IBMS Certificate of Competence by Equivalence (Biomedical Scientist)

CURRICULUM HANDBOOK
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1. Introduction

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

1.2 It differs from the three established programmes in that the assessment against the Health and Care Professions (HCPC) standards of proficiency for biomedical scientists (December 2014) will recognise experiential learning as contributing to the academic knowledge and specific training required to meet these standards.

1.3 All of the HCPC standards must be met. However, as the HCPC standards of proficiency are standards that apply to an individual’s scope of practice, assessment against the standards is contextualised by the role the individual undertakes. 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 The vehicle for demonstrating this is the Registration Equivalence (Biomedical Scientist) Portfolio of evidence. Candidates are required to provide evidence to demonstrate they meet the HCPC standards of proficiency through the learning outcomes identified for the areas of core, generic and profession specific knowledge and skills applicable to regulation of biomedical science practitioners.

1.5 It is essential that applicants read this Curriculum Handbook to decide whether or not they are able to provide evidence they can meet the HCPC standards of proficiency from previous experience or 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. The basis for completing this is to demonstrate how they might meet the biomedical science profession specific knowledge, understanding and skills (section 4) coupled with the Modular Aims, Curriculum, and Learning Outcomes (section 5).
2. Core Areas of Practice for a Biomedical Scientist

2.1 Professional practice

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

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.

Graduates 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.

Graduates 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

Graduates are expected to have 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 (see section 4.2) in which graduates must demonstrate a systematic understanding and application of relevant knowledge to laboratory investigation of patient samples for diagnosis, monitoring a treatment of disease across the wider biomedical science disciplines.

2.3 Research and development

Graduates must demonstrate an understanding of their area of practice sufficient to enable them to critically evaluate and critique current research and innovation methodologies. They must be able to recognise the strengths, weaknesses and
opportunities for further development of healthcare and healthcare science which either directly or indirectly leads to improvements in patient experience, clinical outcomes and scientific practice.
3. Application of Knowledge and Skills to Professional Practice

Based on the QAA Subject Benchmark Statement: Biomedical Sciences (2015), principal areas of practice for a biomedical scientist are underpinned by a range of more generic graduate and transferable skills (section 3.1) together with core biomedical knowledge, understanding and skills (section 3.2) and specific knowledge, understanding and skills (section 3.3).

The integration of knowledge with professional practice and the application of this to the candidate’s scope of practice will be the basis for assessing other elements of competence to practise as a biomedical scientist in the following areas. These have been taken from the QAA Subject Benchmark Statement: Biomedical Sciences (2015) and cross-referenced to the HCPC standards of proficiency for biomedical scientists.

3.1 Generic knowledge, understanding and skills

3.1.1 Intellectual skills

The ability to:

a. Recognise and apply subject-specific theories, paradigms, concepts or principles.

b. Make evidence-based decisions.

c. Obtain and integrate several lines of subject-specific evidence to formulate and test hypotheses.

d. Apply subject knowledge and understanding to address familiar and unfamiliar problems.

e. Recognise the moral and ethical issues of investigations and appreciate the need for ethical standards and professional codes of conduct.

3.1.2 Practical and professional skills

The ability to:

a. Demonstrate competence in the basic experimental skills appropriate to the area of practice.

b. Demonstrate an awareness and knowledge of quality assurance and quality control principles as part of an understanding of the need for quality management systems and a culture of continued quality improvement.

c. Be able to plan an experiment in terms of hypothesis, sample, test or observation, controls, observable outcomes and statistical analysis.

d. Conduct and report on investigations, which may involve primary or secondary data (for example from a survey database).
e. Obtain, record, collate and analyse data using appropriate practical techniques.

f. Undertake practical investigations in a responsible, safe and ethical manner, paying due attention to risk assessment, relevant health and safety regulations, ethical issues, procedures for obtaining ethical permission and informed consent.

3.1.3 Analytical, data interpretation and problem solving skills

The ability to:

a. Receive and respond to a variety of sources of information: textual, numerical, verbal, graphical.

b. Carry out sample selection; record and analyse data in the laboratory or elsewhere.

c. Ensure validity, accuracy, calibration, precision, replicability and highlight uncertainty during collection.

d. Prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programmes for presenting data visually.

e. Demonstrate an understanding of statistical significance and statistical power.

f. Solve problems by a variety of methods, including the use of appropriate software.

g. Evaluate published claims by interpreting methodology and experimental data, and make judgements about the strength of the evidence.

3.1.4 Communication, presentation and information technology skills

The ability to:

a. Communicate about their subject appropriately to a variety of audiences using a range of formats and approaches and appropriate scientific language.

b. Cite and reference work in an appropriate manner, including the avoidance of plagiarism.

c. Use a range of media critically as a means of communication and a source of information.

3.1.5 Interpersonal and teamwork skills

The ability to:
a. Identify individual and collective goals and responsibilities and perform in a manner appropriate to these roles, in particular those being developed through practical, laboratory and/or field studies.
b. Recognise and respect the views and opinions of other team members.
c. Use negotiating skills.
d. Evaluate their own performance as an individual and a team member.
e. Evaluate the performance of others.
f. Develop an appreciation of the interdisciplinary nature of science and of the validity of different points of view.

3.2 Core biomedical science knowledge, understanding and skills

a. Engagement with the essential facts, major concepts, principles and theories associated with biomedical science subjects.
b. Competence in the basic experimental and/or survey skills.
c. Understanding of information and data within the context of biomedical science accompanied by critical analysis and assessment to enable understanding of the subject area as a coherent whole.
d. Familiarity with terminology, nomenclature and disease classification systems, as appropriate.
e. Methods of acquiring, interpreting and analysing biomedical science information with a critical understanding of the appropriate contexts for its use through the study of texts, original papers, reports and data sets.
f. Awareness of the contribution of biomedical science to the development of knowledge about the complexity of human health and disease.
g. Knowledge of a range of communication techniques and methodologies relevant to biomedical science, including data analysis, information technology and the use of statistics.
h. Engagement with current developments in biomedical science and their applications, and the philosophical and ethical issues involved.
i. Awareness of the contribution of biomedical science to debate and controversies, and how this knowledge and understanding forms the basis for informed concern about the quality and sustainability of health and well-being.
j. Awareness of intellectual property (IP) and how scientific advances can be secured and progressed by the application of intellectual property rights (IPRs).
k. An appreciation of the complexity and diversity of life processes.
l. The ability to read and use appropriate literature with a full and critical understanding, while addressing such questions as content, context, aims, objectives, experimental design, methodology, data interpretation and application.
m. The capacity to give a clear and accurate account of a subject, the ability to marshal arguments, mediate and debate both with specialists and non-specialists, using appropriate scientific language.

n. Critical and analytical skills including recognition that statements should be tested and that evidence is subject to assessment and critical evaluation.

o. The ability to employ a variety of methods of study in investigating, recording and analysing material.

p. The ability to think independently, set tasks and solve problems.

3.3 Biomedical science profession specific knowledge, understanding and skills

This is specifically applicable to the new HCPC standards of proficiency (SoP) 13.1 – 13.10 and 15.2 - 15.6 in the IBMS Registration Equivalence Portfolio Module 1: Application of Professional Knowledge. The learning outcome components are defined in the QAA Subject Benchmark Statement: Biomedical Sciences, against which the curriculum is mapped for the IBMS accreditation of undergraduate degree programmes.

To successfully complete the programme candidates will be expected to demonstrate they have achieved the outcomes specified in Table 1 against the curriculum subjects and indicative areas.
### Table 1. Biomedical Science Profession Specific Subjects, Indicative Areas and Learning Outcomes

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

• 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. |
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<th>Profession Specific Subjects</th>
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<th>Learning Outcomes</th>
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<tbody>
<tr>
<td>proteins, degradation of</td>
<td>Integration of metabolic pathways and their regulation.</td>
<td>• Understand the main principles of gene expression.</td>
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<td>amino acids, urea cycle.</td>
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<td>Genetics is the study of</td>
<td>Mendel’s laws of inheritance, genotype, phenotype, dominance, sex-linked</td>
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<tr>
<td>the structure and function</td>
<td>variation, Genetic inheritance patterns, autosomal and sex-linked genes. Blood</td>
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<td>of genes (including their</td>
<td>group inheritance, population genetics, cytogenetics, chromosomal abnormalities.</td>
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<td>role in human disease) and</td>
<td>Genomes, nuclear DNA, mitochondrial DNA. Gene expression, gene structure and</td>
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<td>inheritance.</td>
<td>regulation in prokaryotes and eukaryotes.</td>
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<td>Molecular Biology is that</td>
<td>Molecular biology overlaps with biochemistry, genetics and cell biology.</td>
<td>• Understand how the principles of genetics underlie modern molecular biology.</td>
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<td>branch of biology that</td>
<td>Bioinformatics and systems biology: the computation of high volumes of biological</td>
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<td>deals with the manipulation</td>
<td>data and the properties of a network of interacting components in a system, as</td>
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<td>of nucleic acids (DNA and</td>
<td>well as the components themselves, including an appreciation of the algorithms</td>
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<td>RNA) so that genes can be</td>
<td>to decipher biological relationships.</td>
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<td>isolated, sequenced or</td>
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<td>mutated. It covers methods</td>
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<td>that allow the insertion of</td>
<td>Molecular biology overlaps with biochemistry, genetics and cell biology.</td>
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<tr>
<td>new genes into the genome</td>
<td>Bioinformatics and systems biology: the computation of high volumes of biological</td>
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<td>or the deletion of genes</td>
<td>data and the properties of a network of interacting components in a system, as</td>
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<td>from the genome of an</td>
<td>well as the components themselves, including an appreciation of the algorithms</td>
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<tr>
<td>organism. It allows the</td>
<td>to decipher biological relationships.</td>
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<td>effects of genes and genetic</td>
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<td>factors to be investigated</td>
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<td>in health and disease.</td>
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<td>Immunology is the study of</td>
<td>Organisation and components of the human immune system; Structure, function and</td>
<td>• Have knowledge and understanding of innate and acquired immunity.</td>
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<td>components of the immune</td>
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<td>system, their structure,</td>
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<tr>
<td>function</td>
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<td>Profession Specific Subjects</td>
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<tr>
<td>and mechanisms of action. It includes innate and acquired immunity.</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>Cellular Pathology is the microscopic examination of normal and abnormal cells (cytopathology), and tissues (histopathology) for indicators of disease. It requires knowledge of:</td>
<td>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,</td>
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<tr>
<td></td>
<td>• the preparation of cells and tissues for microscopic examination;</td>
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<td></td>
<td>• Describe the microscopic appearance of normal and abnormal cells and tissues.</td>
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<td>• 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.</td>
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<td>Profession Specific Subjects</td>
<td>Indicative Areas</td>
<td>Learning Outcomes</td>
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<td>• 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.</td>
<td>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.</td>
<td>• 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.</td>
</tr>
<tr>
<td><strong>Clinical Biochemistry</strong> 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</td>
<td>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</td>
<td>• 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.</td>
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<tr>
<td>Profession Specific Subjects</td>
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<tr>
<td>disease;</td>
<td>disorders, digestion and disorders of absorption, pancreatic disease.</td>
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<td>• therapeutic drug monitoring and investigation of substance abuse.</td>
<td>Disorders of calcium, phosphate and magnesium metabolism.</td>
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<td>Role of plasma proteins, plasma protein abnormalities, immunoglobulins, tumour markers;</td>
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<td>Clinical enzymology, measurement of plasma enzymes in diagnosis;</td>
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<td></td>
<td>Endocrinology (clinical biochemistry abnormalities of thyroid, adrenal, hypothalamus, pituitary, gonads;</td>
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<td>Clinical biochemistry measurements in nutrition, investigation of vitamin/trace elements deficiencies;</td>
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<td>Clinical biochemistry of pregnancy and lactation, pregnancy tests, prenatal diagnosis of birth defects, postnatal screening test.</td>
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<td></td>
<td>Inborn errors of metabolism and hereditary diseases (phenylketonuria, glycogen storage disease, cystic fibrosis, genetic and biochemical basis of inherited disease, mass screening;</td>
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<td></td>
<td>Therapeutic drug monitoring (TDM), drugs of abuse and toxicology.</td>
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<td>Profession Specific Subjects</td>
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</tbody>
</table>
| **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, DNA 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. |
| **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, | 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: | - 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. |
### Profession Specific Subjects
- diagnosis, treatment and monitoring;
  - immunological techniques used in clinical and research laboratories;
  - prophylaxis and immunotherapy.

### Indicative Areas
- 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.

### Learning Outcomes
- 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.

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**Haematology** is the study and investigation of the different elements that constitute blood in normal and diseased states. It requires knowledge of:

- 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.

### Indicative Areas
- 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; 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;

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Institute of Biomedical Science, 12 Coldbath Square, London EC1R 5HL
Tel 020 7713 0214  Fax: 020 7837 9658  E-mail equivalence@ibms.org  Website: [www.ibms.org](http://www.ibms.org)
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<th>Profession Specific Subjects</th>
<th>Learning Outcomes</th>
<th>Indicative Areas</th>
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<tr>
<td>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:</td>
<td>● Appreciate the selection, preparation, storage and safe provision of appropriate blood components.</td>
<td>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.</td>
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<tr>
<td>● the genetics, inheritance, structure and role of red cell antigens;</td>
<td>● Be aware of the possible adverse effects associated with the use of blood and blood products.</td>
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<td>● the preparation, storage and use of blood components;</td>
<td>● Have knowledge of the role of histocompatibility antigens in transplantation.</td>
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<td>● the selection of appropriate blood components for transfusion and possible adverse effects;</td>
<td>● Demonstrate knowledge of some diagnostic options where genetic disease is suspected.</td>
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<td>● immune mediated destruction of blood cells.</td>
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<td><strong>Medical Microbiology</strong> is the study and investigation of pathogenic microorganisms. It requires knowledge of:</td>
<td>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.</td>
<td>• 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.</td>
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<td>• the pathogenic mechanisms of a range of microorganisms;</td>
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<td>• the laboratory investigation and the epidemiology of infectious diseases;</td>
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<td>• food, water and environmental microbiology;</td>
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<td>• anti-microbial and anti-viral therapy (including drug resistance);</td>
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<td>• infection control.</td>
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4. Modular Aims, Curriculum and Learning Outcomes for the IBMS Certificate of Competence by Equivalence (Biomedical Scientist) Programme

The IBMS Registration Equivalence Portfolio has been mapped against the revised standards of proficiency for biomedical scientists published by the HCPC in December 2014.

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 and Diversity
- 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
- Module 3: Quality
- Module 4: Performing Standard Investigations
- Module 5: Research and Development

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 these learning outcomes candidates will demonstrate the breadth and depth of professional practice relevant to the curriculum. Their IBMS registration portfolio
will evidence how these learning outcomes have been achieved to demonstrate they have met the biomedical scientist standards of proficiency.

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.

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
- Pathology accreditation systems
- Handling, retention, storage and disposal of human tissue and samples
- Health and safety, personal well-being
- The role of appraisal in staff management and development
- Training, lifelong learning and continuing professional development

Learning Outcomes

To be able to:

a. Describe how you apply the principles of self-management and time-keeping in relation to service delivery and prioritisation of workload. HCPC SoP 1.2

b. Work within departmental sample turnaround times, correctly identify urgent samples as specified in departmental protocol and prioritise performance of analysis to meet urgency of request. HCPC SoP 1.2

c. Demonstrate you understand the role of a biomedical scientist and the relationship to other professionals and your personal scope of practice with reference to the departmental structure and the relationship of pathology to service users. HCPC SoP 2.1, 2.2, 3.1
d. Demonstrate an understanding of the role of the Health and Care Professions Council (HCPC) by describing its role and requirements for statutory regulation with specific reference to:
   - How HCPC standards of proficiency apply to professional practice.
   - How the HCPC code of conduct, performance and ethics (2016) applies to professional practice. HCPC SoP 2, 2.1, 2.2, 2.3, 2.4, 2.8, 3.1

e. Demonstrate an understanding of how the Institute of Biomedical Science document *Code of Conduct and Good Professional Practice for Biomedical Scientists* applies to your scope of practice. HCPC SoP 2, 2.1, 2.2, 2.3, 2.4, 2.8, 3.1

f. Conduct duties and responsibilities in accordance with local, professional and regulatory policies and practice. HCPC SoP 2.3, 2.5, 2.6, 2.7

g. Demonstrate awareness of pathology accreditation systems by being able to describe the principles of accreditation systems for pathology laboratories in the UK. HCPC SoP 2.6

h. Demonstrate you are aware of the legal and professional requirements for the handling, retention, storage and respectful disposal of human tissues and samples. HCPC SoP 2.6

i. Demonstrate you are aware of the implications of the European Community (EC) Working Time Directive (1996) and its principles. Demonstrate how you comply with departmental time-keeping policy. HCPC SoP 2.6

j. Understand the importance of maintaining physical and mental wellbeing and demonstrate that you know how to take appropriate action in response to your own health issues. HCPC SoP 3, 3.2

k. Describe how you apply the requirements for personal responsibility in the context of health and safety, and for the safety of colleagues. HCPC SoP 3.2

l. Describe the limits of your professional practice and describe the referral mechanisms available in order to take appropriate action when personal limit of practice has been reached. HCPC SoP 1.1, 4, 4.1, 4.2, 4.5

m. Describe where and how to access information of relevance to the problem or request for advice and be able to give examples of relevant guidelines or personnel where interpretation of protocol is unclear. HCPC SoP 1.1, 4.3 – 4.5
n. Demonstrate you understand the principles of continuing professional development (CPD) in relation to personal responsibility for maintaining competence and have the skills necessary for self-management of lifelong learning. HCPC SoP 3.3, 11.1, 14.1

o. Demonstrate you actively participate in training and professional development and work towards targets for personal, academic, professional and career development. HCPC SoP 4.6, 14.1

p. Demonstrate that you take personal responsibility for self-directed learning and have developed an adaptable, flexible and effective approach to this. HCPC SoP 11, 11.1

Module 2: Equality and Diversity

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

HCPC standards of conduct, performance and ethics (2016).
Equality and diversity policies and legislation and local and national level.
Principles of equality and diversity.

Learning outcomes:

To be able to:

a. Describe how the Institute of Biomedical Science *Code of Conduct and Good Professional Practice for Biomedical Scientists*, and the HCPC code of conduct, performance and ethics apply to your scope of practice. HCPC SoP 5

b. Demonstrate you are aware of local policies and national legislation on diversity and equal opportunities, and know how they apply to your professional practice. HCPC SoP 5, 5.1

c. Explain what is meant by ‘equal opportunities’. HCPC SoP 5, 5.1

d. Demonstrate that you can practice in a non-discriminatory manner in accordance with instructions received. HCPC SoP 6
Module 3: Communication

To demonstrate a detailed knowledge and experience base for responding to enquiries regarding the service provided when dealing with clinical colleagues and other healthcare professionals, to communicate with patients, carers and relatives, and to communicate the outcomes of problem solving and research and development activities.

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 (TOEFL) Internet Based Test with a minimum score of 100/120. (HCPC SoP 8.2)

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 in order to facilitate and promote effective communication.

Learning outcomes:

To be able to:

a. Clearly convey information or results to the appropriate level of detail, confirming understanding of those to whom information has been given. HCPC SoP 8, 8.1, 8.2

b. Describe the use of a range of communication methods that may be employed by the laboratory to engage with the service user, and the limits of your practice when communicating information, advice, instructions and professional opinion, particularly when communicating patient information. HCPC SoP 8.3

c. Demonstrate where and how to access information of relevance to the request for advice. HCPC SoP 8.4, 8.7

d. Describe the principles of verbal and non-verbal communication. HCPC SoP 8.6

e. Demonstrate the use of correct biomedical and medical language and terminology. HCPC SoP 8.7
f. Identify factors that may influence the type and detail of advice you provide, and respond to routine requests with accurate and current information. HCPC SoP 8.7

g. Demonstrate knowledge of, and the ability to follow, standard operating procedures for dealing with enquiries, giving advice to service users and the procedures for communicating patient results. HCPC SoP 8.7, 8.8

h. Demonstrate that you can receive and respond to a variety of sources of information: textual, numerical, verbal, graphical, and solve problems by a variety of methods, including the use of appropriate software. HCPC 8.1, 8.2, 14.34

i. Understand that different communication methods may be required to facilitate effective feedback and participation of others. HCPC SoP 8.3, 8.5, 8.8, 8.9
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.

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

To be able to:

a. Demonstrate awareness of the data protection policies by describing the extent to which the Data Protection Act 1998, and other legislation and professional guidance, covers patients and laboratory records. HCPC SoP 7, 7.1, 7.2

b. Respect the confidentiality of patients, employer and service users unless disclosure is permitted by law and justified in the patient’s interests. HCPC SoP 7, 7.1, 7.3

c. Understand the purpose of accurate, legible laboratory records and demonstrate the ability to transcribe information accurately and legibly. HCPC SoP 10.3

d. Describe the purpose of error logging and the possible implications of error. HCPC 10.3

e. Follow standard operating procedures for handling clinical information and recording information. HCPC SoP 10, 10.1, 10.5

f. Understand the application of information technology in a pathology service, and describe the use of laboratory information management systems (LIMS). HCPC SoP 10.2, 10.4
g. Know the principal criteria for patient identification and describe the laboratory procedure for receipt of samples, dealing with inadequately or incorrectly labelled specimens, and incomplete request forms. HCPC SoP 10.4, 10.5

h. Demonstrate awareness of the key threats to data security and apply due diligence to password strength, email attachments, downloading of files, backup storage etc. HCPC SoP 7.2, 10.2, 10.6
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.

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

To be able to:

a. Take relevant action to coordinate your contribution with the requirements of others. HCPC SoP 9, 9.1, 9.2

b. Demonstrate you are able to evaluate your own performance as an individual and team member. HCPC SoP 9.1, 9.2

c. Describe how good interpersonal skills within the laboratory team and with service users can sustain good working relationships. HCPC SoP 9.2

d. Identify individual and collective goals and responsibilities, and perform in a manner appropriate to these roles, in particular those being developed through practical and/or laboratory studies. HCPC SoP 9.2, 9.3

e. Demonstrate that you understand and can apply the principles of team working, and can recognise and respect leadership and individual contributions and opinions in the laboratory team. HCPC SoP 9.2, 9.4

f. Describe how the role of the biomedical scientist and pathology services impact on other professional groups (e.g. as part of a multidisciplinary team) in the provision of patient-focused healthcare. HCPC SoP 9.2, 9.3, 9.4, 9.5
g. Demonstrate that you are aware of the relevance of pathology services to other health and social care services in the UK. HCPC SoP 9.3, 9.5, 13.3, 13.4
These may include:
- Other pathology disciplines
- Accident and emergency
- Intensive care unit
- Theatres
- Wards (including specialist units)
- Out-patient clinics
- Mortuary
- General practitioners
- Health education
- Occupational health
- Public health
- Epidemiology

h. Demonstrate the ability to cooperate effectively with service users by providing appropriate advice and assistance as part of a multidisciplinary team. HCPC SoP 9.1, 9.4, 13.3

i. Describe how individual and team responsibilities contribute to the effective work of the laboratory service. HCPC SoP 9.2, 13.5

j. Demonstrate an awareness of how service user* feedback questionnaires can be used to inform service delivery. HCPC SoP 9.2, 9.3, 12.2

k. Demonstrate that you have developed an appreciation of the interdisciplinary nature of science and of the validity of different points of view. HCPC SoP 9.3, 13.3

*Please note: In the context of service users there are three areas of practice that are considered appropriate when interpreting the standards of proficiency:

1. Patients or carers in clinics and/or wards where there is direct contact with biomedical and clinical scientists;
2. Professional groups that have direct patient healthcare role which relies on pathology services including clinical laboratory investigation, advice, treatment evaluation and research;
3. Service providers that employ biomedical and/or clinical scientists for services that contribute to the patient healthcare pathway.
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.

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

To be able to:

Demonstrate knowledge of the following.

a. *Human anatomy and physiology*: the structure, function and homeostatic/hormonal control of the human body, its component parts and major systems (musculoskeletal, circulatory, respiratory, digestive, renal, urogenital, nervous, endocrine) and their relationship to each other. HCPC SoP 13, 13.1

b. *Cell biology*: the structure and function of prokaryotic and eukaryotic cells; the cell as the fundamental unit of life; cell division, cell cycle, stem cells, cell specialisation and cooperation. HCPC SoP 13, 13.1

c. *Biochemistry*: key chemical principles relevant to biological systems, the structure and function of biological molecules, and the biochemistry of processes that support life, including cellular metabolism and its control. HCPC SoP 13, 13.1

d. *Microbiology*: the structure, physiology, biochemistry, identification, classification and control of microorganisms, including the roles of normal flora. HCPC SoP 13, 13.1

e. *Immunology*: acute and chronic inflammation, structure, function and mechanisms of action of the components of the immune system; innate and acquired immunity. HCPC SoP 13, 13.1

f. *Genetics*: the structure and function of genes, the principles of their inheritance and genetic disorders with particular biomedical significance. HCPC SoP 13, 13.1, 13.8

g. *Molecular biology*: the structure and function of biologically important molecules including DNA, RNA and proteins, and the molecular events that govern cell function. Molecular biology overlaps with biochemistry, genetics and cell biology. HCPC SoP 13, 13.1, 13.8

h. *Principles of scientific laboratory investigation* including the difference between quantitative and qualitative methodologies. HCPC SoP 13.2, 13.6

i. *Qualitative and quantitative methods* used in the diagnosis, screening and monitoring of health and disorders. HCPC SoP 13.6
j. *Principles of automated instrumentation and analysers* in a pathology laboratory. HCPC SoP 13.6, 13.7

k. *Knowledge and understanding of various therapeutic strategies* applicable to disease states. HCPC SoP 13.6, 13.7

l. *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. HCPC SoP 13.7, 13.8

m. *Cellular pathology*: the microscopic examination of normal and abnormal cells (cytopathology) and tissues (histopathology) for indicators of disease. Knowledge includes:
   - gross structure and ultrastructure of normal cells and tissues, and the structural changes that may occur during disease
   - reproductive science, including infertility and embryology
   - preparation of cells and tissues for microscopic examination
   - principles and applications of visualisation and imaging techniques, including microscopy, to aid diagnosis and treatment selection.
   HCPC SoP 13.7, 13.8

n. *Clinical biochemistry*: the investigation of the function and dysfunction of systems, organs and tissues by the measurement of biochemical markers. Knowledge includes:
   - range and methods used for the collection of clinical samples that may be subjected to biochemical analysis
   - principles and applications of biochemical investigations used for screening, diagnosis, treatment and monitoring of disease
   - therapeutic drug monitoring and investigation of substance abuse.
   HCPC SoP 13.7, 13.8

o. *Clinical immunology*: the study of immunopathological conditions and abnormal immune function. Knowledge includes:
   - principles of the function and measurement of effectors of the immune response
   - 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
   HCPC SoP 13.7, 13.8
p. **Haematology**: the study and investigation of the different elements that constitute blood in normal and diseased states. Knowledge includes:
- structure, function and production of blood cells
- regulation of normal haemostasis
- nature and diagnosis of anaemia, haematological malignancy, haemostasis, haemorrhagic and thrombotic diseases
- techniques for their investigation
  HCPC SoP 13.7, 13.8

q. **Transfusion science**: the identification of blood group antigens and antibodies to ensure a safe supply of blood and blood components. Knowledge includes:
- genetics, inheritance, structure and role of red cell antigens
- immune-mediated destruction of blood cells
- preparation, storage and use of blood components
- selection of appropriate blood components for transfusion and possible adverse effects.
  HCPC SoP 13.7, 13.8

r. **Clinical genetics**: the identification of genetic mutations and polymorphisms and their influence on disease processes. Knowledge includes:
- 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 medicine
  HCPC SoP 13.7, 13.8

s. **Medical microbiology**: the study and investigation of pathogenic microorganisms. Knowledge includes:
- pathogenic mechanisms of a range of microorganisms
- public health microbiology
- laboratory investigation of a range of infectious diseases, including isolation and identification of microorganisms
- antimicrobial and antiviral therapy (including drug resistance)
- infection control
  HCPC SoP 13.7, 13.8

t. Role of a pathology laboratory in the assessment, diagnosis and treatment of patients, and the relationship between pathology and other professions in health and social care. HCPC SoP 14.14, 14.19, 14.20, 14.21
u. Awareness of the current laboratory methods available for the study, investigation, diagnosis and monitoring of human health and disease in clinical and research environments. HCPC SoP 13.7, 13.8,

v. An appreciation of the development and evaluation of new and current methods and therapeutic intervention strategies. HCPC SoP 13.6, 13.8

w. Ability to integrate the knowledge of various key disciplines to further the understanding of the study, investigation, diagnosis and monitoring of human health and disease. HCPC SoP 13.6, 13.7, 13.8, 14, 14.25

x. Know the methods for processing and analysing specimens, including methods of specimen identification, the effect of storage on specimens, and the safe retrieval of specimens. HCPC 13.2, 14.17 - 14.21, 14.23 - 14.25, 15.6
Module 2: Health and Safety

Aims

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

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

To be able to:

a. Demonstrate an awareness of health and safety legislation and knowledge of the local safety policy. HCPC SoP 15, 15.2

b. Demonstrate that you understand how the laboratory health and safety policy and safety legislation covers the working environment. HCPC 15.2

c. Describe the action required to deal with hazards or potential risks. HCPC SoP 15.1, 15.2, 15.3

d. Demonstrate the correct use of personal protective equipment. HCPC SoP 15.4

e. Describe the risks associated with specimens (fixed and unfixed), clinical waste and equipment, and describe the correct procedure for handling samples that may contain hazard group 2, 3 and 4 pathogens. HCPC SoP 13.11

f. Describe the immunisation requirements for the laboratory, and the role of occupational health. HCPC SoP 15.1, 15.2

g. Describe the principles and applications of disinfectants, methods for sterilisation and decontamination, and for dealing with waste and spillages correctly. HCPC SoP 15.2, 15.3, 15.5
h. Describe the correct procedures for using fume cupboards and microbiological safety cabinets. HCPC SoP 15.2, 15.3

i. Demonstrate the ability to work in a safe manner and act in accordance with health and safety legislation and safety policies applicable to the working environment. Show how you would recognise when you are unable to work safely and take remedial action in order to work in accordance with laboratory safety protocols. HCPC SoP 15.3

j. Confirm that work is carried out with due respect to different types of hazards including fire, electrical, biological, chemical, radiation, manual handling and the use of visual display units. HCPC SoP 15.5

k. Perform laboratory procedures and diagnostic tests in accordance with standard operating procedures and understand the health and safety requirements with respect to: patient identification; sample type; protective clothing; risk assessment; equipment. HCPC SoP 15.2, 15.3, 15.4
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.

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

To be able to:

a. Describe the value of case conferences and other methods of review. HCPC SoP 11.2

b. Describe the purpose of different types of audit in quality management and how an effective audit trail is maintained and can be improved. HCPC SoP 11.2, 12.4

c. Demonstrate an understanding of the importance of reference ranges, the use of scientific units and quality control. HCPC SoP 12,12.1

d. Demonstrate knowledge and application of quality assurance and quality control principles as part of an awareness of the need for quality management systems and a culture of continued quality improvement. HCPC SoP 12.3

e. Indicate sequential testing or specialised tests that are appropriate to patient diagnosis or treatment. HCPC SoP 12.6
f. Describe the principles of quality control and quality assurance and explain the difference between internal quality control and external quality assessment and the type of data required. HCPC SoP 12.5, 12.7, 12.8

g. Know the meaning of the terms ‘specificity’, ‘sensitivity’ and ‘linearity’ and be able to explain the significance of reference ranges and reference materials. HCPC SoP 12.8

h. Know the correct procedures for calibration, for quality control checks and for correcting simple equipment faults. HCPC SoP 12.8 (see also HCPC SoP 14.3, 14.11, 14.13 in Performing Standard Tests section).

i. Describe the principles and practice of standardisation and calibration, and perform these procedures in accordance with standard operating procedures. HCPC SoP 12.8

j. Know how to evaluate unexpected laboratory results and confirm accuracy of the result by seeking additional information as appropriate. HCPC SoP 12.9

k. Use quality assurance methods in accordance with laboratory procedure and take appropriate corrective action if required. HCPC SoP 12.9

l. Understand the common causes of non-analytical errors and the implications of these for the test result. HCPC SoP 12.9, 14.15

m. Be aware of the role of near-patient testing and non-invasive techniques used in diagnostic pathology and monitoring for patient care. HCPC SoP 14.16
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.

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

To be able to:

a. Recognise the need to follow standard laboratory procedures and diagnostic tests relevant to the patient under investigation. HCPC SoP 13.10, 14.7

b. Know the purpose and range of standard laboratory tests relevant for diagnosis and treatment relevant to the discipline. HCPC SoP 13.10, 14.3, 14.7

c. Describe the methods for processing and analysing specimens including methods of specimen identification, the effect of storage on specimen, the safe retrieval of specimens, and confirming suitability of the sample for the intended analytical method. HCPC SoP 14.3, 14.4

d. Recognise the common causes of non-analytical errors and the implications of these for the test result. HCPC SoP 14.3

e. Explain the importance of the correct preparation of buffers, standard solutions, and other solutions used in the laboratory; include weighing,
pipetting, use of volumetric glassware, and making appropriate dilutions of standard and test solutions. HCPC SoP 14.6, 14.12

f. Know the limitations of standard tests and the further associated tests that may be required. HCPC SoP 14.5, 14.7

g. Confirm that samples have been correctly identified and prepared for the intended tests or procedures. HCPC SoP 14.8

h. Confirm that samples have been stored correctly and can be retrieved for laboratory investigation if required. HCPC SoP 14.8

i. Perform the correct procedures for calibration, for quality control checks and for correcting simple equipment faults. HCPC SoP 14.3, 14.5, 14.11, 14.13, 14.26 (see also HCPS SoP 12.8 in Quality section).

j. Use standard laboratory procedures to aid the diagnosis, screening and monitoring of health and disorders, and produce results consistent with the laboratory procedure. HCPC SoP 13.9, 14.5, 14.7, 14.9, 14.10, 14.26

k. Confirm suitability and validation of the intended method for the measurement or procedure required. HCPC SoP 14.5, 14.13
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.

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

To be able to:

a. Demonstrate the ability to prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques, statistical programs, spreadsheets and programs for presenting data visually. HCPC SoP 14.27

b. Demonstrate the capacity to give a clear and accurate account of a subject, marshal arguments in a mature way, and engage in debate and dialogue both with specialists and non-specialists, using appropriate scientific language. HCPC SoP 14.27, 14.28, 14.33

c. Know how to access information about current trends and modern techniques in biomedical science and their impact on healthcare. HCPC SoP 14.28, 14.32

d. Demonstrate critical and analytical skills including a recognition that statements should be tested and that evidence is subject to assessment and critical evaluation. HCPC SoP 14.29

e. Use research, reasoning and problem-solving skills to make judgements or decisions in determining outputs of laboratory procedures and diagnosis. HCPC SoP 14.29, 14.30, 14.32

f. Describe methods of acquiring, interpreting and analysing biomedical science information with a critical understanding of the appropriate contexts for its
use through the study of texts, original papers, reports and datasets. HCPC SoP 14.29, 14.31, 14.33

g. Demonstrate the ability to design, plan, conduct and report on investigations, which may involve primary or secondary data (e.g. from a survey database). HCPC SoP 14.33
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Contact:     Education Department
            T: +44 (0)20 7713 0214
            E: registration@ibms.org

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