

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

**SPECIALTY :**

**Clinical Microbiology**



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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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
	<b>1-SCIENTIFIC</b>	Be able to demonstrate the rigorous application of scientific methods in his/her experience to date
Sci1	<ul style="list-style-type: none"> <li>understanding the science that underpins the specialty (modality) and the broader aspects of medicine and clinical practice</li> </ul>	<ul style="list-style-type: none"> <li>must be able to advise on choice and preparation of samples and of categories of patients relevant to the investigations</li> <li>must be familiar with the evidence for, and limitations of, the common procedures used in the diagnosis and management of patients with suspected infection</li> <li>must understand the scientific basis of the technical procedures employed in investigating a patient</li> <li>must be familiar with scientific developments in clinical microbiology and in other relevant disciplines</li> <li>must have a core body of knowledge of the applications of fundamental (basic) microbiological principles to understanding of the pathogenesis, clinical features and classification of the major categories of infections</li> <li>must have an understanding of how therapeutic or prophylactic antimicrobial interventions are used in clinical management – and of how the outcome of such patients may be investigated, predicted and monitored for iatrogenic adverse effects</li> <li>must have an understanding of infection in the immunocompromised host and how this may alter both the spectrum of potential pathogens, the pathogenesis of disease and the clinical presentation of disease</li> </ul>
Sci2	<ul style="list-style-type: none"> <li>demonstrating a strong base of knowledge appropriate to the specialty and to the investigations and therapeutic options available</li> </ul>	
Sci3	<ul style="list-style-type: none"> <li>experience of searching for knowledge, critical appraisal of information and integration into the knowledge base</li> </ul>	
Sci4	<ul style="list-style-type: none"> <li>ability to apply knowledge to problems associated with the routine provision, and development, of the service</li> </ul>	
Sci5	<ul style="list-style-type: none"> <li>ability to identify the clinical decision which the test/intervention will inform</li> </ul>	
Sci6	<ul style="list-style-type: none"> <li>ability to make judgements on the effectiveness of procedures</li> </ul>	
Sci7	<ul style="list-style-type: none"> <li>application of the knowledge base to the specialty (modality) and to the range of procedures/investigations available</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an understanding of the wide variety of methods employed in the practice of clinical microbiology</li> <li>a critical understanding of the application of investigative protocols and diagnostic tests in clinical microbiology</li> <li>a critical understanding of the integration and interpretation of clinical microbiology parameters with other diagnostic parameters (haematological, clinical biochemistry, imaging etc) in the overall clinical assessment of the patient</li> <li>a critical understanding of scientific method and the tools required to successfully evaluate, develop and/or modify both current and emerging technologies as routine diagnostic tools in clinical microbiology</li> <li>developed research skills and expertise sufficient to support supervised and collaborative research initiatives in clinical microbiology and with clinical medicine</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>an approved postgraduate degree course and/or seminar programme and participation in appropriate ACM and related training programmes</li> <li>the presentation of outcomes of method evaluations, protocol development and clinical research initiatives of a standard suitable for publication</li> <li>participation in local research meetings and evidence of supervised and collaborative research initiatives, potentially leading to PhD</li> </ul>	

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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
	<b>2-CLINICAL</b>	Be able to demonstrate the following relevant to the contribution of his/her specialty to patient care:
Clin1	<ul style="list-style-type: none"> <li>to understand the requirements of accuracy and precision of a procedure in the context of diagnosis, prognosis, monitoring and treatment and to use that information appropriately</li> </ul>	<ul style="list-style-type: none"> <li>must have experience-based understanding of all aspects of the diagnostic process, comprising history-taking, the clinical examination, the formulation of differential diagnosis, the role of pathology and other clinical service investigations, and the consequent integration of knowledge relevant to the individual patient</li> <li>must be familiar with the principles of evidence-based investigation and management (EBM) as applied to diagnosis, clinical monitoring and treatment of patients with infection</li> <li>must be able to advise on choice and preparation of samples and of categories of patients relevant to the investigations</li> <li>must be familiar with the evidence for, and limitations of, the common procedures used in the diagnosis and management of patients with suspected infection</li> </ul>
Clin2	<ul style="list-style-type: none"> <li>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</li> </ul>	
Clin3	<ul style="list-style-type: none"> <li>understanding of the wider clinical situation relevant to the patients presenting to his/her specialty</li> </ul>	
Clin4	<ul style="list-style-type: none"> <li>ability to develop/devise an investigation strategy taking into account the complete clinical picture</li> </ul>	
Clin5	<ul style="list-style-type: none"> <li>understanding of the clinical applications of his/her specialty and the consequences of decisions made upon his/her actions/advice</li> </ul>	
Clin6	<ul style="list-style-type: none"> <li>awareness of the evidence base that underpins the use of the procedures employed by the service</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>a general understanding of clinical medicine and the effects of infection</li> <li>an understanding of antimicrobials available, therapeutic options and drug interactions in specific clinical situations</li> <li>an understanding of clinical laboratory protocols appropriate for specific clinical needs</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>an approved postgraduate degree course, short courses and seminar programme</li> <li>self endeavour, through literature awareness, essays and tutorials with nominated and local supervisors</li> <li>participation in clinical audit, case presentations, attendance at grand rounds and word rounds, clinical report evaluation</li> </ul>	
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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
	<b>3-TECHNICAL</b>	Be able to demonstrate the following, relevant to the modality or area of specialisation in which he/she wishes to be recognised
Tech1	<ul style="list-style-type: none"> <li>understanding of the principles associated with a range of techniques employed in the modality including the appropriate use of Information Technology</li> </ul>	<ul style="list-style-type: none"> <li>must have achieved a high level of competence in performing analytical techniques and procedures in common use in clinical microbiology at a standard that produces consistently valid results</li> <li>must have a working knowledge of related disciplines to be able to integrate relevant results into a meaningful interpretation</li> <li>must have sufficient knowledge of the scientific, operational and material basis of microbiological techniques to be able to recognise, solve and minimise problems connected with analytical performance</li> <li>must have, from an evidence base, a sufficiently detailed understanding of internal quality control, of the use of material reference standards of analytes and analytical reagents, and of the application of reference ranges of analyte values to detect results which may be out of range or invalid and where trouble-shooting may be required</li> <li>must understand, from an experience base, the principles and practice of external quality assessment, of audit and accreditation procedures, and of clinical and performance criteria relevant to evaluating the reproducibility of the commonly requested clinical microbiology laboratory tests</li> </ul>
Tech2	<ul style="list-style-type: none"> <li>knowledge of the standards of practice expected from these techniques including positioning of patients for safe interventions</li> </ul>	
Tech3	<ul style="list-style-type: none"> <li>experience of performing these techniques</li> </ul>	
Tech4	<ul style="list-style-type: none"> <li>the ability to solve problems that might arise during the routine application of these techniques (troubleshooting)</li> </ul>	
Tech5	<ul style="list-style-type: none"> <li>understanding of the principles of quality control and quality assurance</li> </ul>	
Tech6	<ul style="list-style-type: none"> <li>experience of the use of quality control and quality assurance techniques including restorative action when performance deteriorates</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an ability to perform technical procedures as detailed in ACM Training Manual to the required standards of an operational protocol as defined for the purposes of laboratory accreditation under CPA (UK) Ltd or equivalent</li> <li>a critical ability to review results and determine significance of internal quality control and external quality assurance</li> <li>a detailed understanding of technical principles to facilitate trouble shooting</li> <li>an understanding of the hazards (biological, chemical, environmental and physical) associated with the practice of clinical microbiology, the appropriate controlling legislation (eg COSHH, RIDOR) and procedures for risk assessment</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>an approved postgraduate degree course and short courses</li> <li>practical instruction at bench level</li> <li>self endeavour, through literature awareness, essays and local tutorials and seminars nominated by local supervisors</li> </ul>	

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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
	<b>4-RESEARCH AND DEVELOPMENT</b>	Be able to demonstrate a training in research which should include:
R&D1	<ul style="list-style-type: none"> <li>• ability to read and critically appraise the literature</li> </ul>	<ul style="list-style-type: none"> <li>• must have developed sufficient verbal and written communication skills, data handling ability, and peer-group relationships to present with confidence results of research for critical appraisal by colleagues and reviewers</li> <li>• must be able to evaluate whether research/R&amp;D proposals are likely to advance existing knowledge and/or practice</li> <li>• must have acquired the ability to critically appraise published research on a biomedical topic or clinical problem in microbiology and to assess the importance and feasibility of investigating it further</li> <li>• must be able to identify a meaningful hypothesis or answerable question about the topic or problem, to formulate indications for research aims and objectives by which a plan of investigation may be designed, monitored and appraised</li> <li>• must understand the skills needed to effect biomedical research and NHS-related research and development on an microbiological topic or problem</li> </ul>
R&D2	<ul style="list-style-type: none"> <li>• ability to develop the aims and objectives associated with a project</li> </ul>	
R&D3	<ul style="list-style-type: none"> <li>• 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)</li> </ul>	
R&D4	<ul style="list-style-type: none"> <li>• ability to perform the required experimental work ability to produce and present the results (including statistical analysis)</li> </ul>	
R&D5	<ul style="list-style-type: none"> <li>• recognise the value of research and has the ability to critically appraise results in the light of existing knowledge and the hypothesis developed and to formulate further research questions</li> </ul>	
R&D6	<ul style="list-style-type: none"> <li>• ability to present data and provide a critical appraisal to an audience of peers – both spoken and written</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>• knowledge of emerging technologies and their application to a clinical microbiology service, a general understanding of clinical medicine and the effects of infection</li> <li>• ability to conceive, design and execute an individual research project</li> <li>• an ability to write a concise and accurate report of research or development findings</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>• a structured research project within an approved postgraduate degree</li> <li>• self endeavour, through report writing, poster preparation and presentation, and contribution to manuscript preparation</li> <li>• participation in individual research or development and audit projects</li> </ul>	
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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
	<b>5-COMMUNICATION</b>	Be able to communicate in both the written and spoken media to colleagues, peers and patients:
Com1	<ul style="list-style-type: none"> <li>ability to assess a situation and act accordingly when representing the specialty</li> </ul>	<ul style="list-style-type: none"> <li>must be able to communicate personally to colleagues within the discipline, and in other branches of the NHS and allied professions, with clarity of thought, expression, and purpose</li> <li>must be able to communicate effectively and sensitively, avoiding jargon, with a range of people of different national, social or cultural heritage</li> <li>must be able to listen carefully, to check understanding, and to negotiate in difficult issues without triviality or hostility</li> <li>must understand the importance of effective communication with colleagues and be able to function as an effective member of a multidisciplinary team</li> <li>must be able to present scientific, technical, clinical and managerial information effectively, using a range of appropriate media, so as to maximise understanding whilst maintaining economy and essence of time</li> <li>must be able to educate and train colleagues generically and in the specialty, with enthusiasm and responsibility, in a variety of professional settings</li> </ul>
Com2	<ul style="list-style-type: none"> <li>ability to respond to enquiries regarding the service provided when dealing with clinical colleagues</li> </ul>	
Com3	<ul style="list-style-type: none"> <li>ability to communicate with patients, carers and relatives, the public and other healthcare professionals as appropriate</li> </ul>	
Com4	<ul style="list-style-type: none"> <li>ability to communicate the outcome of problem solving and research and development activities</li> </ul>	
Com5	<ul style="list-style-type: none"> <li>evidence of presentation of scientific material at meetings and in the literature</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>ability to communicate clearly and confidently to clinical and other professional colleagues in both formal and informal settings</li> <li>ability to educate others both within and outside clinical microbiology department</li> <li>an understanding of all aspects of information technology pertinent to service provision and support of clinical microbiology laboratory</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>a postgraduate degree, short courses and practical instruction</li> <li>presentations both oral and written within and outside clinical microbiology laboratory</li> <li>participation in local seminars, clinical audit and case presentations</li> <li>self-endeavour</li> </ul>	
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<b>GENERIC COMPETENCES</b>		<b>SPECIFIC COMPETENCES</b>
	<b>6-PROBLEM SOLVING</b>	Be able to deal with the unexpected and thus be able:
PS1	<ul style="list-style-type: none"> <li>to assess a situation</li> </ul>	<ul style="list-style-type: none"> <li>must be able to communicate personally to colleagues within the discipline, and in other branches of the NHS and allied professions, with clarity of thought, expression, and purpose</li> <li>must appreciate that many problems in clinical microbiology are recognised by their timing or unusual association and that problem solving is enhanced by prior experience, training and knowledge</li> <li>must be able to initiate and follow through the timely resolution of an impending or acute problem with confident action, direction and effective communication</li> <li>must recognise and minimise circumstances that are associated with recurrence of a specific or related problem and communicate with others in circumventing this</li> <li>must have a thorough knowledge of all aspects of the service and of guidelines to deal with and anticipate problematic circumstances</li> </ul>
PS2	<ul style="list-style-type: none"> <li>determine the nature and severity of the problem</li> </ul>	
PS3	<ul style="list-style-type: none"> <li>call upon the required knowledge and experience to deal with the problem</li> </ul>	
PS4	<ul style="list-style-type: none"> <li>initiate resolution of the problem</li> </ul>	
PS5	<ul style="list-style-type: none"> <li>demonstrate personal initiative</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>an understanding of the significance of, and interrelationships between, individual items of laboratory data</li> <li>an awareness of the extent of available knowledge in clinical microbiology and an ability to employ appropriate information tools to search for, consolidate and critically examine information</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>an approved postgraduate degree course and/or short courses and seminar programme</li> <li>self endeavour through literature surveys and tutorials with nominated and local supervisors</li> <li>participation in local clinical and laboratory seminars, clinical audit and case presentations</li> </ul>	
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	<b>7-PROFESSIONAL ACCOUNTABILITY</b>	Be able to demonstrate an understanding of management principles and techniques, including the following:
Prof1	<ul style="list-style-type: none"> <li>Has read, understands and follows the Standards of Proficiency for Clinical Scientists and published by the Health Professions Council</li> </ul>	<ul style="list-style-type: none"> <li>must be able to recognise legal and ethical boundaries of the modality and practice and conduct research and practical routine microbiology within these boundaries</li> <li>must understand the principles of clinical governance and be able to audit, reflect on and review practice</li> <li>must understand the importance of effective communication with colleagues and be able to function as an effective member of a multidisciplinary team</li> <li>must understand the need for and basic requirements of accreditation schemes appropriate to the modality of clinical microbiology</li> <li>must have acquired a basic understanding of the structure and organization of the department, and relevant financial aspects</li> <li>must have acquired a basic knowledge of health and safety requirements appropriate to the discipline</li> <li>must be able to recognise the limits of his/her knowledge and skills</li> <li>must participate in an appropriate Continuing Professional Development (CPD) scheme (after completion of training)</li> <li>must understand the principles of appraisal and be able to supervise staff in his/her area of responsibility</li> </ul>
Prof2	<ul style="list-style-type: none"> <li>To be personally responsible for and must be able to justify their decisions</li> </ul>	
Prof3	<ul style="list-style-type: none"> <li>Understanding of the legal and ethical requirements of the modality, and the ethical aspects of scientific research.</li> </ul>	
Prof4	<ul style="list-style-type: none"> <li>Understands the need to practice safely and effectively within their abilities and can recognise the limits of personal practice and identify when to seek advice.</li> </ul>	
Prof5	<ul style="list-style-type: none"> <li>Ability to manage personal workload and prioritize tasks appropriately.</li> </ul>	
Prof6	<ul style="list-style-type: none"> <li>Can demonstrate competence in the principles of clinical governance including clinical audit, accreditation requirements relevant to the modality. This will include the importance of equality and diversity, confidentiality, informed consent and data security</li> </ul>	
Prof7	<ul style="list-style-type: none"> <li>Ability to contribute effectively to work undertaken as part of a multi-disciplinary team</li> </ul>	
Prof8	<ul style="list-style-type: none"> <li>Ability to supervise others as appropriate to area of practice. Understanding of the role of appraisal in staff management and development.</li> </ul>	
Prof9	<ul style="list-style-type: none"> <li>Understanding of the need and obligation for career-long self-directed learning and the importance of continuing professional development.</li> </ul>	
Prof10	<ul style="list-style-type: none"> <li>Understanding of the need for, and ability to establish and maintain, a safe practice environment. Understanding of the requirements and obligations of Health and Safety including infection control</li> </ul>	

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Prof11	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	
<i>Achievement of:</i>	<ul style="list-style-type: none"> <li>• an understanding of the management principles and tools used in the service</li> <li>• the ability to act as a professional and work effectively as part of a team</li> <li>• understanding of the importance and principles of accreditation, audit, confidentiality, data security and safe working practice</li> </ul>	
<i>Achieved through:</i>	<ul style="list-style-type: none"> <li>• 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</li> <li>• participation in local seminars and meetings, attendance at clinical audit meetings and clinical governance committees.</li> <li>• attendance at departmental management meetings</li> <li>• involvement, under supervision, in management within the laboratory</li> <li>• mentoring by an experienced practitioner</li> </ul>	
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