IBMS Certificate of Competence by Equivalence (Biomedical Scientist)

MODULE INFORMATION 2023-2024

Version 1.0

1. Introduction

1.1 The IBMS Certificate of Competence by Equivalence (Biomedical Scientist) programme is intended for individuals who already hold a minimum of a BSc (Hons) degree or equivalent and already have extensive professional experience *at a level commensurate with a registered biomedical scientist.*

1.2 This route assesses the candidate's knowledge, understanding and practice against the Health and Care Professions (HCPC) standards of proficiency (SOPs) for biomedical scientists (2022), implemented from 1st September 2023. Experiential learning is recognised for its contribution to the academic knowledge and specific training required to meet these standards.

1.3 As the HCPC standards of proficiency apply to an individual's scope of practice, assessment against the standards is contextualised by the role the individual undertakes in the laboratory. Some standards will therefore need to be interpreted according to the applicant's specific role and others should evidence knowledge and understanding of the wider biomedical science disciplines.

1.4 Candidates are required to provide evidence to demonstrate they meet ALL the HCPC standards of proficiency in the evidence that supports their equivalence portfolio. Each piece of evidence should demonstrate several HCPC standards.. *It is recommended that the candidate clearly states which HCPC SoPs are being demonstrated by each piece of evidence.*

1.5 It is essential that applicants read this Module Information guide to decide whether or not they can provide evidence that they meet the HCPC standards of proficiency using previous and current practice and identify where further work is required.

1.6 Applicants for the IBMS Certificate of Competence by Equivalence (Biomedical Scientist) programme are required to submit a Portfolio Development Plan as part of their application. To complete the portfolio the applicant needs to demonstrate clearly how they meet the biomedical science profession specific knowledge, understanding and skills. The evidence provided be set out in the order of the modules and sections detailed in this guidance document and the Programme Handbook.

2. Core Areas of Practice for a Biomedical Scientist that should be Evidenced

2.1 Professional practice

Professional practice must meet the standards of conduct, performance and ethics defined by the professional body (the IBMS) and the regulator (HCPC). Practitioners must be safe, lawful and effective, and work within their scope of practice for the role undertaken, while maintaining fitness to practice.

Personal qualities must encompass communication skills, self-management, self-awareness, acting with integrity, the ability to take responsibility for self-directed learning, maintaining their own health and wellbeing, critical reflection and action planning to maintain and improve performance.

Applicants must demonstrate the ability to be an independent, self-directed learner acting autonomously in a non-discriminatory manner when planning and implementing tasks at a professional level, contributing to the education and training of colleagues and providing mentoring, supervision and support as appropriate.

Applicants must demonstrate the ability to work, where appropriate, in partnership with other professionals, often as part of a multidisciplinary team, supporting staff, service users and their relatives and carers, while maintaining confidentiality. Similarly, they must demonstrate the ability to work with the public, service users, patients and their carers as partners in their care, embracing and valuing diversity.

2.2 Scientific and Technical Practice

Applicants will need to demonstrate a broad basic understanding of how cells, organs and systems function in the human body in health and disease, the common causes and effects of disease, the body's defence mechanisms and approaches to treatment. These form the foundation for the more in-depth and advanced knowledge within the biomedical sciences. Applicants must demonstrate integrated knowledge and understanding of laboratory investigations of patient samples for diagnosis, monitoring a treatment of disease across the wider biomedical science disciplines.

2.3 Research and development

Applicants must be able to demonstrate an understanding of their area of practice and the ability to analyse, evaluate and critique current research methods and innovative technology. They must be able to recognise the strengths, weaknesses and opportunities for further development of healthcare that can lead to improvements in patient experience, clinical outcomes and scientific practice.

3. Application of Subject Specific Knowledge and Skills

The QAA Subject Benchmark Statement for Biomedical Science and Biomedical Sciences (2023), identifies principal areas of practice for a biomedical scientist that are underpinned by basic knowledge and detailed knowledge and understanding of specified clinical specialisms.

Applicants for the equivalence route will be required to evidence their knowledge, understanding of the clinical pathology disciplines as summarised in Table 1 plus their ability to demonstrate the HCPC Standards of proficiency in their portfolio.

3.1 **Approaches to study and the subject knowledge covered by the candidate's completed BSc (Hons) degree courses include:**

- interdisciplinary and, where appropriate, multidisciplinary approach in advancing knowledge and understanding of the processes and mechanisms of life, from the molecular and cellular levels through to the whole body and the environment in which a person lives
- engagement with the essential facts, major concepts, principles and theories associated with the chosen subject
- competence in the basic experimental and/or technical skills appropriate to the subject under study; relevant knowledge and understanding of a range of methodologies for data analysis, including the application of appropriate statistical methods and other analytical tools
- understanding of information from a variety of sources such as texts, published journal articles, reports and clinical data within the context of biomedical sciences; familiarity with methods of acquiring, interpreting and analysing information with a critical understanding of its use and limitations
- familiarity with relevant terminology and classification systems
- awareness of the contribution of the subject area to the development of knowledge about the complexity of human health and disease
- competence in the use of a range of appropriate communication platforms, both digital and physical, for the effective dissemination of information to scientific and lay audiences
- engagement with current developments in the subject area and awareness of their contribution to debate and controversies; their applications to the quality and sustainability of health and well-being; the philosophical and ethical issues involved and awareness of intellectual property (IP) and how scientific advances can be secured and progressed by the application of intellectual property rights (IPRs)
- appreciation and enactment of the applicability of the subject-specific and transferable skills and knowledge of graduates to a wide variety of career paths and further study opportunities both within and beyond the life sciences.

3.2 **Graduate attributes will include, but are not limited to:**

• an appreciation of the complexity and diversity of human processes in health and disease

• the ability to read and evaluate appropriate literature with a full and critical understanding, including the context, aims, objectives, experimental design, methodology, data interpretation and application of the study

• the capacity to give a clear, current and accurate account of their subject area, the ability to critically discuss and debate both with specialists and non-specialists, using appropriate scientific language

• critical and analytical skills, including a recognition that statements and hypotheses should be tested, and that evidence is subject to assessment and critical evaluation

• the ability to successfully apply a variety of methods of study in investigating, recording and analysing material

• the ability to think independently, work autonomously and solve problems

• an understanding of how to identify, protect and exploit intellectual property (IP) as part of the scientific innovation process

• an appreciation of the global reach of the subject area, the impact on human life and the environment and the ethical considerations implicit in their application.

3.3 **Biomedical science profession specific knowledge, understanding and skills**

Candidates completing the IBMS Certificate of Competence by Equivalence (Biomedical Scientist) will be expected to demonstrate they have good knowledge and understanding of the subject areas summarised in Table 1.

Table1. Biomedical Science Profession Specific Subjects, Indicative Topics and Learning Outcomes (taken from the QAA Subject Benchmark Statement 2023)

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
Human Anatomy and Physiology refers to the structure, function and control of the human body, its component parts and major systems.	Structure, tissue types and organisation of principal body systems. Digestive system: gastrointestinal tract and accessory organs, digestive processes. Cardiovascular system: heart and vessels, conduction system, cardiac cycle, homeostasis control, lymphatic vessels and tissues. Respiratory system: respiration and its control, gas exchange and transport. Urinary system: physiological role, regulation and control. Reproductive system: Male and female reproductive tract, control of reproductive functions. Sensory system: Receptors, pain, vision, hearing, equilibrium, taste, smell. Central and peripheral nervous system. Endocrine system: endocrine glands, hormonal mechanisms of action, physiological role of pituitary, pineal, thyroid, parathyroid, adrenal, pancreas and sex hormones. Muscular system, muscle contraction. Integumentary system: skin, accessory organs. Skeletal system: bone, joints, ligaments.	• Demonstrate a sufficient knowledge of the structure and function of the cardiovascular, endocrine, gastrointestinal, nervous, renal, reproduction, neurological, respiratory and skeletal systems of the human body. • Describe clearly the control of the functioning of the component parts of the above systems. • Have knowledge of basic human anatomy and physiology sufficient to underpin studies in the clinical laboratory specialties.

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
Cell Biology is the study of the structure and function of cells (and the organelles they contain) and includes their life cycle, division, self-replication and eventual death.	Basic structure and function of prokaryotic and eukaryotic cells; membrane structure and support systems, structure and function of the nucleus, ribosomes, endoplasmic reticulum, Golgi body, lysosomes, mitochondria. Stem cells, cell cycle and cell division. Mitosis and meiosis. Cell specialisation.	• Have a knowledge and understanding of prokaryote and eukaryote cell structure and function (including organelles) and how cells respond to stress and injury. • Have some knowledge and understanding of cell structure and function at the molecular level, and have some appreciation of the interplay of complex molecular events that help to maintain cell homeostasis.
Biochemistry is the study of chemical processes that support life. It requires knowledge of key chemical principles which are relevant to biological systems and includes the structure and function of biological molecules and cellular metabolism and its control.	Biomolecules: lipids, carbohydrates, proteins, nucleic acids and their structures, properties and function within living organisms. Role of enzymes in catalysis, enzyme deficiency, bioenergetics, catabolism and anabolism. Carbohydrate metabolism: glycolysis, anaerobic and aerobic metabolism, citric acid cycle. Glucogenesis, glycogenolysis, glycogen synthesis. Mechanics of control of carbohydrate metabolism. Lipid metabolism: dietary lipids, catabolism of triacylglycerols and fatty acids. Biosynthesis of fatty acids. Control of fatty acid metabolism. Cholesterol synthesis. Lipoprotein metabolism. Protein metabolism: protein turnover, hydrolysis of proteins, degradation of amino acids, urea cycle. Integration of metabolic pathways and their regulation.	• Relate the structure and function of carbohydrates, lipids, nucleic acids and proteins to the chemical properties of their building materials. • Describe metabolic pathways as interconnected sequences of coupled enzyme-catalysed reactions and interrelate catabolism and anabolism. • Explain the synthesis of storage forms of fuel molecules and their degradation to provide usable energy through metabolic processes. Describe intracellular and extracellular strategies to regulate cellular metabolism.

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
Genetics is the study of the structure and function of genes (including their role in human disease) and inheritance.	Mendel's laws of inheritance, genotype, phenotype, dominance, sex-linked variation, Genetic inheritance patterns, autosomal and sex-linked genes. Blood group inheritance, population genetics, cytogenetics, chromosomal abnormalities. Genomes, nuclear DNA, mitochondrial DNA. Gene expression, gene structure and regulation in prokaryotes and eukaryotes.	• Understand the main principles of gene expression.
Molecular Biology is that branch of biology that deals with the manipulation of nucleic acids (deoxyribonucleic acid (DNA) and ribonucleic acid (RNA)) so that genes can be isolated, sequenced or mutated. It covers methods that allow the insertion of new genes into the genome or the deletion of genes from the genome of an organism. It allows the effects of genes and genetic factors to be investigated in health and disease.	Molecular biology overlaps with biochemistry, genetics and cell biology. Bioinformatics and systems biology: the computation of high volumes of biological data and the properties of a network of interacting components in a system, as well as the components themselves, including an appreciation of the algorithms to decipher biological relationships.	• Understand how the principles of genetics underlie modern molecular biology.
Immunology is the study of components of the immune system, their structure, function and mechanisms of action. It includes innate and acquired immunity.	Organisation and components of the human immune system; Structure, function and mechanisms of action. Innate and acquired immunity including acute and chronic inflammation, phagocytosis, complement and wound healing Memory and specificity, antigens and antibodies, molecular immunology.	• Have knowledge and understanding of innate and acquired immunity.

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
Microbiology is the study of the structure, physiology, biochemistry, classification and control of micro-organisms, including the role of normal flora.	History and scope of microbiology. Microbial taxonomy, diversity, structure and function. Eukaryotic microbes: fungi, protists, helminths etc. Prokayotic and eukaryotic viruses Microbial growth and its control. Bacterial genetics, pathogenesis and virulence Aseptic techniques, destruction of microbes (disinfection, sterilisation), antimicrobial agents. Human microflora. Enumeration, isolation and identification of microorganisms.	• Have knowledge of important morphological features of the major classes of microorganisms and be able to handle, culture and observe microorganisms in a safe and aseptic manner.
Cellular Pathology is the microscopic examination of normal and abnormal cells (cytopathology), and tissues (histopathology) for indicators of disease. It requires knowledge of: • the preparation of cells and tissues for microscopic examination; • microscopy and its applications; • the gross structure and ultrastructure of normal cells and tissues and the structural changes which may occur during disease; • the principles and applications of visualisation and imaging techniques.	Microscopic examination of normal and abnormal cells (cytopathology), and tissues (histopathology). Gross structure and ultrastructure of normal cells and tissues and the structural changes which may occur during disease. Reproductive science, including infertility and embryology. Preparation of cells and tissues for microscopic examination, including fixation, dehydration, impregnation and embedding. Tissue sectioning (microtomy), basic staining techniques and visualisation techniques including molecular cytological and immunochemistry techniques. Principles and application of microscopy for diagnosis of disease.	• Describe the microscopic appearance of normal and abnormal cells and tissues. • Describe the changes cells and tissues undergo when removed from the body, the principles of fixation, methods for the preparation of cells and tissues (including cytological and frozen material), decalcification and embedding techniques. • Describe the principles and practice of microtomy, and of section mounting. • Describe the principles of simple routine staining procedures and demonstrate practical ability in their application. • Describe the principles and practice of light, fluorescent and electron microscopy and understand their role in the diagnosis of disease.

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
Clinical Biochemistry is the evaluation of analytes to aid the screening, diagnosis and monitoring of disease. It requires knowledge of: • principles and applications of routine methods used in clinical biochemistry; • the investigation of the function and dysfunction of organs and systems and of the biochemical changes in disease; • the principles of the biochemical investigations used in the diagnosis, treatment and monitoring of disease; • therapeutic drug monitoring and investigation of substance abuse.	Use of clinical biochemistry in the laboratory investigation of the function and dysfunction of systems, organs and tissues by the measurement of biochemical markers. Interpretation of clinical data. Sample selection, quality assurance, near patient testing, manual and automated methods of investigation of disorders of: Plasma lipids and lipoproteins; Carbohydrate metabolism e.g. diabetes, inherited metabolic disorders; Liver disorders, liver function tests; biochemistry of liver diseases; Renal function tests, assessment of renal failure, sodium/potassium measurement; Gastrointestinal tract disorders, digestion and disorders of absorption, pancreatic disease. Disorders of calcium, phosphate and magnesium metabolism. Role of plasma proteins, plasma protein abnormalities, immunoglobulins, tumour markers; Clinical enzymology, measurement of plasma enzymes in diagnosis; Endocrinology (clinical biochemistry abnormalities of thyroid, adrenal, hypothalamus, pituitary, gonads; Clinical biochemistry measurements in nutrition, investigation of vitamin/trace elements deficiencies; Clinical biochemistry of pregnancy and lactation, pregnancy tests, prenatal diagnosis of birth defects, postnatal screening test. Inborn errors of metabolism and hereditary diseases (phenylketonuria, glycogen storage disease, cystic	• Have a knowledge and understanding of the biochemical responses that may occur in a range diseases states. • Have an appreciation of how biochemical changes associated with disease are assessed in the clinical laboratory and how information about such changes is applied to the diagnosis and monitoring of disease.

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
	fibrosis, genetic and biochemical basis of inherited disease, mass screening; Therapeutic drug monitoring (TDM), drugs of abuse and toxicology.	
Clinical Genetics is the identification of genetic mutations and polymorphisms and their influence on disease processes. It requires knowledge of: the principles of the methods used to study human chromosomes and DNA • Epigenetics; • the identification of genes for Mendelian diseases; • testing and screening for genetic susceptibility.	Principles and application of DNA sequencing, DMA microarrays relevance to targeted gene expression and function analysis in health and disease; Genomic, transcriptomic and proteomic methods used to analyse and study human chromosomes and DNA; Application of molecular biology and bioinformatics in medicine; Pharmacogenetics and personalised (stratified) medicine; Phenotypic changes in gene expression (epigenetics) in health and disease; Genetic testing and associated ethical issues.	• Understand the rationale behind the human genome project. • Explain how mutations in DNA can give rise to the pathological changes seen in some diseases and how these mutations may be inherited.

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
Clinical Immunology is the study of immunopathological conditions and abnormal immune function. It requires knowledge of: • the principles of the function and measurement of effectors of the immune response; • the causes and consequences of abnormal immune function, neoplastic diseases and transplantation reactions together with their detection, diagnosis, treatment and monitoring; • immunological techniques used in clinical and research laboratories; • prophylaxis and immunotherapy.	Techniques used in the laboratory investigation of immunopathological conditions and abnormal immune function (immunoassays, haemagglutination, ELISA, tissue typing, functional assays) Lymphocyte activation, control and measurement of soluble immunoregulators (cytokines, interleukins, chemokines). Investigation of immune dysfunction: hypersensitivity, non-organ and organ specific autoimmunity (MHC, rheumatoid, thyroid, coeliac, pernicious anaemia, diabetes), immunodeficiency: complement, primary (T, B and NK cell, secondary (HIV). Transplantation, rejection, solid organs, bone marrow; Cancer: tumour antigens, immunosurveillance, evasion; Defence against infection, immunotherapy, prophylaxis.	• Have a knowledge and understanding of the causes and consequences of diseases associated with abnormal immune function, neoplastic diseases of the immune system and transplantation reactions. • Have an appreciation of how diseases associated with abnormal immune function, neoplastic diseases of the immune system and transplantation reactions are diagnosed, treated, and maintained.
Haematology is the study and investigation of the different elements that constitute blood in normal and diseased states. It requires knowledge of:	Study and laboratory investigation of the different elements that constitute blood in normal and diseased states, manual and automated methods of investigations: cell identification and counting, haemoglobin variants, coagulation tests. Blood cell formation, haemopoiesis; Red cell metabolism, disorders of red cells;	• Have a knowledge and understanding of diseases of haematopoiesis and haemostasis, and of the anaemias and leukaemias. • Explain the biochemical basis of the human ABO blood group system.

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
• the structure, function and production of blood cells; • the regulation of normal haemostasis • the nature and diagnosis of anaemias; haemoglobinopathies and thalassaemias; haematological malignancy; and thrombotic diseases.	Haemoglobin biosynthesis, function, nature and diagnosis of anaemias, haemoglobinopathies, thalassaemias; Haemostasis, platelet structure and function, coagulation, fibrinolysis, thrombosis, coagulation therapy; Leucocyte structure and function, haematological malignancies, classification and treatment;	
Transfusion Science is the identification of blood group antigens and antibodies, which ensures a safe supply of blood and blood components. It requires knowledge of: • the genetics, inheritance, structure and role of red cell antigens; • the preparation, storage and use of blood components; • the selection of appropriate blood components for transfusion and possible adverse effects;	• Appreciate the selection, preparation, storage and safe provision of appropriate blood components. • Be aware of the possible adverse effects associated with the use of blood and blood products. • Have knowledge of the role of histocompatibility antigens in transplantation. • Demonstrate knowledge of some diagnostic options where genetic disease is suspected.	Main blood group systems, genetics and inheritance, structure and role of red cell antigens, blood group antibodies; Effective blood bank practice and component preparation/storage/provision; Adverse transfusion reactions, immune mediated destruction of blood cells, haemolytic disease of the newborn.

Profession Specific Subjects	Indicative Topics	Candidates will be expected to:
• immune mediated destruction of blood cells.		
Medical Microbiology is the study and investigation of pathogenic microorganisms. It requires knowledge of: • the pathogenic mechanisms of a range of microorganisms; • the laboratory investigation and the epidemiology of infectious diseases; • food, water and environmental microbiology; • anti-microbial and anti-viral therapy (including drug resistance); • infection control.	Biology of pathogenic micro-organisms. Examples of infectious diseases could be tuberculosis, streptococcal disease, influenza, hospital acquired (nosocomial) infections; Overview of infections: gastrointestinal tract, respiratory tract, sexually transmitted infections, Epidemiology and public health microbiology: water, food and other environmental pathogens, sources of infection, spread of disease, disease control; Normal internal and external flora of the human body; Microbiological hazards and risk assessment; Diagnostic microbiology and virology: collection and preservation of samples, aseptic techniques, enumeration, isolation and identification; Infection control: antifungals, antivirals, and antibacterial antibiotics, antibiotic resistance.	• Understand and carry out quantitative and qualitative methods to enumerate, identify and determine antibiotic sensitivity of microorganisms of medical importance. • Describe selected serological and molecular methods used in the diagnosis of infectious diseases.

3 Module Aims, Curriculum and Learning Outcomes for the IBMS Certificate of Competence by Equivalence (Biomedical Scientist)

The IBMS Certificate of Competence by Equivalence Portfolio has been mapped against the standards of proficiency for biomedical scientists published by the HCPC in 2022 (implemented from 1st September 2023).

Due to the overlapping nature of some standards of proficiency, individual standards have been grouped into modules that relate to specific areas of practice under two sectional headings: **Professional Conduct** and **Professional Skills and Standards**. The purpose of this is to relate the standards to distinct areas of practice and to reduce duplication of evidence.

Professional Conduct
This is core to the principles of fitness to practise and is defined by standards that relate to professional roles and conduct. The relevant modules grouped under Professional Conduct are:

- Module 1: Personal Responsibility and Development
- Module 2: Equality Diversity and Inclusion
- Module 3: Communication
- Module 4: Patient Records and Data Handling
- Module 5: Professional Relationships

Professional Skills and Standards
This is core to the principle of applicants being able to show they have the skills required to practise as a biomedical scientist.

- Module 1: Application of Professional Knowledge
- Module 2: Health and Safety and Wellbeing
- Module 3: Quality
- Module 4: Performing Standard Investigations
- Module 5: Research and Development

The module aims, indicative curriculum and learning outcomes have been identified for each module and are mapped to the HCPC standards of proficiency within the module. The learning outcomes reflect the philosophy, core values, skills and knowledge base that are applied through the areas of knowledge, understanding and skills identified in section 4.

Through the identified learning outcomes, applicants will demonstrate the breadth and depth of their professional practice relevant to the curriculum. Their Certificate of Competence by Equivalence portfolio will evidence how these learning outcomes have been achieved, thus demonstrating that they have met the standards of proficiency for biomedical scientists.

4.1. Section 1: Professional Conduct

Module 1: Personal Responsibility and Development

Aims

To demonstrate a detailed knowledge and experience base for the candidate's own professional behaviour and awareness of its impact on others. This includes the level of autonomy that comes with responsibility for completing tasks and procedures, for using judgment within broad parameters and being able to reflect on this and other learning opportunities to inform self-development as a biomedical scientist.

The HCPC standards of performance, conduct and ethics and the Institute of Biomedical Science 'Code of Conduct' and 'Guide to Good Professional Practice' should be used as reference points, together with other relevant organisational and national/international standards.

As a registered biomedical scientist, you must be able to recognise the responsibilities you have for your own professional behaviour and its impact on others. You must be able to work safely and effectively within your scope of practice and personal competence, recognising that these will change and evolve as you develop your professional expertise. You should also demonstrate your engagement in continuous professional development (CPD) to maintain and develop your own knowledge, understanding and skills and to ensure an up to date, high quality service for patients.

Indicative Curriculum

- Role of HCPC, IBMS and regulatory/professional standards
- Role of the biomedical scientist and relationship to other professionals
- Self-management, timekeeping, turnaround times
- The role of appraisal in staff management and development
- Training, lifelong learning and continuing professional development

Learning Outcomes

By successfully completing this module, the candidate will be able to:

- Demonstrate transferable skills required for effective practice, including high standards of personal and professional conduct, personal responsibility, justifying their decisions and actions, and exercising appropriate personal initiative.
- Understand what is required of them by the Health and Care Professions Council, including their ability to apply legislation, policies and guidance relevant to biomedical scientists within their scope of practice.
- Justify the importance of continuing professional development throughout their career; be able to identify the limits of their practice and know when to seek advice.

Module 2: Equality Diversity and Inclusion

Aims

To demonstrate a detailed knowledge and experience base with respect to developing and maintaining an equality culture that recognises the diversity of people and their rights and responsibilities.

Indicative Curriculum

Completion of this module requires you to demonstrate a good understanding of equality legislation and apply it to your practice. This includes the Equality Act 2010 that defines protected characteristics as age, disability, gender reassignment, race, religion or belief, sex, sexual orientation, marriage and civil partnership and pregnancy and maternity. Equivalent equality legislation in Northern Ireland protects age, disability, gender, race, religion or belief and sexual orientation.

You will demonstrate that you recognise the potential impact of your own values, beliefs and personal biases (which may be unconscious) on your practice. You will evidence how you take personal action to ensure all service users and carers are treated with appropriate dignity and respect. You will demonstrate that you consider equality, diversity and inclusion in your application of all HCPC standards, across all areas of your practice.

Learning outcomes:

By successfully completing this module, the candidate will be able to:

- Apply equality legislation to their practice and understand how their own values, beliefs and personal biases (which may be unconscious) could impact on their practice.
- Acknowledge the rights, dignity and values of others and actively challenge barriers to inclusion in their practice.
- Take personal action to ensure colleagues, service users and carers are treated appropriately with respect and dignity.

Module 3: Communication

To complete this module, you must be able to demonstrate that you communicate information professionally, clearly and effectively, within your scope of practice. You will evidence how you ensure both you and the colleagues you communicated with accurately record and understand the information, and that it is acted upon appropriately. You will also demonstrate how you use effective verbal and non-verbal skills to communicate with service users, carers, colleagues and others. You will evidence your ability to listen carefully to patients, carers and other healthcare professionals, to ensure you understand their requirements.

You will demonstrate that you have the appropriate English language proficiency and communication skills for service delivery and patient care in the UK (equivalent to level 7 of the International English Language Testing System, with no element below 6.5).

You will also demonstrate how you effectively use information, communication and digital technologies appropriate to your practice to keep accurate records, ensuring you comply with local and/or legal requirements.

Applicants who do not have English as their first language and do not have a UK degree, are required to provide evidence of English language skills with a minimum International Language Testing System (IELTS) score of 7.0 with no element less than 6.5, or a Test of English as a Foreign Language (TTOEFL) Internet Based Test with a minimum score of 100/120. (HCPC SoP 7.2)

Indicative Curriculum
Principles of verbal and non-verbal communication.
Biomedical and medical language and terminology.
Factors that influence type and detail of advice to routine requests for information.
Application of a variety of communication methods and approaches to facilitate and promote effective communication.

Learning outcomes:
By successfully completing this module, the candidate will be able to:

- Communicate the outcomes of clinical laboratory investigations accurately and reliably to service users, carers, colleagues and others.
- Use information, communication and digital technologies competently in their practice.
- Demonstrate an ability to adapt their communication methods to ensure clear communication with a variety of audiences.

Module 4: Patient Records and Data Handling

Aims
To demonstrate a detailed knowledge and experience base to follow and initiate correct procedures for recording, sharing, storing and accessing information in the laboratory with respect to the role of a biomedical scientist.

To complete this module, you must be able to demonstrate that you have the knowledge and skills needed to follow correct procedures for recording, sharing, storing and accessing information in the laboratory, with respect to your role as a biomedical scientist. You must maintain patient confidentiality and only communicate

personal/clinical information to appropriate healthcare professionals. You must demonstrate your ability to maintain the confidentiality of patients, employer, and service users with an understanding that disclosure can be permitted if it is by law and justified in the patient's interest. You must also demonstrate your understanding of your local policies, national guidelines and current legislation, including the legislation concerning storage and use of individual identifiable data (General Data Protection Regulations, 2018 (GDPR)) and any subsequent legislation.

Indicative Curriculum

Information governance, data security.
Legislation, protocols and guidance for managing records.
Confidentiality.
Information management systems, application of information technology in pathology services, error logging.
Patient identification, sample receipt and handling.

Learning outcomes

By successfully completing this module, the candidate will be able to:

- Maintain confidentiality and comply with data governance requirements
- Manage and keep clear, accurate and detailed records in accordance with applicable legislation, protocols and guidelines.
- Adhere to specimen identification protocols, use systems for the accurate and correct identification of laboratory specimens and recognise the importance of backup storage of electronic data.

Module 5: Professional Relationships

Aims

To demonstrate an understanding and experience base to contribute effectively to work undertaken as a biomedical scientist as part of a laboratory team and with service users.

To complete this module, you must demonstrate how you create and sustain work relationships in the context of the role of a biomedical scientist to achieve the best results for service users. You will demonstrate how you work effectively in partnership and cooperation with service users, carers, colleagues and others, for the benefit of the patient and service. You will demonstrate your understanding of the principles and practices of other health and care professionals and systems and how they interact with your profession.

You will also demonstrate your understanding of the need to build and sustain professional relationships, as both an autonomous practitioner, and collaboratively as a member of a team. You should evidence your contribution to multi-disciplinary and/or multi-professional teams. You will evidence that you recognise that leadership is a skill that all professionals can demonstrate and demonstrate your own leadership behaviours, appropriate to your practice, for example acting as a role model for others.

Indicative Curriculum
Role of a biomedical scientist.
Principles of team working.
Recognising and valuing the contributions of other team members and different points of view.
Working effectively with others and develop productive working relationships across professions.

Learning outcomes
By successfully completing this module, the candidate will be able to:

- Build and sustain professional relationships that enable autonomous and collaborative working, using a range of personal transferable skills.
- Actively participate in training that supports high standards of practice, professional conduct and positive interpersonal relationships.
- Recognise the qualities, behaviours and benefits of effective leadership and demonstrate leadership behaviours appropriate to their practice.

4.2. Section Two: Professional Practice

Module 1: Professional Knowledge
Aims
To demonstrate a broad basic understanding of how cells, organs and systems function in the human body in health and disease, the common causes and effects of disease, the body's defence mechanisms and approaches to treatment. These form the foundation for the more in-depth and advanced knowledge within biomedical science in which a systematic understanding and application of relevant knowledge to laboratory investigation of patient samples for diagnosis, monitoring and treatment of disease is demonstrated.

To complete this module, you must demonstrate your detailed and relevant subject knowledge of biomedical science that underpins the skills needed to perform a range of core laboratory investigations. You will evidence how you integrate your

academic knowledge of the key clinical disciplines with your understanding of the study, investigation, diagnosis and monitoring of human health and disease, plus the therapeutic strategies available. You are encouraged to use case studies, plus data analysis and evaluation in this module to demonstrate how you apply your knowledge to laboratory-based investigations and patient outcomes.

Indicative Curriculum

Human anatomy and physiology.
Cell biology.
Biochemistry.
Microbiology.
Immunology.
Genetics, molecular biology and bioinformatics.
Principles of scientific laboratory investigation and the use of quantitative and qualitative methodologies in the diagnosis, screening and monitoring of health and disorders.
Principles of automated instrumentation and analysers in a pathology laboratory.
Role of a pathology laboratory in the assessment, diagnosis and treatment of human disease and the application of laboratory techniques in the following disciplines:

- Cellular pathology.
- Clinical biochemistry
- Clinical immunology
- Haematology
- Transfusion science
- Clinical genetics
- Medical microbiology

Learning Outcomes

By successfully completing this module, the candidate will be able to:

- Understand in detail, the role of clinical specialisms in the diagnosis, treatment and management of disease: cellular science, blood science, infection science, molecular and genetic science and reproductive science.
- Apply their knowledge of the scientific principles underpinning clinical laboratory investigations used to investigate human diseases, disorders and dysfunction.
- Clearly articulate the causes of named disorders, including the molecular, cellular and / or genetic changes associated with disease progression.

Module 2: Health and Safety and Wellbeing

Aims

To ensure an understanding and experience base to work safely in accordance with national legislation and organisational policies for health and safety and wellbeing.

To complete this module, you must demonstrate how you take responsibility for yourself and others, in accordance with national legislation and organisational policies for health and safety. You will also evidence your contribution to the evaluation and improvement of relevant health and safety procedures. This might include being able to guide others in the correct use of health and safety signage, personal protective equipment, the correct handling of specimens and hazardous chemicals, and being able to deal with incidents. Your evidence should demonstrate your understanding of the need to maintain the safety of yourself and others, including service users, carers and colleagues.

You will also demonstrate how you look after your own health and wellbeing and seek appropriate support where necessary. This should include evidence of how you develop and adopt clear strategies for physical and mental self-care and self-awareness, which allow you to maintain a high standard of professional effectiveness and safe working environment.

Indicative Curriculum

Requirements and obligations of Health and Safety, including infection control.
Health and safety legislation/policies at local and national level applicable to the specialism, immunisation requirements.
Procedures for risk assessments, dealing with hazards or potential risks when handling of samples.
Correct use of personal protective equipment and safety cabinets.
Principles and applications of disinfectants, sterilization and decontamination methods, dealing with waste and spillages.

Learning outcomes

By successfully completing this module, the candidate will be able to:

- Identify hazards and mitigate risks by complying with local operational procedures, policies and relevant health and safety legislation.
- Establish safe environments for practice and apply principles of good laboratory practice to maintain the safety of themself and others.
- Recognise the potential impact of their own mental and physical health on their ability to practise safely and effectively, including how to seek help and support when necessary.

Module 3: Quality

Aims

To ensure an understanding and experience base for the application of internal and external quality control and assessment procedures, audit and performance criteria relevant to evaluating the provision and reproducibility of the laboratory testing service.

To complete this module, you must demonstrate how and why you select and apply relevant quality control (QC) procedures. You must evidence how you work with accuracy and precision to maintain effective quality management / quality assurance (QA) processes and work towards continual improvement.

You should demonstrate how you perform calibration and quality control checks. You should also evidence that you are able to monitor the quality of your work, know what to do if it deviates from performance standards and how to verify that results are within acceptance limits. You must demonstrate that you follow procedures to address QC failures and participate in QC/QA performance reviews and resolve non-compliance issues, appropriate to your scope of practice.

Indicative Curriculum

Specificity, sensitivity and linearity and the significance of reference ranges and reference materials.

Principles of standardisation, calibration, and quality control and causes of abnormal outcomes.

Principles of quality assurance as part of quality management systems, including national programmes, case conferences and quality review programmes.

Different types of audit (e.g. horizontal, vertical and clinical audit).

Quality assurance of near-patient testing and non-invasive techniques used in diagnostic pathology.

Learning outcomes

By successfully completing this module, the candidate will be able to:

- Recognise the value of quality control, quality assurance and clinical governance to ensure continual improvement.
- Identify and respond appropriately to abnormal outcomes from quality indicators.
- Accurately and precisely perform calibration and quality control checks appropriate to their role.

Module 4: Performing Standard Tests

Aims

To ensure an understanding and experience base for performing analytical techniques and procedures in common use in an area of biomedical science at a standard that produces consistently valid results.

To complete this module, you must demonstrate how you work safely and effectively within your scope of practice and personal competence, recognising that these will change and evolve as you develop your professional expertise. You must demonstrate competence in your application and utilisation of all samples, clinical specimens, equipment and reagents required to competently perform a range of core laboratory investigations. You must evidence that you follow standard operating procedures to the required quality standard.

The standard investigations evidenced in this module should be focussed on routine laboratory work and standard operating procedures that are applicable to the scope of practice of a newly registered biomedical scientist in one or more disciplines.

Indicative Curriculum

Principles and application of common procedures/investigations/techniques used in biomedical science including: specimen identification and processing, effect of storage, safe retrieval and confirmation of suitability for intended analytical method.
Selection of appropriate diagnostic tests for individual patients, interpretation of results and causes on non-analytical errors.
Limitations of standards tests and options for further associated tests.
Troubleshooting problems that might arise during the routine application of techniques.
Use of quality control and quality assurance, including remedial action when performance deteriorates.

Learning Outcomes

By successfully completing this module, the candidate will be able to:

- Apply their knowledge and understanding of standard laboratory investigations to select, review and appraise appropriate techniques.
- Prepare, process, analyse and interpret clinical laboratory data and present the data in a suitable format.
- Conform with standard operating procedures when working with specific laboratory equipment and demonstrate relevant practical skills.

Module 5: Research and Development

Aims

To ensure an understanding and practical experience base for the role of research and development methodologies and recognise the strengths, weaknesses and opportunities for further development of healthcare and biomedical science.

To complete this module, you must demonstrate your knowledge and understanding of the complexity and diversity of human processes in health and disease. By applying a professional, evidence-based approach, you will demonstrate your ability to think independently, work autonomously and solve problems. You will evidence your acquisition of coherent and detailed knowledge through the creation and completion of an evidence-based research project.

You will successfully apply a variety of methods to study, investigate, record and analyse material. You will also evidence your ability to manage autonomous learning and use scholarly reviews and primary sources (including published journal articles and clinical guidelines) to devise and inform your research hypothesis. You will demonstrate your ability to design and carry out experiments, analyse data, present findings and critically evaluate results. These important research skills and attributes form the basis for statutory regulation as a biomedical scientist.

Indicative Curriculum

Ethics approval processes and research governance (e.g. Human Tissue Act).
Key statistical concepts and methods typically used in research.
Intellectual property issues and copyright.
Critical evaluations of scientific literature and writing up a literature review.
Presenting quantitative and qualitative data, publishing and communicating research results.

Learning outcomes

By successfully completing this module, the candidate will be able to:

- Analyse qualitative and quantitative data and demonstrate a logical and systematic approach to problem solving.
- Critically evaluate research articles and other evidence to inform their own practice.
- Use current research in their discipline to generate hypotheses, design experiments and analyse novel data to develop their knowledge and expertise.

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