-day problems evidence of effective resolution of problems encountered during both knowledge and competency based elements of training 		
<i>Assessed by:</i>	<ul style="list-style-type: none"> the locally IPEM-nominated PATR co-ordinator and IPEM PATR assessor, or ACS-nominated supervisor and assessors (assuming that the IPEM postgraduate diploma is already obtained) 		

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	GENERIC COMPETENCES	SPECIFIC COMPETENCES
HPC Standards of Proficiency Code – Clinical Scientist	7-PROFESSIONAL ACCOUNTABILITY	Be able to demonstrate an understanding of management principles and techniques, including the following:
1a.1	<ul style="list-style-type: none"> Understanding of the legal and ethical boundaries of the modality, and the ethical aspects of scientific research. 	<ul style="list-style-type: none"> must be able to recognise legal and ethical boundaries of the modality and practice and conduct research within these boundaries must be able to recognise the limits of his/her knowledge and skills must understand the principles of clinical governance and be able to audit, reflect on and review practice must understand the need for and basic requirements of accreditation schemes appropriate to the modality must understand the importance of effective communication with colleagues and be able to function as an effective member of a multidisciplinary team must understand the principles of appraisal and be able to supervise staff in his/her area of responsibility must participate in an appropriate CPD scheme (after completion of training) must have acquired a basic knowledge of health and safety requirements appropriate to the discipline must have acquired a basic understanding of the structure and organization of the department, and relevant financial aspects.
1a.6	<ul style="list-style-type: none"> Ability to recognise the limits of personal practice and when to seek advice. 	
1a.7	<ul style="list-style-type: none"> Ability to manage personal workload and prioritize tasks appropriately. 	
1a.3, 1a.4, 2b.5, 2c.2	<ul style="list-style-type: none"> Understanding of the principles of clinical governance including clinical audit, accreditation requirements relevant to the modality. The importance of confidentiality, informed consent and data security 	
1b.2	<ul style="list-style-type: none"> Ability to contribute effectively to work undertaken as part of a multi-disciplinary team 	
1b.4	<ul style="list-style-type: none"> Ability to supervise others as appropriate to area of practice. Understanding of the role of appraisal in staff management and development. 	
1a.8, 2c.2	<ul style="list-style-type: none"> Understanding of the need for career-long self-directed learning and the importance of continuing professional development. 	
1a.5, 1a.8, 2b.4, 3a.3	<ul style="list-style-type: none"> Understanding of the need for, and ability to establish and maintain, a safe practice environment. 	
	<ul style="list-style-type: none"> Understanding of the structure and organization of the department and how it fits into the local clinical setting, General understanding of the way the modality is structured and practised in other locations within the UK. Basic understanding of the importance of financial accountability, budgetary control and resource management. 	

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<i>Achievement of:</i>	<ul style="list-style-type: none"> • an understanding of the management principles and tools used in the service • the ability to act as a professional and work effectively as part of a team • understanding of the importance and principles of accreditation, audit, confidentiality, data security and safe working practice
<i>Achieved through:</i>	<ul style="list-style-type: none"> • a structured taught element (eg approved MSc course or approved lecture programme), participation in appropriate training programmes and local courses on general, personnel and financial management, health and safety, audit, etc • participation in local seminars and meetings, attendance at clinical audit meetings and clinical governance committees. • attendance at departmental management meetings • involvement, under supervision, in management within the laboratory • mentoring by an experienced practitioner
<i>Assessed by:</i>	<ul style="list-style-type: none"> • the nominated local supervisor and appropriate professional body external advisor/tutors