National School of Healthcare Science

NHS
Health Education England

Modernising Scientific Careers Practitioner Training Programme
BSc (Hons) Healthcare Science Curriculum

Life Sciences v 1.0 for 2017-18

Developing people for health and healthcare

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CONTENTS

SECTION 1: INTRODUCTION TO THE PROGRAMME

READERSHIP

The Practitioner Training Programme (PTP) is an integrated academic and work-based undergraduate BSc (Hons) degree which may be undertaken through an on-site academic programme or through an apprenticeship. This document provides the curriculum (both academic and work-based) for the PTP and will be of interest to:

- academic and administrative staff, including external examiners within Higher Education Institutions (HEIs) which are accountable for the delivery of the curriculum;
- employers who may wish to support apprentices or employees in undertaking the PTP degree programme;
- learners, host departments and managers of services that employ healthcare science (HCS) staff;
- work-based trainers, including all those involved in supervising, mentoring, co-ordinating, assessing and delivering PTP education and training;
- Health Education England (HEE) Local Education and Training Boards (LETBs) and all HCS education and training commissioning organisations in the UK;
- National School of Healthcare Science (NSHCS);
- Academy for Healthcare Science (AHCS);
- patients and the public.

A list of abbreviations and glossary of terms used is provided in the appendices.

Introduction to Modernising Scientific Careers (MSC) and the Practitioner Training Programme (PTP)

1.1 Healthcare Science and the MSC Education and Training Programme

1. The HCS workforce plays a central role in safe and effective patient care across all pathways of care from health and wellbeing to end of life. There are approximately 55,000 employees in the HCS workforce in the NHS in the UK, and approximately 80% of all diagnoses can be attributed to their work.
2. Healthcare science involves the application of science, technology and engineering to health. *Good Scientific Practice* (GSP)[1] sets out the principles and values on which good practice within healthcare science is founded. It makes explicit the professional standards of behaviour and practice that must be achieved and maintained by all those who work in healthcare science. GSP and the Academy for Healthcare Science's (AHCS) Standards of Proficiency[2] and Standards of Education and Training[3] form the basis for all MSC training curricula that contextualise the Standards of Proficiency set down by the Health and Care Professions Council (HCPC) in a way that is accessible to the profession and the public.
3. The HCS workforce and services are grouped into four broad areas called divisions, namely: Life Sciences, Physical Sciences, Physiological Sciences and Clinical Bioinformatics. Within each division there are a number of HCS specialisms. With advances in scientific technology, changes to the delivery of healthcare scientific services and the development of MSC, the boundaries between these divisions have been shifting. MSC recognises this important change and to date has identified seven PTP themes (groupings of specialisms within a HCS division), which define training across a total of 19 HCS specialisms.

1.2 Introduction to the Practitioner Training Programme (PTP)

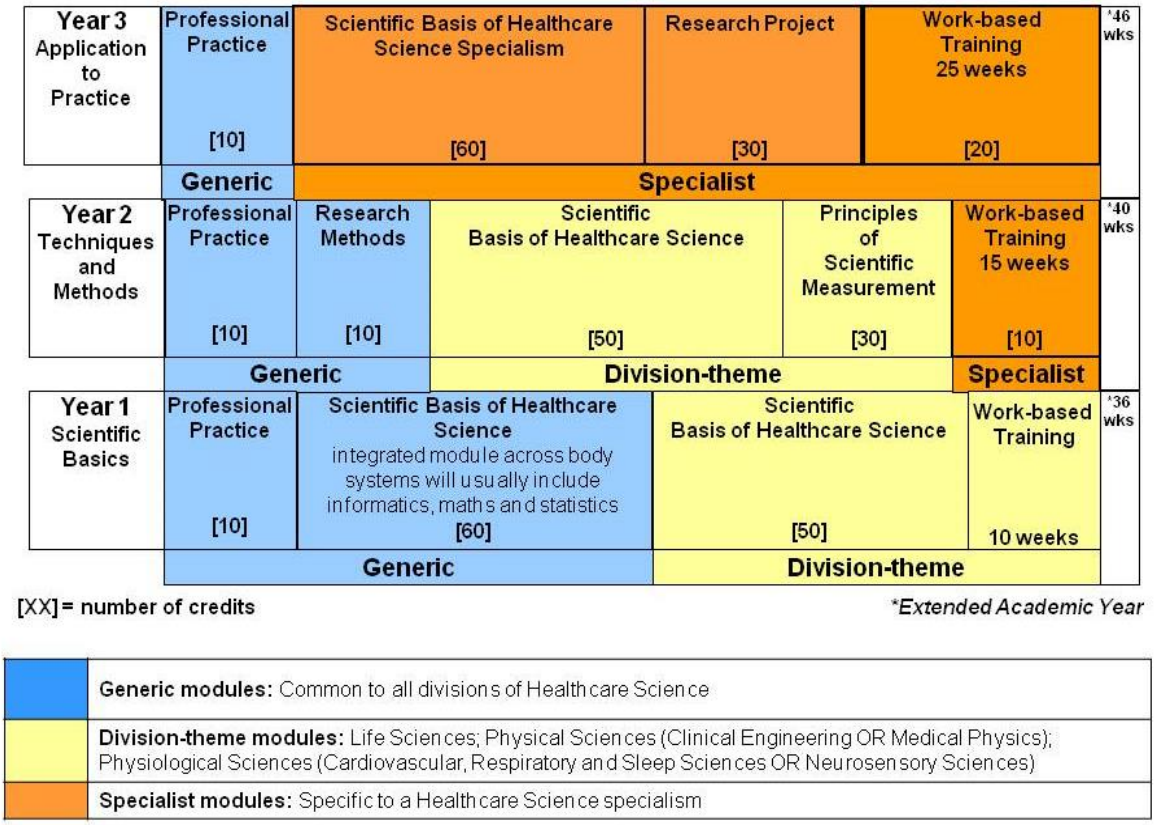
4. The HCS Practitioner Training Programme (HCS PTP) is a degree programme that has 2 routes of delivery:
   i. *On-site academic route:* an academic degree programme in which the learner[4] undertakes work-based placements but is not employed
   ii. *Apprenticeship route:* an in-service degree where the apprentice is employed whilst undertaking the PTP
5. The PTP typically will take a minimum of 3 years (but may be longer depending on the learner and the requirements of the employer and/or HEI to complete. It leads to a BSc Honours degree qualification that is contextualised for workplace occupational competency as a Healthcare Science Practitioner (HCSP) who provides HCS scientific and technical services within the HCS divisions and specialisms of Life Science, Physiological Science, or Physical Science.
6. The BSc (Hons) PTP is designed to provide the HCSP with a strong science-based,

[1] http://ahcs.flinthosts.co.uk/wordpress/wp-content/uploads/2013/09/AHCS-Good-Scientific-Practice.pdf
[2] http://www.ahcs.ac.uk/wordpress/wp-content/uploads/2014/07/AHCS_StandardsofProficiency.pdf
[3] http://www.ahcs.ac.uk/wordpress/wp-content/uploads/2014/08/AHCS_PTPStandardsOfEducationAndTraining.pdf
[4] the term *learner* is generally used to include both students undertaking the PTP through the on-site academic route and the apprenticeship route, except where reference to apprentices is specifically required.

patient-centred education and training in a specialist area of HCS. The overall aim of this HCSP education and training programme is to prepare the learner to fulfil the function of a HCSP working in a clinical HCS setting. The programme combines and integrates both academic and work-based learning and has a strong patient and technical scientific focus. Within the first year learners will experience of number of short placements or 'tasters' within the chosen PTP theme and gain some exposure to other aspects of the patient pathways, for example through clinics, patient education programmes, medical records and other area in which HCS contributes to patient care. This will give the learner a wide appreciation of the many related specialisms within HCS and a more holistic view of the areas that contribute to high-quality patient-centred care.

7. The diagram below depicts the broad framework and credit structure around which all PTP BSc (Hons) degree programmes in HCS are structured. The divisions within the MSC Programme (Life Sciences, Physical Sciences, Physiological Sciences and Clinical Bioinformatics)[5] have interpreted and adapted this framework to fit the range of HCS specialisms within the division/theme. Further refinement has been undertaken by each HEI to develop and deliver BSc (Hons) programmes that enable learners to meet the learning outcomes of the course. There is a strong generic programme that emphasises professional practice, research and the scientific basis of HCS.

High-level framework for the integrated BSc (Hons) in Healthcare Science



[5] Although at the current time there is no PTP in Clinical Bioinformatics.

8. Once employed as a HCSP a range of career development options will be available, including structured in-post programmes of continuous personal and professional development (CPPD), provided through Accredited Scientific Practice programmes.[6]
9. PTP degrees can be delivered either as an on-site academic programme with clinical placements, or through an apprenticeship[7], in which the learner is employed whilst the degree is undertaken. HEIs offering the degree apprenticeship must join the Skills Funding Agency's (SFA) Register of Apprenticeship Training Providers (RoATP)[8].
10. HEIs can choose to deliver the degree apprenticeship inclusive of the mandatory end-point synoptic assessment (EPA)[9] through an "integrated" degree, or may choose to only deliver the academic component of the apprenticeship and without including the EPA in its assessment programme – a "non-integrated" degree. Where employers choose the non-integrated degree for an apprentice, they will be required to ensure that the apprentice undertakes the EPA once the degree is obtained through an appropriately accredited Assessment Organisation (AO) that is on the SFA Register of Apprenticeship Assessment Organisations (RoAAO), in order that the apprenticeship is completed.[10] Whichever options are chosen, the PTP will develop the technical, scientific, interpersonal and behavioural skills and knowledge of learners so that they can operate effectively in HCS as a HCSP.

1.3 Practitioner Training Programme Outcomes

11. Graduates of the BSc (Hons) will possess the essential knowledge, skills, experience values, behaviours and attitudes required of a newly qualified HCSP. They will have the necessary expertise in applied scientific techniques underpinned by theoretical knowledge within a division or related specialism and will work in a range of healthcare settings. Many will work directly with patients but all HCSPs will work in roles that will have an impact on patient care and outcomes. Learning, therefore, must be in the context of the patient and patient-centred care.
12. On successful completion of the BSc (Hons) (academic and work-based learning outcomes) all graduates should be able to demonstrate the outcomes of the AHCS's Standards of Proficiency for HCSPs,[11] which will enable them to register on its Professional Standards Authority (PSA) accredited register. In addition, Life Science graduates should also be able to demonstrate the outcomes of the HCPC Standards of Proficiency for Biomedical Scientists, which will enable them to register with the HCPC as Biomedical Scientists. Degree programmes must align to the Quality Assurance Agency's (QAA)[12] level 6, but which will have been extended and contextualised to the NHS job role for HCSP.

13. The AHCS Standards of Proficiency cover three key areas:
    - professional autonomy and accountability;
    - skills required for practice as a HCS Practitioner;

[6] http://hee.nhs.uk/2015/03/26/modernising-scientific-careers-accredited-scientific-practice-asp/
[7] Less commonly, some individuals will be employed by a trust and undertake the degree on a part-time basis.
[8] https://www.gov.uk/government/collections/register-of-apprenticeship-training-providers
[9] described more fully in Section 1.8
[10] Of significance, it should be noted that the employer will be responsible for the costs attached to the EPA. Employers and HEIs should be aware that the funding cap for this programme is fixed at £27,000. This may therefore require employers to fund the EPA outwith the apprenticeship levy and be an additional cost to the overall apprenticeship.
[11] http://www.ahcs.ac.uk/wordpress/wp-content/uploads/2014/07/AHCS_StandardsofProficiency.pdf
[12] http://www.qaa.ac.uk/en

- knowledge of healthcare science.

14. **Entry routes:** Entry into BSc (Hons) on-site academic HCS programmes is through the UCAS application process.[13] Increasingly, employers and patients are expected to be part of and contribute to the selection process, with HEIs using values-based recruitment[14] as an underpinning principle of their selection processes. Those seeking to undertake the PTP through an apprenticeship will be competitively appointed by employers who will involve their local HEIs in the appointment process.
15. **Award titles and mode of delivery:** These degree programmes can be delivered either as on site academic programmes or as in-service apprenticeship programmes. The title of the degree programme should be consistent with current HCS terminology.[15] See http://www.nshcs.org.uk/for-trainees/accreditation/134-accreditation-for-heis for further details.
16. **Apprenticeship Standard:** where employers appoint apprentices to undertake the degree, the apprenticeship standard for HCSPs (Level 6)[16], the PTP degree and the End-point Assessment (EPA) demonstrating achievement of the standard must be achieved, either through an integrated or non-integrated degree.[17]
17. **Relevant Quality Assurance Agency (QAA) Code(s) of Practice:** HEIs must adhere to the current QAA Code of Practice for the Assurance of Academic Quality and Standards in Higher Education.
18. **Accreditation:** A BSc (Hons) HCS programme must hold accreditation from HEE's NSHCS to confirm that it meets the Standards of Accreditation for the HCS BSc (Hons),[18] reflecting the AHCS Standards of Education and Training and those of the HCPC[19], where appropriate.
19. **Accreditation of prior learning (APL):** A process of APL that conforms to the guidelines below must be defined by each HEI provider. This must clearly describe the minimum and maximum level of APL that will be awarded, the timing, costs and process, and align to statutory requirements for HCS. Good practice supports the view that such prior learning should only be used once; double counting is not recommended. This process will be of particular relevance for apprentices who have previously achieved the Level 4 Diploma in HCS.[20]
20. **Progression, compensation, condonation:** Should a clinical placement or the employer in the case of apprentices not deliver the environment/learning that supports a learner in achieving the required learning outcomes, the HEI and employer will need to support the learner/apprentice appropriately. While it is recognised that HEIs are likely to have a wide portfolio of degree programmes that

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[13] https://www.ucas.com
[14] http://hee.nhs.uk/work-programmes/values-based-recruitment/
[15] In Scotland a 'full-time-equivalent' model is used to train clinical physiology practitioners who are NES employees, with their work-based learning being integral to the award. The programme timescale is identical to a full-time HEI learner (i.e. 4 years in Scotland).
[16] At the time of publication of the 2016 PTP curricula the Level 6 apprenticeship standard was awaiting publication. Once published it should be available via: https://www.gov.uk/government/collections/apprenticeship-standards#healthcare-standards (see Healthcare Science section)
[17] which will involve an AO for the EPA in the case of a non-integrated degree
[18] http://nshcs.org.uk/images/Accreditation/Proforma-BSc-accreditation-standards-July2014.pdf
[19] http://www.hpc-uk.org/aboutregistration/standards/sets/
[20] http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/Higher-education-credit-framework-for-England-guidance-on-academic-credit-arrangements-in-higher-education-in-England-Augu.aspx
http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/Guidelines-on-the-accreditation-of-prior-learning-September-2004.aspx

fall under a single set of regulations (ordinances), the following conditions are specific requirements of the PTP BSc (Hons) degree programme accreditation process, irrespective of the HEI's own academic regulations:

- all modules are mandatory;
- no condonation or compensation of marks between modules (although there is a measure of compensation within a module) or extended re-sits of modules marks is permitted;
- multiple assessment components in any single module cannot be aggregated to reach a final module mark;
- each assessment within a module should be mandatory and passed at the required level.

21. Where learners do not achieve the module requirements for progression they must follow a 'module retrieval plan', which supports them to recover the failed module(s) as soon as possible so that they can progress with minimum delay.
22. **Programme delivery and monitoring:** It is expected that all BSc (Hons) HCSP programmes should be an integral part of the faculty/school and that opportunities for interprofessional learning are maximised. There should be an appropriate balance between academic staff and visiting specialist staff to ensure teaching reflects current NHS practice, which must be evidenced as part of the programme accreditation by the NSHCS.

1.4 Purpose of the BSc (Hons) PTP Curriculum

23. There are three main purposes of this BSc (Hons) curriculum. It:
    i. clearly sets out the expectations of graduates from the programme, including the academic skills, knowledge and understanding, and attitudes and behaviours that each learner will be expected to gain, develop and apply during work-based training;
    ii. signals the importance to employers of the current structure, strategic direction and priorities of healthcare delivery in the UK, e.g. the *NHS Constitution* or equivalent frameworks across the UK, and the requirement to prioritise patients and their care, ensuring that the patient and service provided by HCS is at the centre of all learning, assessment and work-based practice;
    iii. introduces learning in relation to new scientific and technological developments as these become available.
24. **Curriculum development and maintenance:** The first BSc (Hons) curricula in HCS were published in 2010. Recently the NSHCS and the Council for HCS Education in Higher Education and its PTP Special Interest Group, professional bodies and other stakeholders have contributed to updating the scientific and professional content of the curriculum[21], resulting in this 2016 edition of the curricula. Led by the NSHCS, all MSC curricula will be subject to regular review, with all stakeholders given the opportunity to contribute to each review. Current and previous versions of the BSc (Hons) HCS programmes and work-based learning guides can be found on the NHS Networks website.[22]
25. BSc (Hons) HCS programmes leading to an academic award must be aligned to current NHS policy and strategy and equivalent policy documents for the devolved

[21] including taking into account external feedback on the curricula undertaken by the Institute of Education (IOE)
[22] http://www.networks.nhs.uk/nhs-networks/msc-framework-curricula and https://www.nshcs.hee.nhs.uk/

administrations and should be consistent with current professional body guidance. HEIs should ensure they keep abreast of future strategic direction and policy.

1.5 Programme Delivery

26. **Programme delivery:** HEIs and employers are expected to ensure that all teaching, learning and assessment is up-to-date and informed by research to ensure that at graduation HCSPs meet the Framework for Higher Education Qualifications (FHEQ) descriptor at level 6. By undertaking a research project learners should become aware of the major contribution the HCS workforce makes to research and innovation to benefit patients, patient outcomes and the delivery of healthcare.
27. Although HEIs will deliver the programme described in this curriculum according to their local requirements, the key principles of programme delivery that underpin the NSHCS accreditation process[23] involve:
    - programmes must deliver all of the BSc (Hons) PTP learning outcomes (and will, de facto, deliver the outcomes required by the Level 6 HCSP apprenticeship standard which maps to the curricula) and indicative content, which the HEE Education and Training Scrutiny Group (ETSG) has advised meets the requirements of *Modernising Scientific Careers: The UK Way Forward* and the Academy for HCS's *Good Scientific Practice;*
    - wherever possible, delivering the principles and knowledge underpinning practice should occur before the work-based learning;
    - ensuring programmes meet current NHS education quality metrics and current AHCS and HCPC Standards of Education and Training;
    - ensuring that employer host departments, patients and the public are involved in the design, implementation, delivery and review;
    - the use of fair, valid, reliable, and clearly articulated assessment programmes for all modules, and the timing and content of which should consider and complement the work-based assessment programme;
    - the provision of a robust learner support and mentoring system, together with clearly defined arrangements to identify and support learners in difficulty (including the support services in place) clearly defined;
    - delivery of the programme within a high-quality teaching and learning environment with appropriate resources and facilities to support teaching and research;
    - teaching staff who are research active with a track record of undertaking high-quality research of national and potentially international standing that is relevant to the practice of HCS and the NHS.
28. Good Scientific Practice (GSP) underpins the PTP and the Level 6 HCSP apprenticeship standard and spans both the academic and work-based programmes. Key professional practice learning outcomes are included in the BSc (Hons) programme through its GSP syllabus, thus embedding the standards of professionalism set out in GSP in all aspects of the delivery and assessment of the programme. Learners should be encouraged to develop a range of skills to support their professional life and CPPD spanning communication, leadership, personal reflection, duty of care, duty of candour, critical reflection, giving and receiving feedback, career planning and commitment to lifelong learning, and show development and maturation in these areas through the degree programme.

[23] In Scotland NES is responsible for accreditation of PTP programmes.

29. HEIs should ensure that all staff involved in each BSc (Hons) programme have read and are aware of the requirements of *Good Scientific Practice* and the GSP syllabus in the PTP.
30. **Teaching and learning:** It is expected that a blended learning approach will be adopted, based on a model of learner-centred adult learning that balances and integrates face-to-face teaching, e-learning, etc., and considers the broader requirements of each BSc (Hons) programme. It is anticipated that a broad range of teaching and learning activities will be utilised, appropriate to the learning outcomes. Learners should be enabled to gain the skills necessary to manage their own learning, and to exercise initiative and personal and professional responsibility. The learning strategy matrix and proformas outlined in 'Liberating Learning'[24] describe a range of activities that may be appropriate to this BSc (Hons) programme. They are likely to include:
    - Case study/discussions
    - Debate
    - Discussion forums
    - Expert briefings
    - Interactive lectures
    - Individual tutoring
    - Learner-led and tutor-led seminars
    - Library study
    - Personal critical reflection and action planning
    - Problem-based learning
    - Role play
    - Self-assessment
    - Self-directed learning activities
    - Simulation
    - Skills teaching
    - Team projects
    - Tutor-led small group learning
31. It is also expected that e-learning and, where possible, m-learning[25] opportunities will be available to enable to be active participants in a range of learning activities. Work-based learning will also contribute to the academic educational experience of the learner through, for example, seminars, journal clubs, local and national scientific and education meetings.
32. All academic and NHS staff leading or contributing to the BSc (Hons) programme should be appropriately qualified to teach and assess within the academic and/or work-based environment and have up-to-date knowledge of the requirements of the programme, GSP and the Standards of Proficiency for HCSPs. Further details can be found in the Accreditation Guidance from the NSHCS.[26]
33. **Interprofessional learning:** Opportunities to enable interprofessional and interdisciplinary learning, within and outside HCS, should be a fundamental part of each programme.

[24] Liberating Learning, The Report of the Conference of Postgraduate Medical Deans' ad hoc Working Group on the Educational Implications of the European Union Working Time Directive and the subsequent European Working Time Regulations: November 2002 (revised 2009).
[25] JISC TechDis: see **http://www.jisctechdis.ac.uk/technologymatters/mobilelearning** for further information with respect to mobile (m) learning.
[26] http://www.nshcs.org.uk/for-trainees/accreditation/134-accreditation-for- heis

34. **Patient-centred care:** The delivery of high-quality, compassionate, patient-centred care should be an integral part of each degree programme, with the emphasis on the contribution of the HCS workforce to ensure that learners are aware that their actions have an impact on the patient and the patient's family. They should make clear and explicit links to new models of service delivery, care and patient pathways. The responsibility of all staff in the NHS to maximise quality, productivity and efficiency and to continually strive to improve services should be stressed. Equally important is the ability of graduates from the PTP to communicate with the general public with respect to HCS, leading to a better-educated public that is encouraged to take responsibility for its own health and wellbeing and have a greater understanding of the role that science plays in society.
35. **Patient and public involvement:** The HEI programme team must have mechanisms in place to ensure that there is meaningful patient and public involvement in the design, delivery, development and quality assurance of each programme. It is expected that patients will be represented on course committees at all levels and contribute to teaching, learning and assessment.
36. The participation of patients and the public in HCS in all aspects of education and training brings a number of benefits, including:
    - active, constructive lay involvement in the training of healthcare scientists;
    - assisting in the development, monitoring and evaluation of HCS training programmes and their outcomes;
    - operating as lay advisors to all professionals, academics, researchers and others involved in the teaching of healthcare scientist trainees (including the private and charity sector);
    - engaging with professionals, academics, researchers, patients/carers and the general public to promote education/publicity about the work and impact of healthcare scientists on the health of the community;
    - developing protocols and training opportunities that involve lay persons in the delivery, analysis and evaluation of training programmes;
    - initiating and supporting ideas/proposals/research questions about HCS and its impact on patients.

1.6 Introduction to Work-based Learning

37. The overall aim of the PTP is to prepare the learner to fulfil the function of a HCSP working in a clinical HCS setting. The programme combines and integrates both academic and work-based learning and has a strong patient and clinical focus. Within the first year it is expected that the experiential component will start broad with short 'tasters' across a theme, with some exposure to other aspects of patient pathways, for example a clinic, patient education programme, medical records, or other area of healthcare. This will give the learner a wide appreciation of the many specialisms and a more holistic view of the areas that contribute to high-quality care.
38. The work-based programme is divided into modules, all of which are focused on service need, patient/care and continuous service improvement. Each module follows a standard format. The aim and scope of each module is described followed by the:
    - **Learning Outcomes** – high-level descriptors of the required work-based achievements for the module;
    - **Clinical Experiential Learning** – the learning activities that will facilitate learning and achievement of the stated outcomes;

- **Competences** – further outcome-based statements for each learning outcome;
- **Knowledge and Understanding** - as applied to appropriate competences.

39. Both the curricula and the apprenticeship standard are based on GSP[27] and HCPC Standards[28], resulting in a direct relationship between the two, ensuring that the curricula deliver the underpinning knowledge, skills and professionalism required by the standard. The learning outcomes of the curricula are clearly focused on employer and service requirements, reflecting patient care and clinical pathways and continuous improvement in a given area of HCS.
40. The work-based training for all learners has three components, which correspond to the academic programme, all of which are underpinned by the professional practice curriculum:
    - induction;
    - theme training;
    - specialist training.
41. It is anticipated that all learners will have an induction period in each employer/host department at the beginning of the apprenticeship and/or of each placement. The duration and timing of work-based placements will vary, depending on the HEI in which the learner studies.

1.7 Employing and Training Departments

42. The training and work environment is vital for successful training in the BSc and in this context includes each of the employers, training departments and other healthcare settings facilitating work-based training. The success of the training and the learner experience requires the commitment and enthusiasm from employers and those in the work environment to provide high quality, well-supervised training, underpinned by work-based formative assessment and a close working relationship with the HEI.
43. Training departments and employers should therefore ensure that they are fully familiar with the components of the BSc (Hons) programme, including the work-based training programme, including the required learning outcomes, competences and assessment processes, and have been trained by the HEI in each work-based assessment method. Additionally, the responsibilities for mentoring and supervision, whilst the learner is on placement should be clear, including access to HEI learner support services.
44. **Induction**: At the start of the training programme learners should be provided with an induction programme by employers and training units. Initial work-based induction should include an overview of the:
    - hospital/employer/healthcare setting and local policies, including health and safety, confidentiality, data protection, etc., relevant to the employment;
    - range of services provided by the department;
    - range of people who use the services provided by the department;
    - function, operation, and routine and corrective maintenance requirements of equipment appropriate to the section(s) of the department in which the trainee will be working;

[27] https://www.ahcs.ac.uk/wordpress/wp-content/uploads/2013/09/AHCS-Good-Scientific-Practice.pdf
[28] http://www.hcpc-uk.org/assets/documents/100004FDStandards_of_Proficiency_Biomedical_Scientists.pdf

- host trust IT systems, including the library and knowledge service as required.

45. **Supervision**: At the core of successful work-based employer training is appropriate educational and clinical supervision, facilitation and feedback. It is recommended that each learner is allocated to a training officer[29] from within the host/employing department. Learners are advised to ensure that a planned schedule of meetings with their training officer is agreed early in training, commencing with a meeting during the first week.
46. BSc educational and clinical supervision should promote learning, reflective practice and action planning. It will need to ensure that the learner becomes proficient in the specific skills and competences required by the curriculum, helping them to develop self-sufficiency and self-awareness in the ongoing acquisition of skills and knowledge. At every stage, patient safety must be paramount.
47. The first supervision meeting should be set up during the first week of the training programme. At the first meeting the training officer should ensure that the learner is following the agreed induction programme. It is recommended that the following areas should be explored and agreement reached at the first meeting with respect to the:
    - expectations of the training officer and learner;
    - responsibilities of the training officer and learner;
    - confidentiality;
    - boundaries between the training officer and learner;
    - frequency and duration of planned supervision meetings;
    - methods of communication and responsibility for arranging meetings;
    - level of support and arrangements for communications between meetings;
    - models of reflection and action planning;
    - record keeping;
    - content of the work-based training programme;
    - for apprentices, clarity between their employment responsibilities and their learning opportunities (i.e. formal training/learning time)
    - the approach to assessment;
    - sources of help and support.
48. The HEI and employers are responsible for ensuring that learners have access to training opportunities to enable the achievement of all the learning outcomes of the BSc (Hons) and where required, to meet the apprenticeship standard. In return learners are expected to take responsibility for:
    - ensuring that they fulfil their obligations to the HEI, to employers, to departments providing work base training and to patients (especially with regard to patient safety and confidentiality) as healthcare professionals;
    - engaging as active adult learners by initiating work-based assessments; contributing to learning activities; taking into account feedback received from their trainers and assessors; and giving considered and constructive feedback on their experience of their training.

1.8 Assessment

49. **Purpose of assessment:** The purpose of assessment is to enable the learner to demonstrate that they have the requisite knowledge, skills, values, behaviours and

[29] For the purposes of this document training officer has been used; however, the title may vary between departments and may be subject to a title change in England as part of developments for the whole of the professional healthcare workforce.

attitudes to work as a HCSP and meet standards of education and training, professional skills, conduct performance and ethics to provide reassurance to the public and the appropriate regulatory bodies. Given the integrated nature of this academic and work-based degree, each HEI's assessment programme must address both academic and work-based assessment (see Section 1.11 below) and must support assessment for learners undertaking the programme through an on-site academic programme or through an apprenticeship.

50. The full BSc (Hons) HCS assessment programme should support both assessment *for* and assessment *of* learning, and in particular:[30]
    - help clarify what good performance is (goals, criteria, standards);
    - encourage 'time and effort' on challenging learning tasks;
    - deliver high-quality feedback information that helps learners to self-correct;
    - encourage positive motivational beliefs and self-esteem;
    - encourage interaction and dialogue around learning (peer and teacher–learner);
    - facilitate the development of self-assessment and reflection in learning;
    - involve learners in decision making about assessment policy and practice;
    - support the development of learning communities;
    - integrate and complement the work-based assessment programme:
    - help teachers adapt teaching to learner needs;
    - for apprentices, facilitate and ensure readiness for the synoptic EPA.
51. The HEI must have in place a clear, overarching strategic and systematic approach to assessment that fits with the curriculum and delivers assessment methods that are valid, reliable/generalisable, feasible, fair, acceptable and defensible, and is led by assessment experts. The approach to the assessment of the BSc (Hons) HCS should also be cognisant of and complement the work-based assessment programme, which is defined by the NSHCS and which is part of all NSHCS accredited BSc (Hons) programmes. In addition, where an integrated degree is offered, enabling those undertaking the degree through an apprenticeship route, the end-point assessment (EPA) must conform to Department for Education (DfE) requirements.[31]
52. The assessment programme should be designed to enable the learner to obtain regular and constructive feedback on progress and achievement. It should encourage critical reflection and action planning, identifying both strengths and areas for development and improvement.
53. The approach to assessment should include and be overseen by a central co-ordinating leadership group or assessment-focused group in the HEI. The role of this group is to advise and scrutinise assessment across modules and years in order to build a consistent approach to assessment across the whole programme, involving module/programme leaders as appropriate. The HEI's overall assessment strategy should be documented in a clear and accessible manner with accountabilities clearly allocated. The strategy should also demonstrate how the approach is based on a sound understanding of the evidence base, academic literature and good practice in assessment.

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[30] Nicol DJ (2007) Principles of good assessment and feedback. REAP International Online Conference. www.reap.ac.uk/public/Papers/Principles_of_good_assessment_and_feedback.pdf (accessed 2.12.09).

[31] At the time of publication of the 2016 PTP curricula the Level 6 EPA was awaiting publication. Once published it should be available via: https://www.gov.uk/government/collections/apprenticeship-standards#healthcare-standards (see Healthcare Science section)

54. Key areas that are required for NSHCS accreditation and which must be covered by an HEI's Assessment Strategy include:
    - a clear statement of accountabilities, including the governance structure for assessment;
    - the balance between academic and work-based assessment;
    - the balance between formative and summative assessment;
    - clarity on the EPA programme for apprentices and preparation for it;
    - the assessment of each module, including the contribution of individual assessments and examinations within the module;
    - progression criteria;
    - the range of valid, reliable and appropriate assessment techniques that will be utilised across the programme and for each module;
    - the process for providing clear and timely information for learners;
    - how all examiners will be selected and trained (including refresher training) and the guidelines that will be given;
    - the mechanisms in place to ensure comparability of standards and to share good practice, including external examiners;
    - how standard setting is undertaken;
    - how opportunities for learner feedback will be maximised, including time lines and importance of developing learners-centred feedback;
    - the arrangements for assessment of learners with a disability, which should be consistent with the ability to undertake this modified practice in the workplace setting;
    - an assessment blueprint demonstrating the relationship between each assessment and the learning outcomes of the programme;
    - exemplar criteria and marking scheme, including critical reflective writing;
    - the process of appointing external examiners;
    - a defined role for external examiners that includes contributing to the review and development of assessment strategies and providing advice from an overarching perspective;
    - the role and contribution of patients and the public to the assessment programme.
55. The on-programme assessment of the degree modules will include a range of formative and summative assessment approaches, for example essays, reports, completion of practical tasks and work-based projects as well as formal summative examinations as the degree progresses. In addition, a programme of formative work-based assessments will support progression through the degree, ensuring that for apprentices, there is adequate opportunity to practise scientific skills, and to gain feedback, as preparation for the EPA for apprentices.
56. For those undertaking the degree through an apprenticeship, the learner must achieve the award of the BSc (Hons) and pass the EPA. HEIs will be required to be on the SFA's RoATP and RoAAO. Where the EPA is not integrated as part of the degree programme, the EPA will be delivered following completion of the degree by an organisation on the RoAAO. In the event of failure to pass either the degree course or the EPA, completion of the apprenticeship cannot be achieved. Employers should be assured that HEIs have robust and well-established assessment and quality assurance processes, incorporating internal moderation and external examiners to ensure independence across the degree programme and consistency between HEIs and that these Honours degrees are all approved by the QAA.

1.9 On-programme (work-based) Assessment

57. **Formative assessment** is used to support learners in the workplace by ensuring regular, structured checks on developing competence. The formative assessment tools detailed in Table 1are used by all workplaces to capture evidence of the skills, knowledge, behaviours, attitudes and values required by the apprentice in the workplace, in their enactment of their practitioner role and in their interactions with colleagues, peers, patients and the public (where and as appropriate). Formative assessment helps to uncover performance issues or concerns and the HEI and employer will be able to support the learner and provide extra guidance where such issues might arise to ensure that the learner is fully supported in meeting the outcomes of the degree and the apprenticeship for those required to do so. The delivery of that support is likely to differ across HEIs and workplaces.
58. For apprentices, completion of the formative assessment programme is essential preparation for the synoptic EPA near the end of the programme that is designed to capture evidence of the apprentice's mastery of the skills, knowledge, behaviours and values defined in the standard (see section below for more detail). Table 1 also sets out the arrangements for the summative work based employer assessment competency log that encapsulates the performance of the HCSP learner in the demonstration of competences that have been achieved.
59. The high level learning outcomes and clinical experiential learning required in each of the areas of HCS are set out in the PTP curricula for HCSPs.[32] These detail the work-based learning outcomes that form an integral part of the degree programme for HCSPs should be used to guide the selection of formative assessments. The curricula also provide the templates for each of the work-based assessment tools to ensure assessment standardisation across the work-based programme (see appendices).
60. This formative work-based assessment programme should find a balance between what is realistic and achievable for employers and learners and what provides sufficient evidence of progress/competence. It is therefore recommended that learners, in consultation with their clinical supervisor, undertake work-based assessments as set out in the table below:

Recommended number of assessments per academic year

Year 1		**Year 2**		**Year 3**	
2 1	DOPs CBD	4 1 1	DOPs CPD OCE	4 2 2	DOPs CBDs OCEs
	Competence		Competence		Competence

[32] and in the Institute of Biomedical Science's (b) Registration Portfolio for those undertaking this degree programme

Table 1 Summary of On-Programme (work-based) formative assessment methods and the Employer based Competency Log[33]

Assessment tool	Direct Observation of Practical skills (DOPs)	Observed Clinical Event (OCE)	Case-based Discussion (CbD)	Work-based/employer based Competency Log
Purpose	Assessment of a practical skill or procedure, including, where relevant, interaction with a patient through direct observation. Learner and assessor feedback is generated, learning needs identified and an action plan agreed	Observation and assessment of a clinical encounter or interaction with colleagues with respect to an aspect of patient care. The format and approach is similar to DOPs but takes place with a patient present or when the learner is working with clinical colleagues	A clinical case is used as the basis for a discussion to assess the learner's application of knowledge and understanding of an aspect of an activity they have been part of, e.g. professional practice, communication, leadership, science, the role of healthcare science in patient care	A record of attainment which demonstrates achievement of each work-based competence and clinical experiential learning (CEL) activity, reflecting the performance of the learner, including the demonstration of achievement of aspects of the apprenticeship standard where this is appropriate
Method	The assessor observes a practical activity and facilitates learner- centred feedback either during or immediately following the observation. The learner generates an action plan and agrees this with the assessor.	The assessor observes a clinical activity and facilitates learner-centred feedback either during or immediately following the observation. The learner generates an action plan and agrees this with the assessor.	A discussion between the learner and assessor with respect to any aspect of a case, including professional practice/*Good Scientific Practice*	An assessor reviews the evidence provided by the learner to support achievement of each competence and CEL. The expectation is that as the learner progresses the competency log will demonstrate an evidential base of achievement/progression.

[33] Whilst each individual assessment is formative review of the log as a whole forms part of the summative assessment of the degree and of the EPA.

1.10 Work-based/employer based Competency Log

61. All learners will also be required to provide evidence to demonstrate that they have successfully achieved the competences set out in the curriculum and for apprentices, those competences specifically reflected in the apprenticeship standard, through success in the EPA. The learner is expected to provide evidence to demonstrate achievement of each competence, which should then be reviewed and signed off by the trainer in the competency log. Learners will gain competence at their own pace, but in line with the overall delivery of the relevant modules. Each competence will link directly to a specific work-based learning outcome in the curriculum and some competences may be linked to more than one learning outcome. Successful completion of the curriculum and, for an apprentice the standard, cannot therefore be achieved until achievement of *all* work-based learning outcomes have been demonstrated.
62. On-going completion of a competency log (the high level requirements are set out in Table 1 above) is therefore essential for progression within the programme and as a requirement for achievement of the degree and completion of the apprenticeship. The expectation is that as the learner progresses the competency log will demonstrate an evidence base of their achievement. The achievement of each competence and a record of all on-programme work-based assessments must be recorded using a written log, or the HEI's own electronic system. For those in HCS programmes this should be presented within a Portfolio of Evidence that is accumulated by the learner to demonstrate learning, competence and insight into practice and professionalism.[34]

1.11 End Point Assessment for apprenticeships

63. All apprentices will have to pass the EPA that is designed as a final check on the apprentice's workplace competence and ability to integrate their learning across all elements of the PTP.
64. Where the EPA has been integrated into the degree programme, the degree obtained will provide verification that both the academic part of the standard and the required synoptic assessment have been met and graded. As described above, some HEIs may choose to deliver a non-integrated degree, which will not include the EPA. If an employer chooses to use such a non-integrated degree programme for an apprenticeship, then it will be required to ensure that the synoptic assessment described below is delivered by an appropriately accredited organisation that is on the SFA's RoAAO. In addition the employer will be responsible for the costs attached to the EPA which is delivered by the AO. Although a funding cap for this degree apprenticeship standard has not yet been allocated, employers and HEIs should be aware that if the full amount is used for the delivery of the degree programme, employers will be required to fund the EPA outwith the apprenticeship levy which will be an additional cost to the overall

[34] For those learners studying to become healthcare science practitioners through biomedical science degrees, the IBMS Registration Portfolio provides the framework for education and training. This Portfolio enables biomedical science learners to demonstrate their fitness to practice through evidence of competence that can be independently verified against the HCPC Standards of Proficiency. This supports the biomedical science graduate in registering with the HCPC. A combined portfolio reflecting this Registration Portfolio and the HCS Portfolio of Evidence for those undertaking the PTP programme in the Life Sciences is currently under development.

apprenticeship. For integrated degrees, HEIs are likely to have to pay a small fee to the AHCS to help support and maintain standardisation of the EPA assessment tools (Situational Judgment Test; Professional Discussion and Research evaluation templates).

65. The formative work-based assessment programme described above supports apprentices in acquiring and building the skills, knowledge, behaviours and values defined in the apprenticeship standard. Underpinned by the academic learning and summative assessment provided by the HEI, this will ensure that the learner is prepared and ready to understanding the synoptic assessment, demonstrating these.
66. All apprentices will therefore have to pass the EPA that is designed as a final check on the apprentice's workplace competence and ability to integrate their learning across all elements of the PTP. In integrated degrees, the EPA is delivered towards the end of the three-year programme; in non-integrated degrees, the EPA is undertaken after the degree is achieved and is administered by a registered AO.
67. The EPA is conducted with an independent assessor towards the end of the degree programme and takes approximately two hours. It consists of the following three components, each of which must be passed independently:
    i. one hour written Situational Judgment Test (SJT) set by the HEI;
    ii. face-to-face Professional Discussion, taking approximately 40 minutes, between the apprentice and the trained independent assessor (who has not been involved in the education or training of the apprentice) and based on questions arising from the assessor's scrutiny of the apprentice's portfolio of workplace-based assessments, experiences and critical reflection;
    iii. a presentation of up to 10 minutes to the assessor, in which the apprentice describes the research project undertaken as part of their degree programme. The presentation is followed by a 15 minute question and answer session with the independent assessor on issues raised by the research.

The link to the full version of the Level 6 HCSP Apprenticeship EPA was not available at the time of publication of the 2016 curricula but should be available via: https://www.gov.uk/government/collections/apprenticeship-standards#healthcare-standards

1.12 Learner Support and Mentoring

68. The learner supervision, support and mentoring systems will span the academic and work/employer-based elements of the programme, and the relationship between the two systems must be clear to learners, employers work-based staff and HEI staff. The learner supervision, support and mentoring system must be designed to encourage safe and effective practice, independent adult learning, appropriate professional conduct of the learner, the safety of the patient and quality assurance of all work activities of each learner. Those undertaking the role of supervisor or mentor must have relevant qualifications and experience and have undertaken appropriate and up-to-date training. The HEI will be expected to have an academic supervisory, support and mentoring scheme in place and to provide access to learner support services.
69. **Fitness to practise:** The HEI must have a clear policy with respect to fitness to practice (FtP), which must clearly articulate how staff and learners are made aware of the policy and how the policy is implemented. The HEI's FtP policy should reflect

and be aligned to the FtP policy of the AHCS and the HCPC (for Life Sciences). Alongside this must be a clear policy on how learner whistleblowers are supported. Breaches of professional practice and behaviour identified by the HEI or during HEI activities must be reported and investigated in accordance with this FtP policy and accurate records maintained within the HEI.

1.13 Annual Monitoring of Progress and Equality and Diversity

70. **Annual monitoring of progress:** All on-site academic learners will usually be expected to complete the requirements for the BSc (Hons) HCS award within three years after initial registration, in accordance with the regulations of each HEI. For those undertaking the degree through an apprenticeship, employers and the HEI should ensure that good progress is made, although through agreement between the employer, the apprentice and the HEI, the duration of the degree may take longer than 3 years.
71. Programme governance must include annual monitoring of progress that considers the outcome of the review of each module (including learner and patient evaluation) and the handling and consideration of the external examiner's report. This process should enable the programme leaders to identify and propose changes to the programme in response to feedback.
72. **Equality and diversity:** HEE, the AHCS, HEI's, scientific professional bodies and employers are committed to the principle of equality and diversity in employment, membership, academic activities, assessment, examinations and training.
73. As part of this ethos these groups are committed to inspire and support all those who work, train and provide training in HCS to operate in a fair, open and honest manner. The approach taken is a comprehensive one and reflects all areas of diversity, recognising the value of each individual. This means that no one is treated less favourably than another on the grounds of ethnic origin, nationality, age, disability, gender, sexual orientation, race, or religion, in accordance with the Equality Act 2010[35]. This reflects not only the letter but also the spirit of equality legislation, taking into account current equality legislation and good practice.

1.14 Critical Reflection and Learning

74. **Critical reflection**: Critical reflection on progress and performance is an integral part of both the BSc and of being a professional. Learners should therefore be taught the theoretical models underpinning reflection and required to regularly critically reflect on their progress and performance, enabling them to develop skills in self-evaluation and action planning.
75. This should be used to support the learner as they learn from experiences gained in the workplace. Reflection should help the learner to understand and learn from work-based situations/experience, bridging the gap between theory and practice. Each learner should be taught about the underpinning evidence for the use of reflection and encouraged to reflect regularly on their progress and performance, developing their skills in self-assessment and action planning.

[35] Equality Act 2010. http://www.legislation.gov.uk/ukpga/2010/15/contents

76. Learners should be encouraged to think about what they are doing as they do it (Reflection *in* Action) and retrospectively to reflect on practice (Reflection *on* Action). The reflective practitioner should describe and analyse experience, considering how the situation might have been handled differently and what other knowledge would have been helpful. When critically reflecting on an experience, learners should use a recognised model of reflection.

1.15 Relationships and Partnerships

77. **The National School of Healthcare Science:** The NSHCS is hosted by HEE, West Midlands Local Team. The NSHCS provides a national co-ordinating and oversight function to support the delivery of work-based training for HCS training and education programmes. With respect to the PTPs it is responsible for:
    - holding HEIs to account for the quality, integration, co-ordination and delivery of both the academic programme and work-based training through the accreditation process, ;
    - identification of programme issues that may need to be addressed and resolved and reporting these as part of agreed governance arrangements;
    - liaising with LETBs on local issues and problems and their resolution;
    - providing advice and support to accredited PTP programmes as necessary;
    - overarching review to ensure common standards of delivery and content and recommending ongoing training activities to support the CPD of work-based trainers.

    The School can be contacted at www.nshcs.org.uk

78. **The Academy for Healthcare Science:** The AHCS provides the professional voice for the HCS workforce and quality assurance of HCS training and education.[36] Included in its functions are to:
    - act as a strong and coherent professional voice;
    - be able to influence and inform a range of stakeholders on all matters relating to HCS and scientific services;
    - act as the overarching body for professional issues related to education, training and development in the UK health system, including the provision of UK-wide quality assurance across education and training arrangements[37];
    - provide the infrastructure to support the professional regulation/registration of the HCS workforce, including:
        - a system of professional accreditation of education and training programmes for the regulation/registration of the HCS workforce;
        - setting the professional standards for the delivery of accredited registers as required by the PSA's for Health and Social Care to ensure consistency and coherence across all HCS education and training programmes;
        - taking the central role in the sponsorship of the registers to achieve 'accredited' status as set out by the PSA;

[36] http://www.ahcs.ac.uk/wordpress/wp-content/uploads/2014/08/18th-Feb-2016-AHCSQA-Framework-pdf.pdf

[37] The Institute of Biomedical Science (IBMS) also has a role in approving laboratories for training and accrediting healthcare science degrees in the Life Sciences.

- being a HCPC education provider for the statutory regulation of Clinical Scientists;
- offering a system for equivalence across the HCS workforce to enable those who can demonstrate evidence of training, experience and qualifications equivalent to the required outcomes of HCS training programmes to support entry on to the PSA accredited ACHS register www.academyforhealthcarescience.co.uk/

1.16 Programme Outcomes

79. On completion of the BSc (Hons) all graduates should be able to demonstrate the following outcomes that align to QAA level 6, extended and contextualised to the NHS job role for HCSP.

Professional Practice

i. Professional practice that meets the professional standards of conduct, performance and ethics defined by *Good Scientific Practice*[38] and is safe, lawful and effective, and within the scope of practice for the role undertaken, while maintaining fitness to practice.
ii. Personal qualities that encompass communication skills, self-management, self-awareness, acting with integrity and the ability to take some responsibility for self-directed learning, maintaining their own health and wellbeing, critical reflection and action planning to maintain and improve performance.
iii. 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.
iv. The ability to work, where appropriate, in partnership with other professionals, often as part of a multidisciplinary team (MDT), supporting staff, service users and their relatives and carers while maintaining confidentiality.
v. The ability to work with the public, service users, patients and their carers as partners in their care, embracing and valuing diversity.
vi. A range of transferable generic academic skills and capabilities to the exercise of initiative and personal responsibility, decision making in complex and unpredictable contexts spanning study skills, independent learning, reflective practice, communication, team working, research and leadership skills.
vii. A conceptual understanding that enables the learner to devise and sustain arguments and/or to solve problems, using ideas and techniques, some of which are at the forefront of a specialism of HCS.
viii. The ability to apply problem-solving skills, evaluate evidence, arguments and assumptions, to reach sound judgements and to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

Scientific and Clinical Practice

[38] and the HCPC in the Life Sciences

ix. An understanding of a complex body of knowledge, some of it at the current boundaries of an academic discipline, and the ability to apply the scientific principles, method and knowledge to HCS.
x. The ability to apply scientific method and approaches to analytical techniques, HCS research, development and innovation.
xi. The ability to perform technical investigations/skills and technical reporting of quality assured tests, investigations and interventions on patients/samples safely and skillfully, adhering to applicable legislation and in compliance with local, national and international guidelines.
xii. The ability to provide therapeutic interventions, some of which may be specialist, in a number of specialisms.
xiii. A systematic understanding of key aspects of their field of study, including acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of defined aspects of HCS.
xiv. High-quality clinical and scientific practice that applies core scientific knowledge, skills and experience in a healthcare setting, places the patient/public at the centre of care, prioritising patient safety and dignity and reflecting NHS/health service values and the NHS Constitution.

Research, Development and Innovation

xii. An appreciation of the uncertainty, ambiguity and limits of knowledge, the ability to manage their own learning, and to make use of scholarly reviews and primary sources (for example refereed research articles and/or original materials appropriate to HCS).
xiii. To apply the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding, and to initiate and carry out projects.
xiv. An understanding of the strengths, weaknesses and opportunities for further development of healthcare and HCS as applicable to their own clinical practice, research, audit, innovation and service development, which either directly or indirectly leads to improvements in patient experience, clinical outcomes and scientific practice.

Clinical Leadership

xv. Scientific and clinical leadership appropriate to the HSCP job role based on the continual advancement of their knowledge, skills and understanding through the independent learning required for CPPD.

1.17 Transferable Skills

80. It is expected that all BSc (Hons) HCS programmes will meet the descriptors for a higher education qualification at level 6 (Bachelor's degree with honours) outlined by the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (FHEQ) and the Scottish Credit and Qualifications Framework (SCQF) Level 10. On graduation all will have gained a range of transferable generic academic skills and capabilities, including study skills, independent learning, problem solving, reflective practice, communication skills, team working, research, innovation and leadership skills. These transferable skills should be embedded in the curriculum developed by each HEI. For those undertaking the apprenticeship programme, employers will be further assured that apprentices have gained the

transferable skills required, given the successful completion of the EPA as part of or in addition to the degree programme.

SECTION 2: BSc(Hons) IN LIFE SCIENCES

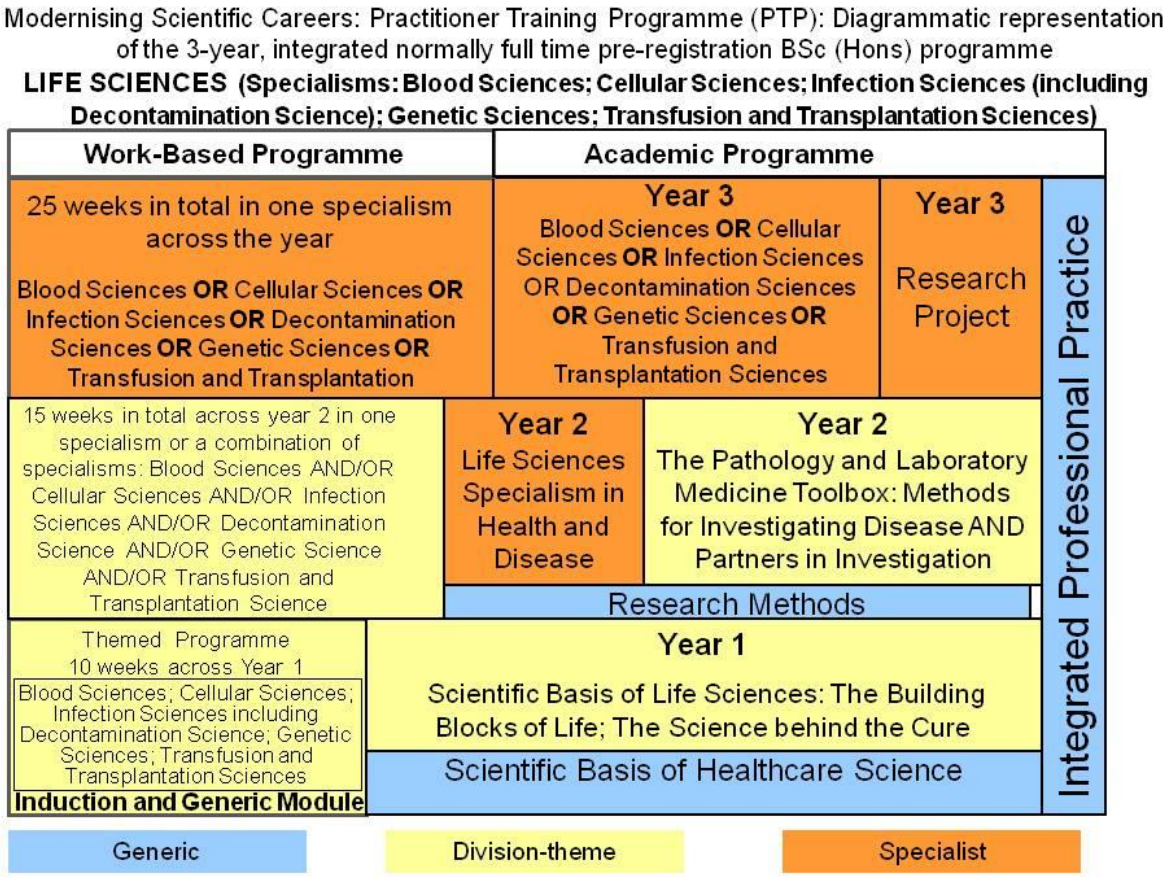
2.1 Details of the PTP Curriculum in Life Sciences

The BSc (Hons) in Healthcare Science for the Practitioner Training Programme will begin with an induction programme provided by the academic provider. All HCS students will then complete a generic introductory module entitled ‘Scientific Basis of Healthcare Science’ and will begin to develop their knowledge and understanding of professional practice. Later in Year 1 they will complete the modules ‘The Building Blocks of Life’ and ‘The Science behind the Cure’, and during Year 1 students will undertake 10 weeks of work-based learning, where they will have an opportunity to gain an overview of the life sciences specialisms in the workplace.

In Year 2, the students will continue to develop their learning in areas that are common across Life Sciences namely ‘The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease’ and ‘Partners in Investigation’. They will also continue to build on their professional practice and complete the generic Research Methods module. Year 3 is a specialist year where students will continue to build their professional practice, specialist practice and their research skills, including completing a research project in their chosen specialism. During Years 2 and 3 there will be a further 40 weeks of work-based learning, which can be in a range of life sciences specialisms in Year 2 and then focus in a specialist area in Year 3. The emphasis will be developing and building knowledge and skills as they move through the programme consistently demonstrating the requisite attitudes, behaviours and skills.

The diagram overleaf summarises the training programme for Life Sciences.

Modernising Scientific Careers: Practitioner Training Programme (PTP): Diagrammatic representation of the full-time, three-year, pre-registration, integrated academic and work-based BSc (Hons) in Healthcare Science



This programme can be delivered part-time through employment, e.g. through an apprenticeship

2.2 List of Modules

Year	Module Title	Credits
1	Professional Practice	10
1	Scientific Basis of Healthcare Science – integrated module across body systems	60
1	The Building Blocks of Life	20
1	The Science Behind the Cure, including work-based training	30
2	Professional Practice	10
2	Research Methods	10
2	The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease	60
2	Partners in Investigation	10
2	Work-based Training	10
	BLOOD SCIENCES (Clinical Biochemistry; Haematology; Immunology)	
2	Blood Sciences in Health and Disease	20
3	Professional Practice	10
3	Blood Science Specialisms in Action	60
3	Research Project in Blood Sciences	30
3	Work-based Training	20
	CELLULAR SCIENCES (Cytology; Histology; Reproductive Science	
2	Cellular Sciences in Health and Disease	20
3	Professional Practice	10
3	Cellular Science Specialisms in Action	60
3	Research Project in Cellular Sciences	30
3	Work-based Training	20
	INFECTION SCIENCES (Clinical Microbiology, Decontamination Science; Virology)	
2	Infection Sciences in Health and Disease	20
3	Professional Practice	10
3	Infection Science Specialisms in Action	60
3	Research Project in Infection Sciences	30
3	Work-based Training	20
	GENETIC SCIENCES	
2	Genetic Sciences in Health and Disease	20
3	Professional Practice	10
3	Genetic Science Specialisms in Action	60
3	Research Project in Genetic Sciences	30
3	Work-based Training	20
	TRANSFUSION AND TRANSPLANTATION SCIENCES	
2	Transfusion and Transplantation Sciences in Health and Disease	20
3	Professional Practice	10
3	Transfusion and Transplantation Sciences Specialisms in Action	60
3	Research Project in Transfusion and Transplantation Sciences	30
3	Work-based Training	20

SECTION 3: GENERIC GOOD SCIENTIFIC PRACTICE SYLLABUS

Introduction

The Academy for Healthcare Science (AHCS) has set out the principles, values and the standards of behaviour and practice for the HCS workforce in the document *Good Scientific Practice* (GSP). These standards and values must be achieved and maintained in the delivery of work activities, the provision of care and personal conduct. In addition, the AHCS holds a Professional Standards Authority accredited register for Healthcare Science Practitioners (HCSP) not covered by statutory regulation.[39] The Health and Care Professions Council (HCPC) sets out the Standards of Proficiency, which must be achieved for statutory registration as a Biomedical Scientist on completion of the Life Sciences Practitioner Training Programme (PTP).

Key professional practice learning outcomes are included in the BSc (Hons) programme through its GSP syllabus thus embedding the standards of professionalism set out in GSP in all aspects of the delivery and assessment of the programme. The GSP syllabus is a common component of all PTP curricula and must be followed throughout the whole training period, with engagement at the appropriate level, depending on the stage of training.

The syllabus is divided into five domains. These align with the five domains of *Good Scientific Practice*:

- Domain 1: Professional Practice
- Domain 2: Scientific Practice
- Domain 3: Clinical Practice
- Domain 4: Research, Development and Innovation
- Domain 5: Clinical Leadership

Each domain contains an overall learning objective, which is described by a number of competence statements. These are presented as:

- knowledge to be acquired and applied;
- practical skills to be demonstrated;
- attitudes and behaviours to be consistently displayed.

[39] Practitioners who have completed an HCPC-approved PTP course in Life Sciences are eligible to apply for Statutory Regulation as Biomedical Scientists.

As students progress through the three-year programme they are expected to critically reflect on their performance as they build on and extend the depth and complexity of the knowledge, skills and experience (spiral learning) that underpins professional practice as a HCSP.

Domain 1: Professional Practice

Topic	Professional Practice	GSP reference
Learning objective	By the end of the course the student will be able to practise as an autonomous professional, usually within the context of the MDT, applying their knowledge appropriately, exercising their own professional judgement, practising within the legal and ethical boundaries of the role of a HCSP and critically reflecting on and developing their professional practice.	
High-level learning outcome(s)	By the end of the course, the student will be able to: • Demonstrate verbally, in written form and in practice, the knowledge and understanding of the professional requirements of a HCSP in the provision of patient-centred care and healthcare service(s) as described in GSP.	
Knowledge	By the end of the course students will know, comprehend and apply their knowledge and will be able to: 1. Discuss the standards of proficiency of the AHCS and the HCPC and the role of regulation for healthcare professions. 2. Explain the importance of placing the patient at the centre of care and consider services from a user's point of view. 3. Explain the importance of keeping professional knowledge and skills up to date, working within the limits of personal competence. 4. Analyse the ethical, legal and governance requirements arising from working as a HCSP across a range of situations. 5. Summarise and evaluate the evidence to support the high levels of probity required when working at the level of HCSP. 6. Justify the importance of personal health and wellbeing in order to ensure that personal performance and judgement are not affected by their own health. 7. Analyse NHS organisation, policy, values and practice as it affects the provision of healthcare, healthcare science and the patients and populations it serves. 8. Discuss theories of teaching and learning to underpin the role of the HCS workforce in education as a learner, teacher or trainer, according to the best contemporary clinical and educational standards. 9. Explain a range of strategies to ensure that the voice of patients and the public is embedded in all aspects of healthcare, healthcare science and healthcare science education in the academic and work-based setting. 10. Understand the need, where appropriate, to hold indemnity insurance.	1.1.1 1.1.4 1.1.5 1.1.6 1.1.7 1.2 1.2.5 1.4.1 1.4.2 2.3.2

Topic	Professional Practice	GSP reference
Technical procedures and clinical skills	By the end of the course, the student will be expected to apply in practice a range of professional, technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC. They will be able to: 1. Work within their agreed scope of practice. 2. Apply their understanding of professional practice with conduct that places the patient at the centre of care in a manner that promotes patient wellbeing and self-care in all academic and work-based activities. 3. Apply their understanding of the role and importance of continuing personal and professional development (CPPD) to ensure that their professional knowledge and skills are kept up to date. 4. Respond to the ethical, legal and governance requirements arising from working at the level of a HCSP, applying and accruing knowledge and evidence. 5. Work in a manner that demonstrates probity in every aspect of professional practice at all times. 6. Make appropriate judgements to ensure they limit their work or stop practising if their performance or judgement is affected by their health and raise any concerns about the performance of colleagues with their supervisor. 7. Maintain records accurately, comprehensively and comprehensibly in accordance with applicable legislation, protocols and guidelines. 8. Raise concerns through appropriate channels if they have evidence to believe that the practice or judgements of colleagues are impaired and are a matter of concern in relation to patient safety. 9. Work in accordance with relevant current NHS policy, guidelines and practice.	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7 1.1.8 1.1.10 1.2.2 2.2.3 2.2.6 2.2.7 2.3.2 3.2.2 4.1.2
Attitudes, values and behaviours	By the end of the course, the student will be expected to demonstrate the attitudes, values and behaviours of a HCSP and will be able to: 1. Apply evidence-based personal and team professional practice that places the patient at the centre of care. 2. Apply knowledge, experience and critical reflection to identify personal development needs using a range of tools, and develop and update action plans to ensure that they keep skills and knowledge up to date. 3. Display a professional commitment to ethical practice, consistently operating within national and local ethical, legal and governance requirements.	1.1.1–1.1.10 1.2 1.3.1 2.2.3 2.2.6 2.2.7 2.2.8 4.1.2

Topic	Professional Practice	GSP reference
	4. Apply the principles of GSP and its professional standards, performing to the highest standards of personal behaviour in all aspects of professional practice. 5. Consistently operate in accordance with relevant current NHS policy and practice. 6. Operate consistently within a sphere of personal capability and level of authority, managing personal workload and objectives to achieve quality of care.	4.1.6

Domain 2: Scientific Practice

Topic	Scientific Practice	GSP reference
Learning objective	By the end of the course, the student will establish and maintain a safe environment in which healthcare science is delivered, drawing on the knowledge, skills, attitudes and behaviours required for safe and effective practice. They will be able to deliver high-quality scientific services in a safe and secure working environment. They will also be able to reflect on their performance or situations and record their action plans as they continually evaluate, review and improve their practice.	
High-level learning outcome(s)	By the end of the course, the student will be able to: • Explain and apply the knowledge, skills, values and behaviours required of a HCSP in the delivery of high-quality, evidence-based and patient-centred services in a safe and secure working environment to which they effectively contribute.	
Knowledge	By the end of the course, the student will know, comprehend and apply the key concepts of the knowledge base relevant to healthcare science and will be able to: 1. Describe information and communication technologies (ICT) appropriate to the HCS specialism. 2. Explain the principles and practice of quality control, external quality assessment and quality management as applied to relevant areas of healthcare science. 3. Explain the role of audit and the audit cycle and how it is used as a tool to facilitate continuous quality improvement. 4. Discuss and justify relevant health and safety legislation and guidance for the workplace.	1.4.5 2.2.2 2.2.7 2.2.9 2.3.1- 2.3.4 3.1.17 3.2.1 4.1.2
Technical procedures and clinical skills	By the end of the course, the student will be expected to apply in practice a range of professional, technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC. They will be able to: 1. Apply evidence-based practice, both current and new/emerging, in determining the use of scientific investigations and methods. 2. Apply the appropriate HCS knowledge and skills required for safe and effective practice. 3. Perform a range of routine technical and clinical skills relevant to the HCS division and theme in which they are training. 4. Master the use of ICT in relevant areas of healthcare science.	1.1.5 1.4.5 2.1.2 2.1.3 2.2.2 2.2.3 2.2.4 2.2.6 2.2.7 2.2.8

Topic	Scientific Practice	GSP reference
	5. Apply and maintain quality standards and related quality control, assessment and management techniques to assure the validity of scientific and technical investigations routinely, and assure the quality of personal practice. 6. Participate in scientific and technical audit to determine that investigations and methods are fit for purpose. 7. Practise and promote the importance of health and safety standards in the workplace, prioritising patient safety and the safety of all those working in or accessing the specialism, and identify actions that will improve health and safety, including reducing the risk of infection.	2.2.9 2.3 3.1.5 3.2.1 4.1.2 4.1.6
Attitudes, values and behaviours	By the end of the course, the student will be able to: 1. Consistently practise in accordance with the values described in *Good Scientific Practice* and the NHS Constitution to ensure high-level, safe, effective and compassionate patient-centred care.	1.1.1- 1.1.11 1.2

Domain 3: Clinical Practice

Topic	Clinical Practice	GSP reference
Learning objective	By the end of the course, the student will be able to deliver high-quality, effective and safe technical clinical services, performing a range of clinical and/or laboratory skills consistent with the required roles, responsibilities and values of a HCSP within their scope of practice.	
High-level learning outcome(s)	By the end of the course, the student will be able to: • Explain and demonstrate the need for and the ability to deliver high-quality technical and clinical services in the investigation and management of patients as part of a MDT. • Apply and demonstrate those skills, attitudes, values and behaviours, in a variety of settings and with regard to a variety of political, social, technical, economic, organisational and professional contexts required of a HCSP delivering consistently high-quality technical and clinical services that are targeted to meet the needs of the individual and group needs of patients.	
Knowledge	By the end of the course, the student will know, comprehend and apply their knowledge and be able to: 1. Describe the pathophysiology of common diseases that result in a referral to HCS services in a specific area of practice. 2. Evaluate the contribution of the MDT to patient care, patient safety and quality outcomes and consider barriers to effective MDT working. 3. Describe the key roles of the healthcare professions that contribute to the MDT in your area of practice. 4. Discuss your role within the MDT and evaluate the clinical effectiveness of the team, reflecting and suggesting as appropriate areas for improvement. a. Describe typical behaviours of team members, evaluate the clinical effectiveness of the team and suggest areas for improvement as appropriate. 5. Discuss and evaluate the principles and practice of clinical audit as a tool to evaluate the effectiveness of services.	1.1.4 1.1.5 1.3.2 1.3.6 2.2.2 2.3.4 4.1.2 4.1.10
Technical procedures and clinical skills	By the end of the course, the student will be expected to apply in practice a range of professional, technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC. They will be able to: 1. Deliver high-quality technical clinical procedures in the investigation and management of patients. 2. Apply in practice consistently high standards in the technical skills required in the investigation and	1.3.2 1.3.6 2.1.3 2.1.4 2.1.5

Topic	Clinical Practice	GSP reference
	management of patients and critically reflect on their performance. 3. Assist and where appropriate, perform a range of equipment management skills, e.g. preventative maintenance, fault finding and calibration. 4. Attend and, if appropriate, actively participate in MDT meetings. 5. Assist in the design, data collection, data analysis and reporting within the clinical audit cycle.	2.1.6 2.2.1-2.2.4 2.2.6-2.2.9 4.1.10
Attitudes, values and behaviours	By the end of the course, the student would be expected to demonstrate the attitudes and behaviours necessary for the role of a HCSP and will be able to: 1. Commit to the provision of high standards of technical clinical services, taking account of the political, social, technical, economic, organisational and professional environment, and act as a positive role model. 2. Promote the importance of active participation of HCSPs in MDT meetings. 3. Advocate clinical audit as a tool to evaluate and optimise clinical services and communicate ideas and aspirations.	1.1.4 1.1.5 1.1.6 1.1.11 1.2.5 1.3.2 2.3 4.1.10

Domain 4: Research, Development and Innovation

Topic	Research, Development and Innovation	GSP reference
Learning objective	By the end of the course, the student will be able to justify the need for evidence-based practice, audit and innovation to support the development and improvement of patient services and patient safety, and will demonstrate the necessary knowledge, skills, attitudes, values and behaviours in relation to research, development and innovation in the pursuit of improved patient safety and care.	
High-level learning outcome(s)	By the end of the course, the student will be able to: • Explain the need for evidence-based practice, audit and innovation, within appropriate governance and ethical frameworks, in the delivery, development and improvement of patient-centred services. • Undertake or participate in personal or collaborative research, audit, development (professional or service) and innovation, applying the knowledge, skills, attitudes, values and behaviours required of a HCSP.	
Knowledge	By the end of the course, the student will know, comprehend and apply their knowledge and be able to: 1. Know the principles and applications of scientific enquiry, including the evaluation of treatment efficacy, the research process and research methodologies. 2. Know the value of research to the critical evaluation of practice research. 3. Describe and justify how and why research and development is undertaken within governance and ethical frameworks. 4. Explain ways in which the individual HCSP can support the wider healthcare team in the spread and adoption of innovative technologies and practice.	1.1.5 4.1.1 4.1.2 4.1.3 4.1.6 4.1.7 4.1.8 4.1.9 4.1.10
Technical procedures and clinical skills and procedures	By the end of the course the student will be expected to apply in practice a range of professional, technical and clinical skills, and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC. They will be able to: 1. Apply research methods and techniques to initiate and complete a research project, development or innovation project. 2. Evaluate research and other evidence to inform own practice.	4.1.3 4.1.6 4.1.8 4.1.9
Attitudes, values and behaviours	By the end of the course, the student would be expected to demonstrate the attitudes and behaviours necessary for the role of a HCSP and will: 1. Work with appropriate research and development governance, legal and ethical frameworks.	1.1.4 1.1.5 4.1.1

Topic	Research, Development and Innovation	GSP reference
	2. Promote the need for evidence-based practice to support the provision of high-quality care. 3. Be flexible and adaptable to the introduction of new scientific, technical, diagnostic, monitoring, treatment and therapeutic procedures into routine practice. 4. Keep up to date as part of a commitment to CPPD.	4.1.2 4.1.4 4.1.6

Domain 5: Clinical Leadership

Topic	Clinical Leadership	GSP reference
Learning objective	The NHS Leadership Academy states that: '*The Healthcare Leadership Model is to help those who work in health and care to become better leaders. It is useful for everyone – whether you have formal leadership responsibility or not, if you work in a clinical or other service setting, and if you work with a team of five people or 5,000.*' By the end of this course the student should therefore begin to develop an understanding of the key concepts of leadership; the skills, qualities and abilities of effective leaders and how their personal qualities affects the experiences of patients and service users, the organisation, the quality of care provided, and the reputation of the organisation itself. They will be introduced to assessment tools to measure their personal qualities and critically reflect on performance to identify their own personal qualities, including values, principles and assumptions, developing action plans to adapt personal behaviour as necessary.	
High-level learning outcome(s)	By the end of the course the student will: • Understand the principles underpinning the current NHS clinical leadership frameworks[40] and the associated personal qualities and the impact of personal qualities on the culture and climate within which the student, their colleagues and teams work.	
Knowledge	By the end of the course, the student will know, comprehend and apply their knowledge and be able to: 1. Explain the difference between leadership and management. 2. Discuss the skills, qualities and abilities of effective leaders. 3. Describe the impact of personal qualities on the culture and climate the student, their colleagues and teams work in. 4. Discuss how what the student does and how they behave affects the experiences of patients/service users, the organisation, the quality of care provided, and the reputation of the organisation itself.	5.1.1-5.1.6 5.1.10 5.1.12
Technical procedures and clinical skills	By the end of the course the student will be expected to apply in practice a range of professional, technical and clinical skills, and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC. They will be able to: 1. Identify and develop skills in listening, observing and using feedback.	

[40] http://www.leadershipacademy.nhs.uk/wp-content/uploads/dlm_uploads/2014/10/NHSLeadership-LeadershipModel-colour.pdf

Topic	Clinical Leadership	GSP reference
	2. Identify conflict style and develop skills in negotiating and mediating conflicts.	
Attitudes, values and behaviours	By the end of the course the student would be expected to demonstrate the personal qualities that underpin the practice of a HCSP, namely self-awareness, e.g. self-confidence; self-control; self-knowledge; personal reflection; resilience and determination. Students should be aware of their strengths and limitations in these areas and how these will have a direct effect on how they behave and interact with others. Students will be expected to critically reflect on performance to identify their own personal qualities, including values, principles and assumptions, developing action plans to adapt personal behaviour as necessary.	1.3.1 1.3.2 1.3.3 1.3.4 1.3.5 1.3.6

SECTION 4: GENERIC PROFESSIONAL, SCIENTIFIC AND TECHNICAL MODULES

This section covers the three generic modules that will be studied by all students undertaking an MSC accredited BSc (Hons) Healthcare Science integrated degree.

- Year 1–3: Professional Practice [10 credits per year developing learning at Level 4, Level 5 and Level 6]
- Year 1: Scientific Basis of Healthcare Science [60 credits]: Level 4
- Year 2: Research Methods [10 credits]: Level 5
- Year 3: Research Project [30 credits]: Level 6

GM(i): Professional Practice (Years 1, 2 and 3)

Topic	Professional Practice [10 credits per year]	GSP reference
Learning objective	The overall aim of this module is to ensure that the student has the underpinning knowledge, understanding and skills and consistently demonstrates the values, attitudes and behaviours to perform a range of technical and clinical skills working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC. Professional practice should be embedded in every aspect of the three-year programme to enable the student to develop and build their professional practice as they progress through the programme. In line with the concept of a spiral curriculum, students will encounter the same subject in different parts of the curriculum, but across the three-year programme the complexity will increase and the student will reinforce previous learning, gradually increasing their knowledge, skills and confidence.	
Knowledge	On successful completion of this programme the student will: **Professional practice** 1. Describe the values and principles that underpin the shared UK NHS and Social Care services culture, including the HEE five key workforce characteristics and the NHS Constitution, especially the values relating to compassion, transparency, candour, openness and leadership.[41,42] 2. Describe the role of the HCSP and how HCSPs contribute to the delivery of high-quality healthcare. 3. Explain the importance of placing the patient at the centre of care and discuss how this translates into practice. 4. Discuss the impact of culture, equality and diversity on practice. 5. Discuss how HCS services can work in partnership with patients and service users to ensure the views of patients are central to delivering, develop and maintaining high-quality, safe services. **Legal and ethical boundaries of practice** 6. Analyse the ethical, legal and governance requirements arising from working at the level of a HCSP across a range of situations. 7. Discuss the principles, guidance and law with respect to medical ethics, patient confidentiality (the	1.1 1.2 1.3 2.3.4 4.1.1 5.1.2 5.1.4

[41] Investing in People – Workforce Plan for England.
[42] Maps to Francis Report, Recommendation 2 – also to The Speaking Up Charter.

Topic	Professional Practice [10 credits per year]	GSP reference
	limits of the concept of confidentiality), informed consent, equality and diversity, safeguarding, use of chaperones. 8. Summarise the procedures to follow if cautioned, charged with a criminal offence, suspended, or have restrictions placed on personal scientific, clinical, or professional practice. 9. Justify the importance of personal health and wellbeing to ensure personal performance and judgement is not affected by their own health. **Patient safety and quality** 10. Explain the importance of protecting patients from risk or harm presented by another person's conduct, performance, or health, and what to do when concerns are identified or raised. 11. Discuss how to share information appropriately with patients, carers, colleagues and other services to support the quality of care. 12. Explain the common causes of error and understand the critical incident reporting process, recognising the importance of promoting a no-blame culture. 13. Explain approaches to procedures for identifying and reporting critical incidents and receiving and responding to complaints. 14. Explain current national and local policy issues as they affect the service provided by HCSPs and the HCS workforce. 15. Discuss your role in healthcare science and its contribution to the delivery of high-quality healthcare. 16. Explain why it is important that the HCS workforce takes reasonable care of health and safety at work for themselves, members of their team and others. **Communication skills** 17. Explain the principles that underpin effective verbal and written communication within your role, including those who do not have English as a first language and communication with people with sensory and cognitive impairments. **Leadership** 18. Explain the concept of shared leadership and the associated personal qualities and behaviours that promote shared leadership, and apply this knowledge within the work base.	

Topic	Professional Practice [10 credits per year]	GSP reference
	Continuing personal and professional development 19. Explain the importance of keeping professional knowledge and skills up to date and working within the limits of their personal competence. 20. Justify the rationale for engaging in CPPD and critical reflective practice, and evaluate methods for recording, learning, developing and evaluating action plans.	
Technical skills and procedures	By the end of the course, the student will be expected to apply in practice a range of professional, technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC.	1.1 1.2 1.3

GM(ii): Scientific Basis of Healthcare Science (Year 1)

Topic	Scientific Basis of Healthcare Science [60 credits]	GSP reference
Learning objective	The overall aim of this introductory module is to provide all students with a broad knowledge and understanding of clinical science and scientific knowledge, contextualised to the practice of healthcare science and the services provided by their HCS division/specialism. Central to this is the contribution of healthcare science to patient care, patient safety, service delivery, research and innovation, often at the cutting edge of science, for example genomics, personalised medicine and clinical bioinformatics. All members of the HCS workforce must understand the impact of their work on patients and patient care and remember that their work has a direct or indirect impact on patient care. As an introductory module it will provide an overview and reinforcement of key concepts with respect to the organisation, structure and function of the body, and important areas such as the psychosocial aspects of health and disease, clinical pharmacology and therapeutics, genomics, personalised/precision medicine and clinical bioinformatics. Achievement of each learning outcome provides the building blocks for the division- and specialism-specific learning to follow, ensuring a common starting point for all students. This module is designed to provide students with broad scientific knowledge to underpin their future practice to provide the foundations for study in any area of healthcare science.	
Knowledge	On successful completion of this module the student will: 1. Describe the structural, chemical, cellular and tissue organisation of the body and explain the cellular, tissue and systems responses to diseases. 2. Explain the structure and function of all body systems and the effects of common diseases. 3. Explain the principles and core concepts of clinical genetics, genomics and personalised/precision medicine and discuss in the context of patients referred to HCS services. 4. Explain the basis of epidemiology, public health, health prevention and health protection and discuss in relation to the role of the public health function and HCS services. 5. Explain the principles of clinical pharmacology and therapeutics and discuss in relation to patients referred to HCS services. 6. Explain the principles and core concepts of the sociology of health and illness and discuss those relevant to patients typically referred to HCS services. 7. Explain the basic principles of physics and clinical engineering that underpin healthcare science and discuss in relation to patients referred to HCS services.	1.1.4 1.1.5 1.1.6 2.1.6

Topic	Scientific Basis of Healthcare Science [60 credits]	GSP reference
	8. Explain the principles of clinical bioinformatics and health informatics and discuss their impact on healthcare, health and HCS services. 9. Explain a range of mathematical and statistical techniques that underpin the practice of healthcare science. 10. Keep up to date with developments in healthcare and healthcare science, identifying new and innovative scientific and technical developments and their application in healthcare science.	
Technical skills and procedures	By the end of this module the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC. Students will be expected to apply and develop their knowledge as they progress through the programme in their academic and work-based learning. They will also be expected to develop a range of study skills, including time management, organisational skills, using the library, search engines, self-directed learning, critical analysis and avoiding plagiarism.	1.1.4 1.1.5 1.1.6 2.2.4

GM(iii): Research Methods (Year 2)

Topic	Research Methods [10 credits]	GSP reference
Learning objective	The overall aim of this module is to ensure that the student has the knowledge, skills and experience of the place of research, development and innovation in the NHS in improving patient care, including prevention, diagnostics, treatment and service delivery. On completion of this module and the research project students should be able to generate ideas; assess, plan, conduct, evaluate, interpret and report research and innovation projects, which includes original research; and disseminate the findings and, where appropriate, the adoption of the findings. Students will extend their knowledge and application of mathematics, statistics and data presentation techniques gained in Year 1. This module will provide the underpinning knowledge to support the final year research project.	
Knowledge	On successful completion of this module the student will: 1. Explain and justify the process and importance of research, innovation and audit to the NHS and healthcare science. 2. Explain the current UK ethical, legal and governance frameworks within which human and animal research can be conducted. 3. Explain the principles of evidence-based medicine; literature and systematic review; and the development of clinical guidelines. 4. Describe a range of study designs and discuss the appropriate use of each method. 5. Describe and justify the use of statistical techniques to analyse data and a range of dissemination methods to share research findings.	4.1.1 4.1.7

GM(iv): Research Project (Year 3)

Topic	Research Project [30 credits]	GSP reference
Learning objective	The overall aim of this module, building on the Research Methods module, is for the student to apply the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding as they initiate and complete a research project. The research project may span scientific or clinical research, translational research, operational and policy research, clinical education research, innovation, service development, service improvement, or supporting professional service users. Research projects should be designed to take into account the current research programmes of the academic and/or work-based departments in which the research is to be conducted.	
Knowledge	By the end of this module the student will: 1. Discuss the range of research undertaken in health and healthcare science and how these are applied in the specialism in which the student is based. 2. Describe the ethical and governance approval processes required to undertake the planned research project.	1.1.4 1.1.5 4.1.1 4.1.2
Technical skills and procedures	On successful completion of this module and working within legal and ethical frameworks the student will be able to: 1. Work with a supervisor to design, plan and undertake a research project to test a hypothesis from conception to completion/archiving in accordance with ethical and research governance. regulations, drawing on expert advice where necessary and involving patients and service users. 2. Analyse the data using appropriate methods and statistical techniques and interpret, critically discuss and draw conclusions from the data. 3. Prepare a project report that describes and critically evaluates the research project, clearly identifying the strengths and weaknesses. 4. Present a summary of the research project, responding to questions appropriately. 5. Prepare a summary of the research project suitable for non-specialist and lay audiences.	4.1.1 4.1.2 4.1.3 4.1.6 4.1.8 4.1.9
Technical skills and procedures	On successful completion of this module and working within legal and ethical frameworks the student will be able to: 1. Undertake an evidence-based literature review, critically appraise the output, draw appropriate	2.1.6 2.2.4 4.1.1

Topic	Research Project [30 credits]	GSP reference
	conclusions and prepare a written report the findings, and where appropriate, use the findings to inform the third-year research project. 2. Present the outcome of the literature review to a non-scientific and scientific audience.	4.1.2 4.1.7 4.1.9

SECTION 5: DIVISION-THEME SCIENTIFIC AND TECHNICAL SYLLABUS

Life Sciences Syllabus

5.1 Attitudes, Behaviours and Values

The student will be expected to critically reflect on their professional practice and consistently demonstrate the professional attributes and insights required of a HCSP. The student will work within the Standards of Conduct, Performance and Ethics set by the AHCS in *Good Scientific Practice*, show respect and behave in accordance with *Good Scientific Practice*, understand what is required by the HCPC and know about current legislation applicable to the work of the profession.

Professional skills in Life Sciences

1. Be able to exercise a professional duty of care and act in a calm, controlled and reassuring manner, and maintain a professional manner in matters of attendance and appearance.
2. Recognise the limits of professional competence, seeking help and support and referring to colleagues appropriately.
3. Work effectively within a MDT, developing and maintaining professional relationships.
4. Value social diversity and its relationship to service provision in healthcare.
5. Understand the importance of maintaining personal health.

Understand the importance of patient-centred care

1. Treat patients, carers and their families with respect, kindness and compassion, putting them at their ease.
2. Understand the importance of and be able to obtain informed consent.
3. Show understanding of the patient's anxiety and be sympathetic and kind, respecting and understand individuals' beliefs and ways of coping with illness.
4. Appreciate the emotional and psychological impact the patient, relatives and carers might experience when undergoing investigations, diagnosis and treatment.
5. Appreciate that relationships with service users should be based on mutual respect and trust, and be able to maintain high standards of care even in situations of personal incompatibility.
6. Maintain confidentiality of patient information and data and understand the principles of information governance with awareness of the safe and effective use of health and social care information.

Transferable, communication and practical skills

1. Develop a balance between reflective practice and active exploration in personal learning and take responsibility for personal learning.

2. Develop, maintain and improve personal knowledge and skills, keeping skills and knowledge up to date, and understand the importance of career-long learning.
3. Consistently work safely, including being able to select appropriate hazard control and risk management, reduction or elimination techniques in a safe manner and in accordance with health and safety legislation.
4. Be able to establish safe environments for practice, which minimise risks to service users, those treating them and others, including the use of hazard control and particularly infection control.
5 Communicate effectively with the healthcare environment and clinical team, adapting communication to meet varying needs and overcoming barriers to understanding.
6. Communicate scientific information at a level appropriate to the audience, including the public.
7 Bring the highest levels of knowledge and skill at all times and understand how communication skills affect assessment of, and engagement with, service users.

Be able to practise as an autonomous professional, exercising professional judgement

1. Be able to assess a professional situation, determine the nature and severity of the problem and call upon the required knowledge and experience to deal with the problem.
2. Be able to make reasoned decisions to initiate, continue, modify, or cease treatment or the use of techniques or procedures, and record the decisions and reasoning appropriately.
3. Be able to initiate resolution of problems and be able to exercise personal initiative.
4. Recognise that they are personally responsible for and must be able to justify their decisions.
5. Be able to make and receive appropriate referrals.
6. Understand the importance of participation in training, supervision and mentoring.

The PTP syllabus for Life Sciences follows.

5.2 Division-theme Modules

This section covers the four division-theme modules that will be studied by all students undertaking Life Sciences.

LS(i): The Building Blocks of Life (Year 1)
LS(ii): The Science Behind the Cure, including work-based training (Year 1)
LS(iii): The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease (Year 2)
LS(iv): Partners in Investigation (Year 2)

Year 1
LS(i): The Building Blocks of Life
[20 credits]

Topic	**The Building Blocks of Life** **[20 credits]**	**GSP reference**
Learning objective	The overall aim of this module is that the student understands the classification, structure and function of the human body, together with knowledge of health, disease, disorder and dysfunction relevant to Life Sciences.	
Knowledge	By the end of this module the student will be able to: 1. Describe the structure and function of the major classes of carbohydrates, lipids and amino acids, nucleic acids, genes and chromosomes, and the underpinning of genetics and the human genome. 2. Describe the classification and role of proteins in the structure, integrity and function of biological systems. 3. Illustrate how abnormalities in structure and/or function of the structural elements of life may be responsible for human disease.	2.1.4
Technical and clinical skills	**The work-based learning outcomes to be achieved across Year 1 are described in LS(ii): The Science Behind the Cure, including work-based training (Year 1) and the work-based syllabus.**	

Year 1

LS(ii): The Science Behind the Cure, including work-based training
[30 credits]

Topic	The Science Behind the Cure, including work-based training [30 credits]	GSP reference
Learning objective	The overall aim of this module is that the student understands the organisation of the Life Sciences into scientific and clinical specialties and their interrelationships, the nature of work performed in these specialties and gains experience of the basics of good laboratory practice as applied to pathology, laboratory medicine and decontamination science, and is able to work safely and professionally within these environments. The Year 1 10-credit work-based module (see work-based syllabus) will provide a foundation from which students will build their knowledge, skills, experience and attitudes throughout the three-year programme of study and enable them to transfer these skills to employment in healthcare science. It is expected that this period of initial work-based training will provide the opportunity to apply their learning from the modules 'The Building Blocks of Life', 'The Science Behind the Cure' and 'Professional Practice' and begin to integrate and embed many of the professional practice learning outcomes, and enable students to practise safely in the workplace.	
Knowledge	By the end of this module the student will be able to: 1. Discuss the role of the following specialisms in the diagnosis, treatment and management of disease: blood sciences, cellular sciences including reproductive science, infection science, decontamination science, genetic science and transfusion and transplantation science. 2. Explain how Life Sciences is organised and integrated within laboratory medicine and discuss the roles undertaken by professionals working in the scientific and clinical specialties. 3. Discuss the basis of good laboratory/departmental practice, including the handling of biological specimens. 4. Be aware of the impact of pathology services on the patient care pathway and link aspects of human disease to patient care and outcomes. 5. Explore the key elements of an effective patient–practitioner partnership in Life Sciences. 6. Explain how HCS services are delivered across a range of healthcare settings, including the independent sector.	2.2.3 2.2.4 2.2.7 2.2.8
Technical and clinical	**Work-based training to be achieved across the Year 1**	

Topic	The Science Behind the Cure, including work-based training [30 credits]	GSP reference
skills	By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC and will be able to: 1. Perform a range of generic skills, including infection control, basic life support, communication and team working, adhering to health and safety regulations. 2. Perform, under direct supervision, basic procedures[43] in accordance with local health and safety regulations and quality requirements.	2.1.3 2.2.3 2.2.4 2.2.7

[43] This includes health and safety risk assessment, specimen/equipment reception, use of laboratory/departmental equipment and assisting with core methods.

Year 2

LS(iii): The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease [60 credits]

Topic	The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease [60 credits]	GSP reference
Learning objective	The overall aim of this module is that the student understands and gains experience of the principles, practice, quality assurance and application of commonly employed methods and techniques used across pathology, laboratory medicine and decontamination science. In the work base (during Years 2 and 3) the student will develop their skills and experience, and apply and extend their knowledge, skills and experience from Year 1 and the Year 2 modules 'The Pathology and Laboratory Medicine Toolbox' and 'Methods for Investigating Disease; Partners in Investigation'. On completion of this module the student will be able to be able to demonstrate practical skills in the processing of equipment and in the processing and analysis of specimens, including specimen/equipment identification, the effect of storage on specimens and devices and the safe retrieval of specimens and medical devices. They will competently perform safe and secure receipt, handling, storage and disposal of biological specimens and medical devices, working with laboratory and departmental information systems. They will also be able to demonstrate proficiency in core practical skills in the relevant specialism, e.g. blood science, cellular science, reproductive science, infection science, decontamination science, transfusion science, and molecular and genetic science, following standard operating procedures (SOPs) to the required quality standard. They will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD. ***Note:*** *Students will gain experience predominantly in the techniques of their main specialist area, e.g. blood sciences, cellular sciences, genetic sciences, infection science, decontamination science or transfusion and transplantation science.*	
Knowledge	By the end of this module the student will be able to: 1. Describe the basic principles, practice, quality assurance and application of a range of laboratory and medical equipment processing methods. 2. Know the extent of the role and responsibility of the laboratory/department with respect to the quality management of hospital, primary care and community-based services for point of care testing and	

Topic	The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease [60 credits]	GSP reference
	non-invasive techniques. 3. Evaluate the performance of one or more methods, including internal quality control (IQC) and external quality assessment (EQA) data, and recommend corrective action where appropriate. 4. Explain the sample and or medical device journey, including quality control and quality assurance.	 2.3.1 2.3.2 2.3.3
Technical and clinical skills	**Work-based learning to be achieved across Years 2 and 3** By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC, and will be able to: 1. Work in conformance with SOPs and conditions. 2. Store, safely retrieve, process and analyse specimens and or medical equipment. 3. Use laboratory/departmental information systems. 4. Validate scientific, technical data, observations and results from a range of procedures to inform repeat analysis, identify the need for additional investigations, reports and technical procedures. 5. Provide evidence of direct patient interaction, which may include laboratory medicine testing at the point of care, use of home monitoring equipment and interaction with other healthcare professionals and critically reflect on your learning and how this will impact on your technical practice.[44] 6. Perform an audit of the effectiveness of one or more methods, including the introduction of new methods, and evaluate the outcome in the context of the clinical application.	 2.1.3 2.1.1 2.2.2

[44] *This could be demonstrated, for example, through assisting with phlebotomy at the phlebotomy clinic, or performing a point of care testing (POCT) test with the patient present. For decontamination science this could include assisting with supporting patients to use equipment before discharge or within their home. The student should discuss the results/experience in the context of the clinical presentation of the patient with their supervisor.*

Year 2

LS(iv): Partners in Investigation
[10 credits]

Topic	Partners in Investigation [10 credits]	GSP reference
Learning objective	The overall aim of this module is that the student understands and gains experience of the importance of patient-centred care, evidence-based practice, clinical audit and multidisciplinary team (MDT) working.	
Knowledge	By the end of this module the student will be able to: 1. Discuss the importance of patient-centred care with reference to GSP and the NHS Constitution and discuss steps that can be taken within the Life Sciences to facilitate this. 2. Discuss and evaluate the value of MDT working in the investigation of patients or processing of medical devises. 3. Explain how the evidence base that underpins laboratory medicine is generated. 4. Describe the clinical audit process and justify the use of audit to support the optimisation of laboratory medicine services and local and national quality management systems. 5. Discuss how to deal with critical incidents either in the laboratory or involving patients, and recognise the impact the incident may have on diagnosis, treatment and patient care.	1.1.1 3.1.6 2.3.4 2.2.8 2.3.2 3.1.3
Technical and clinical skills	**Work-based learning outcomes should be achieved across Years 2 and 3 as described in module LS(iii): The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease and the work-based syllabus** By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC and will be able to: 1. Contribute effectively to work undertaken as part of a MDT. 2. Engage in evidence-based practice, evaluate practice systematically and participate in audit procedures. 3. Maintain an effective audit trail and work towards continual improvement.	3.1.6 2.2.2 2.3.4 2.3.4

SECTION 6: SPECIALIST BLOOD SCIENCES SYLLABUS

6.1 Specialist Modules for Blood Sciences

Interpretation of the high-level framework: Life Sciences specialising in Blood Sciences

	Module titles					
Year 3 Application to Practice	Professional Practice [10]	Blood Sciences in Action [60]		Research Project in Blood Science [30]		Work-based training 25 weeks [20]
Year 2 Technologies and Methodologies	Professional Practice [10]	Research Methods [10]	The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease [60]	Partners in Investigation [10]	Blood Sciences in Health and Disease [20]	Work-based training 15 weeks [10]
Year 1 Scientific Basics	Professional Practice [10]	Scientific Basis of Healthcare Science – integrated module across body systems [60]		The Building Blocks of Life [20]	The Science Behind the Cure to include 10 weeks of work-based training [30]	

[XX] = Number of credits

Generic modules: Common to all divisions of healthcare science

Division-theme modules: Shared by a group of specialisms, usually within a Healthcare Science division

Specialist modules: Specific to a specialism

Year 3

LSB(i): Blood Sciences in Health and Disease
[20 credits]

Topic	Blood Sciences in Health and Disease [20 credits]	GSP reference
Learning objective	The aim of the module is to ensure the student understands and gains experience of the application and delivery of core clinical biochemistry, haematology and immunology services in the investigation of acute and chronic system dysfunction.	
Knowledge	By the end of this module the student will be able to: 1. Discuss the application of clinical biochemistry methods used in the investigation of the function and dysfunction of systems, organs and tissues by the measurement of biochemical markers. 2. Discuss the application of haematological methods in the investigation of the function and dysfunction of systems, organs and tissues by the measurement of haematological markers. 3. Discuss the application of immunological and histocompatibility and immunogenetics methods in the investigation of the function and dysfunction of systems, organs and tissues by the measurement immunological markers. 4. Discuss the delivery of core and emergency clinical biochemistry and haematology services on a 24/7 basis. 5. Explain how to prepare reports for validation and identify how to prioritise those that require referral to senior colleagues.	2.1.3 3.1.15 2.1.5 3.1.9 3.1.15
Technical and clinical skills	**Work-based learning outcomes should be achieved across Years 2 and 3 as described in module LS(iii): The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease, and LSB(ii): Blood Science Specialisms in Action and the work-based syllabus.**	

Year 3

LSB(ii): Blood Science Specialisms in Action
[60 credits]

Topic	Blood Science Specialisms in Action [60 credits]	GSP reference
Learning objective	The aim of this module is to enable the student to understand and gain experience of the application and delivery of a range of essential services and specialised methods and techniques from across the blood sciences, and to understand the importance of blood sciences in the clinical investigation, diagnosis, monitoring and treatment of patients.	
Knowledge	By the end of this module the student will be able to: 1. Discuss and critically evaluate the application of a range of methods and techniques and illustrate their value in relevant areas of clinical practice, including clinical pathways across the blood sciences, including: • Clinical biochemistry (including those areas where participating in national screening programmes) • Haematology • Transfusion and transplantation • Clinical immunology • Histocompatibility and immunogenetics	2.1.1 2.1.2 2.1.3 2.1.4 2.1.6
Technical and clinical skills	By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC, and will be able to: 1. Perform common procedures within blood sciences using automated and manual methods to current quality standards, recognising individual variations and sample integrity issues. 2. Perform quality control and quality assurance procedures relevant to the blood sciences to current quality standards and interpret performance for both IQC and (EQA). 3. Perform point of care testing (POCT) analysis in blood sciences and understand the result obtained in the context of the clinical presentation of the patient, for example: blood glucose, international normalised ratio (INR), urine analysis, HbA1c, blood gases.	2.1.1 2.1.3 2.2.3 2.2.4 2.3.2 2.3.3 3.1.3 3.1.8 3.2.2

Topic	Blood Science Specialisms in Action [60 credits]	GSP reference
	Clinical biochemistry 1. Perform common procedures for the investigation of a range of biochemical disorders, including hepatic, renal, cardiac, thyroid, diabetes, myeloma, enzymic, acid base, endocrinology and plasma proteins. **Haematology and transfusion** 1. Perform common procedures in haematology in the investigation of a range of haematological disorders, including anaemias, haematological malignancies, haemoglobinopathies and coagulation. 2. Perform common procedures in transfusion: blood group and antibody screen, simple antibody identification and cross-matching. **Immunology** 1. Perform common procedures in the investigation of immunological disorders, allergy and myeloma, including protein electrophoresis, enzyme-linked immunsorbent assay (ELISA), and recommend immunofluorescence where available.	2.2.3 2.2.4 2.2.3 2.2.4 2.2.3 2.2.4

SECTION 7: SPECIALIST CELLULAR SCIENCES SYLLABUS

7.1 Specialist Modules for Cellular Sciences

Interpretation of the high-level framework: Life Sciences specialising in Cellular Science

	Module titles						
Year 3 Application to Practice	Professional Practice [10]	Cellular Sciences in Action [60]			Research Project In Cellular Science [30]		Work-based training 25 weeks [20]
Year 2 Technologies and Methodologies	Professional Practice [10]	Research Methods [10]	The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease [60]		Partners in Investigation [10]	Cellular Sciences in Health and Disease [20]	Work-based training – 15 weeks [10]
Year 1 Scientific Basics	Professional Practice [10]	Scientific Basis of Healthcare Science – integrated module across body systems [60]			The Building Blocks of Life [20]	The Science Behind the Cure to include 10 weeks of work-based training [30]	

[XX] = Number of credits

Generic modules: Common to all divisions of healthcare science

Division-theme modules: Shared by a group of specialisms, usually within a Healthcare Science division

Specialist modules: Specific to a specialism

Year 3

LSC(i): Cellular Sciences in Health and Disease
[20 credits]

Topic	Cellular Sciences in Health and Disease [20 credits]	GSP reference
Learning objective	The aim of this module is for the student to understand and gain experience of the application and delivery of cellular pathology services in the investigation of disease and understand the importance of cellular pathology specialisms in the clinical investigation, diagnosis and monitoring of patients.	
Knowledge	By the end of this module the student will: 1. Describe the role of cellular sciences in the diagnosis of cancer, including the key features of tumour cells and the cellular and molecular pathology underpinning malignant disease. 2. Describe the preparation of human tissue for cellular pathology testing. 3. Describe the normal macroscopic, cellular and sub-cellular appearance of a range commonly investigated tissues. 4. Explain the range of staining techniques used in the microscopic examination of prepared tissue samples. 5. Explain how core and specialised cellular pathology services are organised. 6. Explain how to prepare reports for validation and identify how to prioritise those that require referral to senior colleagues.	2.1.1 2.1.3 2.2.3 2.2.4 2.1.5 3.1.9 3.1.15
Technical and clinical skills	By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC, and will be able to: 1. Perform common procedures within cellular sciences using automated and manual methods to current quality standards, recognising individual variations and sample integrity issues. 2. Perform QC and QA procedures relevant to the cellular sciences to current quality standards and interpret performance for both IQC and EQA. **Work-based learning outcomes should be achieved across Years 2 and 3 as described in module LS(iii): The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease, and CS(ii): Cellular Science Specialisms in Action and the work-based syllabus.**	2.1.1 2.1.3 2.2.3 2.2.4 2.3.2 2.3.3

Year 3

LSC(ii): Cellular Science Specialisms in Action
[60 credits]

Topic	Cellular Science Specialisms in Action [60 credits]	GSP reference
Learning objective	The aim of this module is for the student to understand and gain experience of the application and delivery of a range of core and specialised methods and techniques from across the cellular sciences and to understand their importance in the clinical investigation of patients.	
Knowledge	By the end of this module the student will: 1. Discuss the pathological basis of diseases diagnosed within cytopathology (e.g. cancer, infection, inflammation) and critically evaluate the application and value of cellular science methods and techniques in relevant areas of clinical practice. 2. Describe the systematic investigation of pathological specimens as part of the diagnostic and monitoring processes in a range of common conditions. 3. Discuss the application of histopathology methods and techniques and evaluate how this influences the diagnosis of disease. 4. Discuss the application of cytopathology methods and techniques and illustrate their value in relevant areas of clinical practice. 5. Discuss the use of post-mortem tissue and adherence to the Human Tissue Act and Human (Scotland) Tissue Act 2006. 6. Describe the male and female reproductive systems and the laboratory procedures undertaken within embryology and andrology services, including investigation of infertility and the role of the Human Fertilisation and Embryology Authority (HFEA). 7. Discuss the ethics involved with sperm donation, egg harvesting and storage, gamete and embryo cryopreservation, and cryopreservation prior to cancer treatment, including referral to appropriate services, consent for sperm storage and options for posthumous use.	3.1.4 3.1.6 3.1.7 3.1.12
Technical and clinical skills	By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC, and will be able to: **Histology**	2.2.1

Topic	Cellular Science Specialisms in Action [60 credits]	GSP reference
	1. Assist in dissection and specimen transfer using relevant dissection equipment, e.g. knives and scalpels, to current quality and safety standards. 2. Use tissue processors and embedding equipment to current quality and safety standards. 3. Recognise normal and abnormal results and errors and take the appropriate action. 4. Work in accordance with health and safety regulations and daily care aspects relating to the use of microtomes, and use the equipment to current quality and safety standards. 5. Use automated immunohistochemistry instruments to current quality standards. 6. Use molecular equipment and fluorescence microscopes where available in specialist hubs. **Cytology** 1. Perform a range of common cervical cytology routine tests and preparation, e.g. sample production, liquid-based cytology (LBC) preparation, Papanicolau (PAP) staining, and other emerging techniques including, molecular techniques in cytology, e.g. human papillomavirus (HPV) testing instruments to current quality standards. 2. Assist in the preparation and testing where appropriate to current quality standards, including molecular testing. 3. Perform a range of non-gynaecological cytology techniques routine tests. 4. Assist in the preparation and testing where appropriate to current quality standards. 5. Perform special cytology staining using clinically relevant techniques to specified quality standards, recognising normal and abnormal results to current quality standards. Where available students should participate in immunocytochemistry testing in cytology. **Reproductive science** 1. Use instruments to specified quality standards, e.g. dilution instruments, microscopes, pH meters/papers, counting chambers. 2. Perform semen analysis techniques, e.g. measurement of sperm concentration, motility, morphology, liquefaction, volume, etc., recognising normal and abnormal results. 3. Perform semen analysis of samples with very low numbers or absent sperm, including post-vasectomy semen analysis.	2.2.3 2.2.4 2.2.3 2.2.4 2.1.3 2.1.4 2.2.4 2.2.3 2.2.4

SECTION 8: SPECIALIST INFECTON SCIENCES SYLLABUS

8.1 Specialist Modules for Infection Sciences

Interpretation of the high-level framework: Life Sciences specialising in Infection Science

	Module titles									
Year 3 Application to Practice	Professional Practice [10]	Infection Sciences in Action [60]					Research Project in Infection Sciences [30]		Work-based training 25 weeks [20]	
Year 2 Technologies and Methodologies	Professional Practice [10]	Research Methods [10]	The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease [60]				Partners in Investigation [10]	Infection Sciences in Health and Disease [20]		Work-based training 15 weeks [10]
Year 1 Scientific Basics	Professional Practice [10]	Scientific Basis of Healthcare Science – integrated module across body systems [60]					The Building Blocks of Life [20]	The Science Behind the Cure to include 10 weeks of work-based training [30]		

[XX] = Number of credits

Generic modules: Common to all divisions of healthcare science

Division-theme modules: Shared by a group of specialisms, usually within a Healthcare Science division

Specialist modules: Specific to a specialism

Year 2

LSI(i): Infection Sciences in Health and Disease
[20 credits]

Topic	Infection Sciences in Health and Disease [20 credits]	GSP reference
Learning objective	By the end of this module the student will be expected to understand the breadth of the application of science underpinning microbiological services in the investigation of infectious disease or decontamination services including the processing of medical devices. Building on previous learning they will develop and apply their knowledge and understanding of infection science services and the contribution to the investigation, diagnosis, monitoring and patient-centred care. The student will also be expected to critically reflect on their learning developing their knowledge, skills, attitudes and behaviours underpinning their professional practice.	
Knowledge	By the end of this module the student will: 1. Explain the structure, function, classification and modes of transmission of commonly encountered microorganisms. 2. Discuss the safe handling of human specimens being investigated for infectious disease or a contaminated medical device and evaluate a critical incident resulting from incorrect specimen or device handling. 3. Explain some of situations in which traditional and/or molecular methods are used in the investigation of frequently encountered infectious diseases, including those acquired through contaminated medical device transmission. 4. Describe what is meant by epidemiology and the principles of outbreak investigation and control, including those related to contaminated medical devices. 5. Discuss and critically evaluate the principles of infection control and the role of public health bodies, including how epidemiology contributes to the care of patients/populations. 6. Explain how to prepare reports for validation and identify how to prioritise those that require referral to senior colleagues.	3.1.6 2.1.5 3.1.9 3.1.15
Technical and clinical skills	**Work-based learning outcomes should be achieved across Years 2 and 3 as described in module LS(iii): The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease, and LSC(ii): Infection Science Specialisms in Action and the work-based syllabus.**	

Year 3

LSI(ii): Infection Science Specialisms in Action
[60 credits]

Topic	Infection Science Specialisms in Action [60 credits]	GSP reference
Learning objective	The overall aim of this module is to ensure that the student gains a wider knowledge and experience of the application and delivery of a range of core and specialised methods and techniques from across infection science, and understand their importance in the clinical investigation of patients, the decontamination of medical devices, management of equipment and the requirement for reusable medical devices in relevant circumstances. This module will build on earlier work and develop technical and clinical microbiology and decontamination sciences including hospital-acquired infection, the use of antimicrobial agents and antibiotic resistance.	
Knowledge	By the end of this module the student will be able to: 1. Discuss common microbial infections and critically evaluate the methods used in their investigation, including bacterial, viral, fungal and parasitic infections. 2. Explain the application of microbiological methods and techniques used for the investigation of infection, including hospital-acquired infection (HAI), infection in the community and the decontamination of medical devices. 3. Explain the methods of action and clinical utility of commonly prescribed antimicrobial agents, including antimicrobial resistance mechanisms, antibiotic management and the practical and ethical issues involved when dealing with multi- and totally resistant organisms. 4. Discuss the application of microbiological methods and techniques for the investigation of high-risk patient groups. 5. Evaluate the organisation and application of specialised laboratory methods and services in microbiology and decontamination science.	2.1.1 2.1.2 2.1.3 2.1.4 2.2.7 2.2.8 2.3.2
Technical and clinical skills	**Students are only required to complete the learning outcomes in their specialised area of practice.** By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC, and will be able to:	2.1.1

Topic	Infection Science Specialisms in Action [60 credits]	GSP reference
	Microbiology 1. Perform a range of common microbiology tests used in the detection of pathogens, including urine analysis, swab samples, blood culture, cerebrospinal fluid (CSF), sterile fluid and tissue samples, and enteric samples. 2. Perform microscopy on a range of samples. 3. Perform a range of manual and automated techniques, including molecular testing techniques, e.g. for chlamydia screening. Perform sample culture, pathogen/isolate identification, including mycology and parasitology where available, and antimicrobial susceptibility testing. **Virology** 1. Perform a range of manual and automated virus detection tests, including manual and automated, to specified quality and safety standards. **Serology** 1. Perform diagnostic identification of antibodies and antigens by performing manual and automated serological tests, including, for example, ELISA, agglutination, and immunofluorescence and select tests according to clinical details. **Decontamination Science** **Safe working practice in Decontamination Science** 1. Apply health, safety, quality assurance and risk management principles to all aspects of the role of a Healthcare Science Practitioner in Decontamination Science. **Specialist Skills in Decontamination Science** 1. Perform the reprocessing of reusable medical devices recording all tasks in the Healthcare Science Information Systems (tracking and tracing) database, working in accordance with Standard Operating Procedures and Quality Management Systems.* 2. Perform daily and weekly testing of equipment to ensure that they are fit for safe use, as appropriate to the role of a HCSP.*	2.1.2 2.1.4 2.2.3 2.2.4 2.2.7 2.1.1 2.1.2 2.1.4 2.2.3 2.2.4 2.2.7

Topic	Infection Science Specialisms in Action [60 credits]	GSP reference
	3. Assist in the assessment of medical device manufacturer's Instructions For Use (IFU's) that describe the reprocessing cycles/processes validated as safe for the device and take appropriate remedial action. 4. Review and analyse test reports and be accountable for the return of the equipment back into service implementing corrective action for any equipment that does not meet the required testing standards, referring to senior colleagues as necessary. 5. Provide professional advice to users of the service within the limits of your knowledge, referring to senior colleagues as necessary. ***The range of equipment covered must include sterilisers, washer disinfectors, ultrasonic washers, heat sealers, fume cabinets, insulation testing machines.**	

SECTION 9: SPECIALIST GENETIC SCIENCES SYLLABUS

9.1 Specialist Modules for Genetic Sciences

Interpretation of the high-level framework: Life Sciences specialising in Genetic Science

	Module titles						
Year 3 Application to Practice	Professional Practice [10]	Genetic Science in Action [60]			Research Project in Genetic Science [30]		Work-based training 25 weeks [20]
Year 2 Technologies and Methodologies	Professional Practice [10]	Research Methods [10]	The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease [60]		Partners in Investigation [10]	Genetic Sciences in Health and Disease [20]	Work-based training 15 weeks [10]
Year 1 Scientific Basics	Professional Practice [10]	Scientific Basis of Healthcare Science – integrated module across body systems [60]			The Building Blocks of Life [20]	The Science Behind the Cure to include 10 weeks of work-based training [30]	

[XX] = Number of credits

Generic modules: Common to all divisions of healthcare science

Division-theme modules: Shared by a group of specialisms, usually within a Healthcare Science division

Specialist modules: Specific to a specialism

Year 2

LSG(i): Genetic[45] Sciences in Health and Disease [20 credits]

Topic	Genetic Sciences in Health and Disease [20 credits]	GSP reference
Learning objective	The overall aim of this module is that the student understands and gains experience of the application and delivery of genetic services in the investigation of genetic disease.	
Knowledge	By the end of this module the student will: 1. Explain the principles of cell culturing, harvesting and staining techniques for chromosome and genetic analysis. 2. Describe the principles of DNA and RNA extraction from a range of patient sample types. 3. Compare and contrast the roles of fluorescence in-situ hybridisation (FISH) probes, chromosome enumeration probes, locus-specific probes and whole chromosome paints in the investigation of genetic disease. 4. Describe and critically evaluate a range of polymerase chain reaction (PCR) techniques using both manual and automated technology, including sample preparation and validation of the results of the technique. 5. Describe how genomics is transforming medicine, and how advances in genomic technologies impact on clinical practice. 6. Explain how to prepare reports for validation and identify how to prioritise those that require referral to senior colleagues.	2.1.3 2.1.1 2.2.3 2.2.4 2.2.7 2.3.2 3.1.4 3.1.6 2.1.5 3.1.9 3.1.15
Technical and clinical skills	**Work-based learning outcomes should be achieved across Years 2 and 3 as described in module LS(iii): The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease, and LSG(ii): Genetic Science Specialisms in Action and the work-based syllabus.**	

[45] A change from Genetic Sciences to Genomic Sciences will be considered for the future as genomics will increasingly be reflected in practice.

Year 3

LSG(ii): Genetic Science Specialisms in Action
[60 credits]

Topic	Genetic Science Specialisms in Action [60 credits]	GSP reference
Learning objective	The overall aim of this module is that the student understands and gains experience of the application and delivery of a comprehensive range of genetic analyses from chromosome analysis to gene mutation detection and to understand their importance in the clinical investigation of patients.	
Knowledge	By the end of this module the student will: 1. Explain constitutional chromosome analysis across a range of clinical settings. 2. Discuss the techniques of FISH and array preparations and how the results are analysed across an appropriate range of clinical settings. 3. Compare and contrast methods to detect both known and novel mutations using a range of techniques and analysis methods using appropriate software. 4. Discuss the determination of gene dosage using multiplex ligation-dependent probe amplification (MLPA), and the use of appropriate software to analyse the results. 5. Evaluate the role of microsatellite testing with reference to the quality of the result and clinical context. 6. Discuss the principles of new sequencing technologies, e.g. array comparative genomic hybridisation (CGH) 7. Describe the principles, application and interpretation of novel mutation techniques, including triplet repeats and methylation analysis. 8. Discuss the analysis and interpretation of NHS data using a basic range of statistical and bioinformatics techniques. 9. Evaluate the importance of the role of the genetics practitioner in the clinical investigation of patients.	3.1.5 3.1.9 3.1.12
Technical and clinical skills	By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC, and will be able to:	2.1.2 2.1.3 2.1.4 2.2.3

Topic	Genetic Science Specialisms in Action [60 credits]	GSP reference
	1. Perform a range of routine procedures in genetics, including G-band analysis, FISH and mutation analysis sequencing to specified quality standards. 2. Perform a range of manual and automated PCR techniques to specified quality and safety standards. 3. Use equipment to specified quality standards, including setting up MLPA reaction to detect dosage differences in a variety of clinical settings.	2.2.7 2.3.3 3.2.2

SECTION 10: SPECIALIST TRANSFUSION AND TRANSPLANTATION SCIENCES SYLLABUS

10.1 Specialist Modules for Transfusion and Transplantation Sciences

Interpretation of the high-level framework: Life Sciences specialising in Transfusion and Transplantation Science

	Module titles						
Year 3 Application to Practice	Professional Practice [10]	Transfusion and Transplantation Sciences in Action [60]			Research Project in Transfusion and Transplantation Science [30]		Work-based training 25 weeks [20]
Year 2 Technologies and Methodologies	Professional Practice [10]	Research Methods [10]	The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease [60]		Partners in Investigation [10]	Transfusion and Transplantation Sciences in Health and Disease [20]	Work-based training 15 weeks [10]
Year 1 Scientific Basics	Professional Practice [10]	Scientific Basis of Healthcare Science – integrated module across body systems [60]			The Building Blocks of Life [20]	The Science Behind the Cure to include 10 weeks of work-based training [30]	

[XX] = Number of credits

Generic modules: Common to all divisions of healthcare science

Division-theme modules: Shared by a group of specialisms, usually within a Healthcare Science division

Specialist modules: Specific to a specialism

Year 3

LST(i): Transfusion and Transplantation in Health and Disease
[20 credits]

Topic	Transfusion and Transplantation in Health and Disease [20 credits]	GSP reference
Learning objective	The overall aim of this module is to ensure that the student understands and gains experience of the application and delivery of a comprehensive range of transfusion and transplantation techniques and the role of multidisciplinary teams involved in this specialism.	
Knowledge	By the end of this module the student will be able to: 1. Discuss the application of transfusion and transplantation methods used in the investigation. 2. Discuss safe handling and preparation of human blood and tissues for microbiology, viability and/or compatibility testing. 3. Explain how to prioritise sample processing across all specialisms, e.g. sharing samples, and discuss the importance of sample distribution and storage. 4. Discuss the application of molecular, immunological and serological methods used to investigate transfusion and transplantation reactions and assess transfusion and transplantation viability and/or compatibility. 5. Describe and evaluate the roles of healthcare professionals in the investigation and management of transfusion and transplantation cases. 6. Explain how to prepare reports for validation and identify how to prioritise those that require referral to senior colleagues.	2.1.3 2.2.1 2.2.3 3.1.15 3.1.9 2.1.5 3.1.9 3.1.15
Technical and clinical skills	**Work-based learning outcomes should be achieved across Years 2 and 3 as described in module LS(iii): The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease, and LSB(ii): Blood Science Specialisms in Action and the work-based learning guide.**	

Year 3

LST(ii): Transfusion and Transplantation Specialisms in Action
[60 credits]

Topic	Transfusion and Transplantation Specialisms in Action [60 credits]	GSP reference
Learning objective	The aim of this module is to enable the student to understand and gain experience of the application and delivery of a range of essential services and specialised methods and techniques from across transfusion and transplantation sciences and to understand their importance in the clinical investigation of patients.	
Knowledge	By the end of this module the student will be able to: 1. Discuss the application of transfusion science, clinical immunology, histocompatibility and immunogenetics, stem cell and tissue science methods and techniques and illustrate their value in relevant areas of clinical practice. 2. Discuss common transfusion-transmitted infections and the value-added application of specialised microbiology testing methods and techniques in relevant areas of clinical transfusion and transplantation practice.	2.1.1 2.1.4
Technical and clinical skills	By the end of the course, the student will be expected to apply in practice a range of technical and clinical skills and critically reflect on and develop their performance, working within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC, and will be able to: 1. Perform a range of common techniques used within transfusion and transplantation, including blood grouping, phenotyping, microbiological methods, stem cell methodology and tissue science methods.	2.1.2 2.2.1 2.2.3 2.2.4

SECTION 11: INDICATIVE CONTENT: KNOWLEDGE

11.1 Generic Professional Practice, Technical and Scientific Modules

GM(i) Professional Practice

Indicative Content

KNOWLEDGE

Professional Practice

- The role of regulation
- Regulation of the HCS workforce by the AHCS and HCPC
- NHS Constitution
- HEE five key workforce characteristics
- Values relating to compassion, transparency, candour, openness and leadership
- Current national NHS policies and practice, including policy relevant to the area of practice
- How service delivery aligns to current NHS policy and practice
- The HCS workforce
    - structure into four divisions and specialisms within each division
    - education and training programmes
    - leadership of the HCS profession (e.g. the role of the Chief Scientific Officer)
    - Modernising Scientific Careers (MSC)
    - the contribution of the HCS workforce to health and healthcare services
- The role of the HCSP
- Patient–professional partnerships, with the patient at the centre of care
- Patient and carer perspectives and the diversity of the patient experience
- Use of chaperones
- Current safeguarding regulations relevant to practice as a HCSP
- Culture, equality and diversity and how this can affect practice
- Disability, including learning disabilities
- Mental health
- Patient wellbeing and self-care, including how to support self-care

- How to work in partnership with patients and service users to ensure that the views of patients are central to delivering, developing and maintaining high-quality, safe services
- The role of patient support groups
- The importance of the patient voice in education and training for the HCS workforce, including the structures within each BSc programme to promote the patient voice

Legal and Ethical Boundaries of Practice

- Sharing of information and advice between peers in order to encourage a consistent approach to the implementation of NHS policy
- Ethical, legal and governance requirements arising from working at the level of HCSP
- Principles, guidance and law with respect to medical ethics
- Principles, guidance and law with respect to patient confidentiality
- Principles, guidance and law with respect to informed consent and how to gain informed consent
- The limits of the concept of confidentiality
- The importance of introducing yourself and explaining your role to every patient
- Principles, guidance and law with respect to equality and diversity
- Principles, guidance and law with respect to safeguarding, including the use of chaperones
- The procedures to follow if cautioned, charged with a criminal offence, suspended, or have restrictions placed on personal scientific, clinical, or professional practice
- The importance of personal health and wellbeing to ensure personal performance and judgement is not affected by their own health
- Information governance and be aware of the safe and effective use of health and social care information
- The need to manage records and all other information in accordance with applicable legislation, protocols and guidelines

Patient Safety and Quality

- NHS Constitution
- The wider context of safety in the NHS, including the culture of an organisation
- How effective communication underpins high-quality and safe patient services/patient care, including shared decision making
- The role of national organisations, e.g. NHS England; NHS Improving Quality
- Definition of terms:
  - Quality management
  - Quality control
  - Quality assurance

    - Quality improvement
    - Quality methodologies
    - Quality processes and procedures
- Principles of Quality Management Systems (QMS):
    - Quality management; quality assurance; quality control
    - The role of the United Kingdom Accreditation Service
    - Current HCS accreditation programmes, e.g. Improving Quality in Physiology Sciences
- British, European and international standards that govern and affect pathology laboratory practice
- Safety – prioritisation of patient safety in practice
- Safety – team working and patient safety
- Safety – equipment management
- Calibration, action levels
- Infection control
- Equipment life cycle, including specification, procurement commissioning, preventative maintenance, fault finding and repair, calibration, safety testing and decommissioning for equipment relevant to the specialism
- Strategies to improve patient safety
- Critical incident reporting, review and action
- 'Never' events and strategies to reduce them
- Improving quality of life
- Improving quality of the patient experience of healthcare
- Processes for the distribution of documentation, e.g. Department of Health (DH), Central Alerting System (CAS), Medical Device Alerts (MDA)
- Quality, risk and audit
- Regulatory frameworks such as EU directives and MHRA requirements
- Standard operating procedures, guidelines and protocols
- The contribution to the delivery of high-quality healthcare of the:
    - HCS workforce
    - HCS student
    - HCSP
- Why it is important to monitor and evaluate the quality of practice and the value of contributing to the generation of data for quality assurance and improvement programmes

Communication Skills

- Principles of effective verbal communication
- Principles of effective written communication
- Communication with those who do not have English as a first language
- Communication with people with sensory and cognitive impairments
- When and how to adapt communication methods
- Communication with patients across the age spectrum
- Use of patient leaflets and other appropriate media methods to engage with patients, donors and carers and the public

Leadership

- The concept of leadership and its application to practice
- The NHS Leadership Framework
- Leadership within the NHS, healthcare science, HCS teams and the multiprofessional team

Teaching and Learning

Students should be introduced to key theories of teaching and learning, including teaching and learning practical skills to begin to support their personal development and provide a base for their future career.

Continuing Personal and Professional Development (CPPD)

- The role and importance of CPPD to ensure that their professional knowledge and skills are being kept up to date

ATTITUDES, BEHAVIOURS AND SKILLS

Professional Practice

- Develop and maintain appropriate professional and patient–professional relationships in practice
- Treat patients with compassion and promoting patient wellbeing and self-care
- Work with colleagues, patients and carers in a respectful and non-discriminatory manner
- Provide safe, high-quality care at all times and in all settings
- Consistently bring the highest levels of knowledge and skill at times of basic human need when care and compassion are what matters most
- Create and justify open and non-discriminatory professional working relationships with colleagues, using critical reflection to review personal behaviour and responses to challenging issues
- Develop and maintain appropriate coping mechanisms for a range of potential issues, including stress, and seeking help if appropriate and evaluating the impact of an intervention

- Support and contribute to a culture in which innovation and developments are identified, discussed, evaluated and potentially introduced to improve service delivery
- Recognise and exploit learning opportunities in the workplace
- Act in accordance with the principles and practice of patient-centred care, regularly reflecting on their personal practice and revising judgements and changing behaviour in the light of new evidence
- Practise as an autonomous professional, applying knowledge appropriately and exercising their own professional judgement within their scope of practice and with support from the team
- Promote professional attitudes and values at all times
- Recognise the need to be truthful and to admit to and learn from errors
- Seek advice in the event of ethical dilemmas, including disclosure and confidentiality
- Accept and comply with the requirements for professional regulation

Legal and Ethical Boundaries of Practice

- Consistently operate in accordance with relevant current NHS policy and practice and recognise the limits of their own competence and scope of practice in order to make safe, informed and reasonable decisions about their practice
- Respond to the ethical, legal and governance requirements arising from working at the level of a HCSP, applying accrued knowledge and evidence
- Recognise the factors influencing ethical decision making, including religion, personal and moral beliefs, and cultural practices, and make informed decisions, taking these into account
- Share information in accordance with the regulations, encouraging such behaviour in other members of the healthcare team and taking action where breaches of the guidelines may occur
- Ensure confidentiality is maintained, e.g. removal of patient names where appropriate, reviewing and analysing published literature, and considering the impact of such measures on the clinical service
- Recognise the problems posed by disclosure without consent of the patient, in the public interest
- Ensure patients, relatives and carers are aware of the need for appropriate information distribution within members of the immediate healthcare team
- Use appropriate methods of ethical reasoning to justify a decision where complex and conflicting issues are involved, calling on the support of others where needed
- Act in a manner that demonstrates probity in all aspects of professional practice
- Act in accordance with GSP at all times so that their conduct justifies the trust of patients and colleagues and maintains public trust in healthcare science

- Ensure that personal practice is always provided in line with the legal framework, acting with integrity at all times
- Apply appropriately the principles, guidance and laws regarding medical ethics and confidentiality and demonstrate the ability to gain informed consent
- Complete any/all documentation honestly and accurately, and sign appropriately
- Apply honesty and accuracy about personal qualifications, experience and position in the scientific community
- Act honestly with respect to written and verbal information provided to any formal or legal enquiry, including recognition of the limits of scientific knowledge and experience
- Keep records in accordance with current best practice requirements, including accuracy of information recording within patient records and the framework that underpins data security practice in the NHS

Patient Safety and Quality

- Respond in an open, constructive and timely manner to critical incidents or complaints about their own or team performance, influencing the response, and use self-reflection to review personal behaviour and response to challenging issues
- Take appropriate action if it is suspected that they or a colleague may not be fit to practise, always putting patient safety at the forefront of practice
- Practise within the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC
- Make appropriate judgements to ensure they limit work or stop practising if performance or judgement is affected by their health
- Recognise when personal health takes priority over work pressures, seeking appropriate advice and support, and taking appropriate action
- Co-operate with employers to ensure compliance with health and safety requirements

Leadership

- Recognise the importance of leading by example in setting high standards of personal behaviour, and in acting with openness, candour, fairness and integrity, listening and respecting the views of others

Continuing Personal and Professional Development (CPPD)

- Contribute to a culture that values CPPD in recognising strengths and identifying areas for improvement and supporting others to do the same
- Continue to develop their own learning and reflective practice by maintaining personal records of CPPD, providing evidence of critical reflection, including action planning, with respect to technical and clinical practice and professional development in a form suitable for audit by a professional body or regulator, and demonstrate continuing fitness to practise

- Apply knowledge, experience and critical reflection to identify personal development needs using a range of tools, and develop and update action plans
- Act as a self-motivated professional HCSP, being willing to learn from self-reflection and others, responding positively to constructive and meaningful feedback
- Record critically reflective notes demonstrating how participation in CPPD has contributed to learning and led to improvements in personal and service performance
- Monitor their own performance by a variety of methods
- Respond constructively to feedback and provide feedback when asked to support personal development and the development of others
- Prioritising and organising academic and work-based tasks in order to optimise their own work and the work of the department

Communication Skills

- Effective verbal communication
- Effective written communication
- Frameworks underpinning communication
- Adapt communication skills
- Giving and receiving feedback including feedback frameworks

Teaching and Learning

- Introduction to how people learn
- Teaching and learning practical skills
- Transforming experience into knowledge and skills by reflection and action and linking this to the skills of feedback (see above) and work-based learning

GM(ii): Scientific Basis of Healthcare Science (Year 1)

Students should be introduced to every subject area described by each learning outcome and associated indicative content to provide a broad foundation of scientific and HCS knowledge on which to build their knowledge, skills and professional practice. Following the broad overview learning should then be developed in the context of individual BSc (Hons) Healthcare Science programme, providing the flexibility to study specific areas in more depth.

1. **Introduction to the organisation of the human body**
    - Structural

- Chemical
- Cellular
- Tissue
- Skin
- Cellular, tissue and systems responses to disease:
  - cell death
  - inflammation
  - neoplasia, e.g. carcinoma
  - hypertrophy
  - hyperplasia
  - tissue responses to injury and repair
- How the body changes from birth to old age

2. **Introduction to the structure and function of body systems: embryology, anatomy, physiology, pathology**
   - Embryology
   - Skeletal system
   - Nervous system:
     - spinal cord and spinal nerves
     - brain and cranial nerves
     - sensory and motor systems
   - Endocrine system
   - Vision, hearing and equilibrium
   - Cardiovascular system, including blood and blood vessels
   - Respiratory system
   - Lymphatic system
   - Immune system
   - Gastrointestinal tract, including digestion and absorption of food, nutrition, the liver and liver function tests
   - Renal system
   - Electrolyte and acid-base balance
   - Hormonal mechanisms and control
   - Metabolism
   - Reproductive system

- Abdomen, pelvis and perineum
- Histology and cytology
- Microbiology, including infection control
- Treatment regimens, including antibiotics and antibiotic resistance
- Virology
- Biochemistry
- Haematology
- Immunology and histocompatibility

3. **Introduction to clinical genetics, genomics and personalised medicine**
   - Meiosis and Mendelian inheritance
   - Nucleic acid structure and function
   - Chromosome structure and function
   - Nomenclature used to describe the human genome
   - Common genetic disorders
   - Impact of genetic disorders on the patient and their families
   - Genomic technology and role of the genome in the development and treatment of disease
   - The role of genomic counselling
4. **Introduction to epidemiology and public health**
   - Local, national and international role of the public health function, e.g. Public Health England and related UK organisations
   - Infectious disease services
   - International partnership working for control of infection
   - Principles of epidemiology
   - Basis of health protection:
     - principles of surveillance
     - infectious disease control and emergency planning
   - Screening:
     - screening programmes: purpose, design, outcomes
     - screening programmes: typical screening programmes in healthcare science
   - Using epidemiological data to plan health services
   - Factors affecting the health of the population

- Strategies and methods to improve health
- Factors affecting health and their contribution to inequalities in health between populations
- Changes in population demographics, including ageing

5. **Introduction to clinical pharmacology and therapeutics**
   - Difference between pharmacology, clinical pharmacology, therapeutics and prescribing, and medicine management
   - Principles of pharmacology, pharmacokinetics and therapeutics:
     - drug names
     - classifications
     - definitions of terms and basic mechanisms
   - Role of the pharmacist in primary and secondary care
6. **Sociology of health and illness**
   - Patients' responses to illness and treatment:
     - the impact of psychological and social factors, including culture, age, ethnicity, gender, socioeconomic status and spiritual or religious beliefs on health and health-related behaviour
   - Health belief models
   - Diversity of the patient experience
   - Disability, including learning disabilities
   - Mental health
   - Potential health inequalities
   - Self-care
   - Impact of life-threatening and critical conditions
   - Patient involvement in decisions regarding their healthcare

This topic area should include the underpinning theoretical foundations and models, e.g. Health Belief Model, World Health Organization (WHO) model of activity limitation (disability)

7. **Introduction to medical physics and clinical engineering**
   - Structure of matter (atomic and nuclear models)
   - Radiation: nature and its measurement and radiation safety
   - Radiation dosimeters – personal dosimetry
   - Basic physics and mathematics of image formation

- Imaging Techniques
  - Ultrasound
  - Magnetic Resonance Imaging (MRI)
  - Computerised Tomography (CT)
  - Positron Emission Computed Tomography (PET)
  - Single Photon Emission Computed Tomography (SPECT)
- Basic electricity and magnetism as it relates to the measurement of physiological signals
- Viscous and inertial flow of simple liquids
- Use of radiotherapy

8. **Introduction to clinical bioinformatics and health informatics**
   Clinical bioinformatics brings together the disciplines of computer science, mathematics, statistics and physics/engineering to influence, analyse and inform clinical and biological practice, so helping to maintain patient safety and the integrity and security of data. Students should be introduced to the three specialisms of clinical bioinformatics within healthcare science (genomics; health informatics science and physical sciences) in the context of: (i) innovation, translation and interpretation of complex genomic data, optimising the benefits this brings to patient care, including personalised medicine; (ii) the development and adoption of technology solutions and biomedically motivated methods for the collection, management, movement, analysis and use of health information in line with government legislation to improve the quality and safety of healthcare practice and delivery; and (iii) devices that may have therapeutic, diagnostic, or patient monitoring functions and they generate ever-increasing amounts of data that contribute to patient management. Teaching should be tailored to the student group using examples relevant to health and healthcare science.

   - Contribution of clinical bioinformatics genomics, health informatics sciences and physical sciences to:
     - patient safety
     - patient care
     - healthcare
     - healthcare science
   - Governance and ethical frameworks
   - Storage and sharing of images, DICOM
   - PACS
   - Clinical information systems and applications
   - Clinical information systems and applications, e.g. HL7

- Database management
- Direct patient access to test results

9. **Introduction to mathematical and statistical techniques**
   - Data interpretation, including the variability of biological data and application of statistics
   - Generation of reference ranges and their limitations
10. **Introduction to innovation in health and healthcare science**
   - Identifying, reading and evaluating the literature
   - Innovation in the NHS
   - Using innovation to improve services
   - Scientific and technical developments and their application in HCS
   - The role of the HCS workforce in innovation

GM(iii): Research Methods (Year 2)

1. **Research, innovation and audit**
   - Process and importance of research, innovation and audit to the NHS and healthcare science
   - Role of healthcare science in research, innovation and audit
   - NHS Research and Innovation Strategy
   - Difference between research, audit and service improvement
   - User/patient involvement
   - Peer review
   - Role of statutory, advisory regulatory bodies and funding bodies, including:
     - National Institute for Health and Care Excellence (NICE)
     - National Institute for Health Research (NIHR)
   - Evidence-based practice
   - Clinical guideline development
   - Quality assurance frameworks:
     - quality improvement
     - patient care
     - patient safety
     - improved treatments

- The role of the HCS workforce in undertaking research and innovation and applying findings
- Use of research and audit to interpret and apply new knowledge in the NHS and healthcare science

2. **Current ethical and legal frameworks**
   - Good Clinical Practice (GCP)
   - Health and safety
   - Risk assessment
   - Human research
   - Animal research
   - Innovation
   - Audit
   - Ethical frameworks, including informed consent
   - Legal frameworks
   - Confidentiality
   - Archiving
   - Research governance framework for health and social care research
   - Data Protection Act
   - Intellectual property regulations
   - Informed consent
   - Roles and responsibilities of the research team
3. **Principles of literature searching**
   - Evidence-based practice
   - Principles of a literature search
   - Process of literature searching
   - Critical review of literature
   - Systematic review
   - Publication impact factor
   - Reference manager systems
4. **Introduction to study design**
   - Cohort studies

- Qualitative
- Quantitative
- Case control
- Systematic review
- Meta-analysis
- Sampling techniques
- Clinical trials (pre-clinical to translational)
- Epidemiological studies
- Hypothesis generation and testing
- Clinical trials

5. **Data analysis, statistical techniques and dissemination**
   - Data validity, reliability and appropriateness
   - Application and interpretation of statistical techniques:
     - parametric
     - non-parametric
   - Power calculations/sample size
   - Methods to disseminate research output
   - Impact factor
   - Scientific poster design
   - Writing for scientific journals
   - Writing scientific abstracts
   - Preparing research presentations for time-limited scientific meetings

GM(iv): Research Project (Year 3)

1. **Research in health and healthcare science, including:**
   - Scientific or clinical research
   - Translational research
   - Operational and policy research
   - Clinical education research
   - Innovation, service development

- Service improvement
- Supporting professional service users

2. **Ethical and governance approval process**
   - The student must know the ethical approval and governance process required to undertake the proposed project, including initial approval; monitoring; reporting; data storage and archiving

11.2 Division-theme Modules

The Building Blocks of Life (Year 1)
[20 credits]

Structure/function relationships of carbohydrates, lipids and amino acids

- Carbohydrate structure
- Glucose synthesis and storage, gluconeogenesis, glycolysis
- Examples of disease related to abnormal carbohydrate structure/function
- Lipid structure
- Cholesterol synthesis and metabolism
- Fatty acid synthesis and metabolism; triglycerides
- Examples of disease related to abnormal lipid structure/function
- Amino acid structure
- The assembly of amino acids into peptides and proteins
- Essential amino acids
- Examples of disease related to abnormal amino acid structure/function

Introduction to genetics and the genome

- Basic cell biology
- Chromosome structure and function
- Meiosis and mitosis
- Chromosome segregation
- Nucleic acid structure and function
- Types of genetic mutation
- Methods of inheritance
- Sources of genetic variation
- The human genome and the genomes of infective organisms
- Examples of genetic disease

Classification and role of proteins in the structure, integrity and function of biological systems

- Protein synthesis, transcription, translation and post-translational modification

- Membrane structure and function
- Enzymes
- Antigens and antibodies
- Receptors
- Functional proteins (haemoglobin, albumin, transport proteins, lipoproteins, immunoglobulins, hormones, cytokines, etc.)
- Examples of disease related to abnormal structure function of proteins

The Science Behind the Cure (Year 1)
[30 credits]

Pathology and laboratory medicine: organisation

- The specialisms of pathology and laboratory medicine and decontamination science
- Pre-analytical, analytical and post-analytical functions, including the selection collection and processing of samples for investigation
- Organisation of pathology and laboratory medicine, including specialist services
- Professional roles in pathology and laboratory medicine
- Current and future settings for the delivery of pathology, laboratory medicine and decontamination science
- Current quality standards, management and accreditation, including:
  - Clinical Pathology Accreditation UKAS UK Accreditation Service
  - Medicines and Healthcare products Regulatory Agency (MHRA)
  - Medical Device Regulations 2002
  - Medical Devices Directive 93/42/EEC as amended by Directive 2007/47 EC (CE Marking Accreditation)
  - BS EN ISO 13485:2016 Medical Device: Quality Management
  - Health and Social Care Act (Code of Practice on the prevention and control of infections and related guidance)
  - Joint Advisory Group on Gastrointestinal Endoscopy (JAG)
  - Requirements of Hospital Building Notes (HBN) and National guidance e.g Health Technical Memorandum (HTM), Welsh Health Technical Memorandum (WHTM), Scottish Health Technical Memorandum (SHTM), Northern Ireland Health Technical Memorandum (NIHTM)
- Professional bodies in pathology, laboratory medicine and decontamination science
- Overall contribution of pathology, laboratory medicine and decontamination science to healthcare
- Role of private providers of healthcare, NHS Blood and Transplant (NHSBT) and pharmaceutical companies

Pathology and laboratory medicine: practice

- Basic laboratory practice (e.g. centrifugation, fume cupboards, etc.)
- Specimen reception, handling and storage, use and role of anticoagulants, preservatives and specimen containers
- Liquid handling methodologies, preparation of standard solutions and buffers
- Units of measurement (understanding the International System of Units [SI] system)
- Biological variation, pre-analytical variability and implications of non-analytical errors
- Reference ranges, action limits
- Sensitivity, specificity and predictive values
- Internal quality control and external quality assessment
- Evaluation of assay performance
- Quality management and laboratory accreditation
- Informatics, including laboratory information systems (e.g. middleware) and hospital information systems

Introduction to the blood sciences

- The scope and core practice of clinical biochemistry, haematology, immunology, transfusion science and molecular science in the blood sciences
- Equipment and systems used in the core blood sciences department: automation, robotics, analytical platforms, modular systems
- Data generation, processing and reporting in the blood sciences
- Point-of-care testing systems in the blood sciences
- Providing a 24/7 service in the blood sciences

Introduction to the infection sciences

- The scope and practice of core and specialist services in microbiology
- Causes and investigation of common bacterial infection
- Causes and investigation of common viral infection
- Introduction to decontamination science services
- Introduction to epidemiology and infection control
- The scope and core practice of molecular science in the infection sciences, including decontamination science
- Equipment and systems used in infection science laboratories
- Automation and robotics in infection science

- Data generation, processing and reporting in infection science
- Point-of-care testing systems in infection science

Introduction to the cellular sciences
- The scope and practice of histopathology, cytopathology, reproductive science and molecular science in the cellular sciences
- Equipment and systems used in the cellular sciences department
- Automation and robotics in cellular sciences
- Data generation, processing and reporting in the cellular sciences

Introduction to the genetic sciences
- The scope and core practice of cytogenetics, molecular genetics and molecular cytogenetics
- Data generation, processing, bioinformatics relevant to genetic practice
- Automation, robotics and gene sequencing

The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease (Year 2) [60 credits]

Indicative Content

Principles, practice, quality assurance and application of commonly employed methods and techniques. For each section there is a description of the methods and an illustration of their use with examples from across the Life Sciences.

Photometric and electrometric methods
- Autoanalysers, including visible, infra-red, ultraviolet spectrophotometry, ion-selective electrodes
- Biosensors
- Point-of-care and home testing ‘metric’ assays
- New technologies and future developments, e.g. Apps
- Osmometry

Separation techniques relevant in all blood sciences
- Electrophoresis
    - Chromatography/mass spectrometry (including tandem mass spectrometry)

Immunological methods in core blood sciences

- Method for immunoassay, including EIA, ELISA, nephelometry and RIA, where currently used
- Automation detection systems used in immunoassays

Methods for the culture of microbiological species

- Principles of microbiological culture
- The design, selection and preparation of culture media
- Aseptic technique
- Growth characteristics of cultured microbiological species
- Qualitative and quantitative assessment of cultured species
- Automation of microbiological culture

Methods for counting and evaluating cells

- Red blood cells
- White blood cells
- Platelets
- Flow cytometry
- Diagnostic semen analysis
- Basic chromosome analysis of peripheral blood cells

Methods for retrieval and preserving the integrity of cells, tissues and organs

- Red blood cells, white blood cells and platelets
- Bone marrow
- Stem cells
- Amniotic fluid analysis, chorionic villus cell culture – fibroblast cell cultures
- Oocytes, embryos
- Tissues for transplantation, e.g. cornea
- Solid organs for transplantation, e.g. kidney, liver, heart

Methods for the microscopic investigation of samples

- Collection, preparation and preservation of specimens for microscopy
- Light microscopy
- Electron microscopy
- Principles of fluorescence microscopy
- Staining with conventional stains in microbiology, cytology and histology
- Immunohistochemistry
- Cervical cytology, including liquid-based cytology
- Cytogenetics

Molecular methods

- The extraction and preparation of DNA and RNA
- Polymerase chain reaction (PCR), including reverse transcription PCR
- Methods for assessing single-point genetic variation
- Methods for assessing more complex genetic variation
- Fluorescence in-situ hybridisation (FISH)
- Array technology

Principles, practice, quality assurance and application of commonly employed methods and techniques for equipment and methods for decontaminating medical devices in Decontamination Science

Definition of Decontamination terminology

- Cleaning
- Decontamination
- Disinfection
- Sterilisation

- Levels of Decontamination
  - Appropriately updated current classification and definition of Medical Devices (for 2017 see Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices) and Decontamination Levels

Processing Methods and Testing

- Sterilisers
- Washer Disinfector
- Endoscope washer disinfectors
- Ultrasonic washers
- Drying Cabinets
- Heat Sealers
- Fume Cabinets
- Insulation Testing Machines
- Protein detection devices

Reusable medical devices

- Drills
- Chisels and osteotomes
- Forceps
- Needle holders
- Retractors (single ended and self-retaining)
- Rongeurs
- Scissors
- Speculae
- Suction tubes
- Diathermy
- Laparascopic

Endoscopes

- Gastroscopes
- Colonoscopes
- Bronchoscopes
- Cystoscopes
- Duodenoscopes
- Endoscopes
- Nasoendoscopes

- Transesophageal echocardiogram (TOE)

Quality Assurance
- Environmental Monitoring
- Extent of the role and responsibility of the decontamination science department with respect to the quality management of hospital, primary care and community-based decontamination science services
- Methods of quality assurance including:
  - Internal quality control
  - External quality assessment
  - Correcting failures in quality systems
  - Departmental Training programmes and competency assessments
  - Quality standards
  - Compliance to Manufacturer's Instructions for Use

Medical Device Journey
- Medical device journey, including quality control and quality assurance.
- Service provision
- Meeting clinical activity
- Maintaining a safe service
- Reviewing effective stock utilisation
- Review the internal processes within the department and recommend areas for improvement

Partners in Investigation (Year 2)
[10 credits]

Partners in the investigation and management of disease

Importance of working in partnership appropriate to the clinical scenario and the student's specialist area which could include:
- Patients and carers
- Healthcare professionals
- Doctors – hospital and primary care practitioners

- Public Health specialists
- HCS professionals in medical physics and clinical engineering
- HCS professionals in physiological measurement
- Allied health professionals and other healthcare professionals
- The pathology and laboratory medicine team
- Healthcare commissioners and managers
- Nurses and midwives

Patient-centred care: the role of pathology, laboratory medicine and decontamination processing of medical equipment

- The patient journey and the role of the Healthcare Science Practitioner in Life Sciences
- Patient pathways and protocols
- Evidence-based clinical guidelines
- The role of the multidisciplinary team and professional partnerships
- The role of clinical audit to determine if patient care, healthcare and healthcare science services are being provided in line with standards and its role in ensuring care providers and patients know where their service is doing well, and where there could be improvements
- Patient communication and patient revalidation in feedback forums
- Delivery of laboratory investigation or other life sciences services at the point of care
- The evaluation and introduction of new pathology and laboratory medicine tests, procedures or equipment, including point-of-care and new reusable medical devices procedures and equipment

11.3 Specialist Modules: Blood Sciences

Blood Sciences in Health and Disease (Year 2) [20 credits]

Core clinical biochemistry

- Tests of major organ function (kidney, liver, heart, lungs, bone) and hormones and vascular system
- Water and electrolyte homeostasis
- Acid-base balance
- Diabetes and myeloma diagnosis and monitoring – panel of techniques and understanding, urine microalbumin

Core haematology (10 credits)

- Haematopoiesis, including haemoglobin biosynthesis and function
- Tests of red cell number and function
- Common disorders of red cells, including anaemia and haemaglobinopathies, haematological malignancies and coagulation
- Tests of white cell number and function, cell counts and abnormalities
- Common disorders of white cells, including leukaemias
- Platelet function and measurement
- Common disorders of platelets
- Tests of inflammation (erythrocyte sedimentation rate [ESR] and plasma viscosity)
- Acute haematology services (required on a 24/7 basis)

Blood Sciences Specialisms in Action (Year 3) [60 credits]

Core transfusion medicine (10 credits)

- Blood group systems – genes, antigens and antibodies
- Manual and automated techniques and technologies for ABO/D typing, serological cross-matching, red cell phenotyping, antibody screening and identification
- Overview of blood transfusion services, range of blood components/products manufactured and their applications
- Principles of pre-transfusion testing
- Normal ranges and predictive values for pathology tests used to inform transfusion support
- Aetiology and clinical features of conditions requiring transfusion support
- Overview of legislation/guidelines relevant to blood transfusion practice

Core immunology (components of the normal immune response)

- Role of immunity in infection and cancer
- Myeloma screening and panel of measurement of paraproteins
- Oligoclonal bands – specialist for MS
- Mechanisms of fluorescent microscopy and chemiluminescene autoimmunity where available, and tests for common autoimmune disorders and common immunodeficiency disorders
- Mechanisms of allergy and tests for common allergies where available

- Flow cytometry links with myeloma pathway
- Basics of cellular, complement and humoral immunodeficiency
- Links with genetics, e.g. myeloma genetics
- Leukemia drug administration and genetic profile in new and emerging technology, e.g. peanut allergy

Specialised clinical biochemistry (where available)
- Assessment of cardiovascular risk
- Tests to aid the diagnosis and monitoring of cancer
- Endocrine function testing
- Tests of gastrointestinal (GI) function, nutrition and micro-nutrition
- Therapeutic drug monitoring
- Toxicology and drugs of abuse testing
- Chronic disease monitoring (diabetes, chronic renal failure, osteoporosis, hypertension, chronic heart failure, chronic obstructive pulmonary disease)

Specialised haematology
- Preparation and interpretation of blood films, including blood parasites
- Mechanisms and tests of haemostasis
- Monitoring programmes for new therapies and anticoagulation therapy
- Causes of haematological malignancy
- Tests for the diagnosis and management of haematological malignancy
- Minimal residual disease

Specialised immunology, tissue and transplantation (where available)
- Immunogenetics and the major histocompatibility complex
- Transplantation immunology and histocompatibility testing
- Tests of transplant viability and rejection
- Stem cells
- Tissue banking

Pregnancy and paediatric blood science

- Reference ranges during pregnancy, in neonates and in children
- Tests of conception and pregnancy monitoring
- Protection of the neonate against infection
- Antenatal screening tests for fetal abnormalities of haemolytic disease of the newborn
- Tests of feto-maternal haemorrhage
- Neonatal screening tests for fetal abnormality
- Investigation of inborn errors of metabolism
- Tests of biochemical abnormality in neonates and children (hypoglycaemia, hyperammonaemia, calcium and phosphate disorders, pubertal disorders)
- Tests for diagnosis and management of haematological malignancy in children

11.4 Specialist Modules: Cellular Sciences

Cellular Sciences in Health and Disease (Year 2) [20 credits]

Cellular pathology: basics (10 credits)

- Human anatomy with particular reference to major organs
- Macroscopic appearance of human tissue samples
- General features of the light microscopic appearance of cells and cell components (membranes, nuclei, mitochondria, lysosomes, etc.)
- Normal cellular and sub-cellular light microscopic appearance of a range of commonly investigated tissues (skin, bone, muscle, nerve, liver, lung, urinary tract, thyroid, breast, GI tract, cervix, reproductive organs, lymph nodes)

Principles and practice of cellular science (10 credits)

- Common methods for the collection, receipt and processing of samples of human tissue; implications for sample integrity and clinical validity
- Preparation of tissue for cellular pathology testing
- Application of a range of common staining techniques used in the microscopic examination of prepared tissue samples
- Overview of immunological and molecular methods used in the examination of prepared tissue samples
- Quality control in cellular pathology
- Organisation of cellular pathology laboratory services, including the services available from reference laboratories
- Appreciation of the role of different staff groups in the reporting of cellular pathology results
- Regulations and guidelines relating to the use, storage and disposal of human tissue (e.g. Human Tissue Act) and the use of post mortem tissue
- Overview of screening programmes, e.g. cervical screening

Cellular Sciences Specialisms in Action (Year 3) [60 credits]

Pathological basis of disease (10 credits)

- Overview of pathological processes, including inflammation, embolism, infarction, ischaemia, congestion, fibrosis and oedema
- Overview of carcinogenesis and metastasis

- Overview of epidemiology of specified common pathologies
- Recognition of general cellular pathology features of abnormality, including the recognition of artefacts
- Overview of tests that assess the molecular basis of acquired disease
- Case studies to illustrate a range of specified pathological processes

Systematic investigation of pathological specimens (10 credits)

- Relationship of cellular pathology to a range of invasive and non-invasive surgical procedures (e.g. smears, aspirates, biopsies, excisions, resections)
- Knowledge of sampling and preparation techniques, including cell block techniques and imprint smears; using accepted cellular pathology nomenclature
- Common sampling and staining techniques used in cellular pathology
- Overview of the role of imaging and other non-cellular pathology tests in the investigation of patients with a range of clinical conditions
- Case studies to illustrate the timing and role of cellular pathology in the patient pathways associated with a range of common clinical disorders, including diagnostic and treatment options that are informed by the cellular pathology findings

Applications of histopathology (10 credits)

- Pathogenesis and clinical presentation of common diseases of the major organs (heart, lungs, liver, kidney, GI tract, brain, muscle)
- Application and outcome of initial cellular pathology testing in the investigation of specified common diseases of major organs
- Overview of the range and role of molecular pathology tests in assisting with diagnosis and prognosis of acquired disease
- Application of specific prognostic and predictive markers in designing patient management programmes (e.g. oestrogen receptor, HER-2)
- Existing and proposed screening programmes for breast cancer, colon cancer, prostate cancer, etc.
- Overview of the process and practice of autopsy

Applications of cytopathology

- Pathogenesis and clinical presentation of cervical cancer
- Techniques used in screening for neoplastic conditions of the cervix
- Tests used to confirm the diagnosis and manage treatment of cervical neoplasia
- Role of the cervical cytology laboratory in the prevention of cervical cancer
- Tests for the diagnosis of non-cervical gynaecological malignancy (endometrium, ovary, etc.)

- Pathogenesis clinical presentation and cytopathological diagnosis of cancer of the respiratory tract, urinary tract and serous cavities
- Sampling and preparation techniques used in non-gynaecological cytology
- Special investigative methods applied to common gynaecological and non-gynaecological conditions, including special stains, immunocytochemistry and molecular techniques

Reproductive science: basics

- The anatomy and physiology of the female and male reproductive tracts
- Overview of sexual differentiation
- Biochemical tests of human female and male reproductive function
- Causes and incidence of female, male and combined infertility
- Characteristics of normal and abnormal semen samples
- Tests of compatibility between female and male partners

Applications of reproductive science

- Systematic investigation of the infertile couple
- Situations in which assisted reproductive technologies are applicable
- Overview of gametes and fertilisation
- Methods of in-vitro fertilisation
- Culture systems used to maintain gametes and embryos
- Tests used to assess pre-implantation embryo development
- Egg harvesting and storage
- Embryo cryopreservation and storage
- Regulation and guidelines associated with assisted reproductive technologies (e.g. Human Fertilisation Act)
- Options for fertility preservation prior to cancer treatment, for men and for women

11.5 Specialist Modules: Infection Sciences

Infection Sciences in Health and Disease (Year 2) [20 credits]

Microbiology: the basics

- Bacterial, viral, fungal and parasites, structure, function, classification
- Replication and modes of transmission of microorganisms
- Health and safety when handling bacteria, viruses and potentially infectious samples
- Organisation of laboratory services for investigating common pathogens
- Application of traditional and molecular methods for the investigation of infectious disease
- Decontamination processing of reusable medical devices

Epidemiology and health protection
- Basic epidemiology
- The principles of outbreak investigation and control
- Organisation of laboratory services to support epidemiological investigation
- Overview of prevention and control of microbial infections
- Overview of deliberate release agents (DRA)
- The role of the public health bodies
- The role of global working, e.g. Centres for Disease Control and Prevention, WHO, etc.
- The role of bioinformatics

Infection Sciences Specialisms in Action (Year 3)
[60 credits]

Infectious Agents

Common bacterial infections
- Mechanism of bacterial infection and investigation of patients suspected of having bacterial infection
- Tests for commonly encountered aerobic and anaerobic bacterial infections, including the upper and lower respiratory tract, the GI tract, the urinary tract, the genitourinary tract, wounds, CSF and blood cultures

Common viral infections
- Mechanism of viral infection and investigation of patients suspected of having viral infection
- Tests for commonly encountered viral infections, including the upper and lower respiratory tract, the GI tract, the genitourinary tract, CSF, immune system and nervous system

Less common infectious agents

Prions and Prion Disease (transmissible spongiform encephalopathies (TSEs))
- Biofilms
- Emerging infectious agents

Investigation of infection in the community and hospital setting
- Overview of infectious disease in the community
- Hospital-acquired infection (HAI)
- Decontamination of reusable medical devices and management of processing equipment
- Laboratory investigation of infection in the community, including near patient testing at the point of care
- Guidelines for the optimum treatment of community-based infection
- Management of needle stick injuries in the clinical setting
- Sources and routes of transmission of HAI
- Tests to diagnose common HAIs
- Strategies to reduce the incidence of HAI
- Overview of control of infection and the hospital infection control team
- Screening programmes, e.g. antenatal, chlamydia
- Importance of assessing and evaluating new equipment, methods and procedures prior to routine use

Antimicrobial therapy
- Overview of antimicrobial therapy in acute, chronic and community medicine
- Method of action of commonly prescribed antibiotics
- Role of the laboratory in optimising antibiotic therapy
- Overview of antibiotic resistance
- Method of action of commonly prescribed antiviral therapy
- Role of the laboratory in optimising antiviral therapy
- Vaccine design and use
- Current guidelines relating to antimicrobial agents

The investigation of high-risk patient groups

- Aetiology of the more common sexually transmitted infections (STIs)
- Laboratory investigation of STIs in different healthcare settings (e.g. hospital, specialised clinic, community)
- The MDT approach to the management of STIs
- Laboratory investigation of the immunocompromised patient
- Infections that may compromise pregnancy
- Antimicrobial therapy in pregnancy
- Outline of infectious disease in children
- Laboratory investigation of childhood infections
- Assessing patient risk for prion disease
- Importance of assessing and evaluating new equipment, methods and procedures prior to routine use

Specialised tests in for infectious agents
- Epidemiology of parasitic infections
- Laboratory investigation of common parasitic infections
- Epidemiology of fungal infections
- Laboratory investigation of common fungal infections
- Scope and use of National Reference Laboratories
- Diagnosing prion disease
- Importance of assessing and evaluating new equipment, methods and procedures prior to routine use

11.6 Specialist Modules: Genetic Sciences

Genetic Sciences in Health and Disease (Year 2) [20 credits]

Core genetics science
- The cell cycle and how it can be artificially manipulated to maximise chromosome quality
- Principles of cell culture and cell separation over a range of sample types
- Principles of common staining and chromosome banding techniques and when it is appropriate to use them
- Knowledge of numerical and structural chromosome anomalies as related to genetic disease
- Principles of DNA and RNA extraction chemistries

- Principles and methods available for determining DNA/RNA quantity and quality and specific requirements for downstream processes
- Principles of probe labelling and hybridisation for use in FISH
- Range of probes available and common clinical applications
- Chemistry of PCR reactions, role of reagents and reaction process
- Primer design and optimisation of reactions
- Principles of agarose gel electrophoresis and size separation, effect of voltage, current and buffers; use of sizing markers
- Fragment separation by gel electrophoresis
- Principles of the detection of sequence variation, including single nucleotide and copy number variation (SNV and CNV) – advantages and limitations of commonly used techniques
- Principles of sequencing chemistry (e.g. Sanger sequencing, pyrosequencing, next generation sequencing [NGS]); parameters and applications in both manual and automated settings, including limitations
- Principles of detecting circulating cell free nucleic acid in plasma.
- Human Genome Variation Society (HGVS) and International System for Human Cytogenetic Nomenclature (ISCN) standards and their correct application

Genetic Sciences Specialisms in Action (Year 3)
[60 credits]

- Constitutional chromosome analysis across a range of clinical settings.
- The techniques of FISH and array preparations and how the results are analysed across an appropriate range of clinical settings.
- Principles of new sequencing technologies, e.g. CGH, structural variation by genome arrays, exome and whole genome sequencing, including rare variation by NGS
- Methods to detect both known and novel mutations using a range of techniques and analysis methods using appropriate software
- Determination of gene dosage using MLPA, and the use of appropriate software to analyse the results
- Microsatellite testing with reference to the quality of the result and clinical context
- The principles, application and interpretation of novel mutation techniques, including triplet repeats and methylation analysis
- Principles of genomics transforming medicine and how advances in genomic technologies impact on clinical practice, including the contribution to the clinical investigation of patients, and ongoing management of patients and their families

11.7 Specialist Modules: Transplantation and Transfusion Sciences

Transfusion and Transplantation in Health and Disease (Year 2)
[20 credits]
Core transfusion and transplantation services (10 credits)

- Common disorders of transfusion and transplantation disorders, including haemolytic anaemias, transfusion-transmitted infection and autoimmune diseases
- Patient and/or donor management during common transfusion and transplantation disorders
- Mechanism of transfusion-related infections such as bacterial, viral, fungal and parasitic infections and their, structure, function, classification in relation to transfusion and transplantation practices
- Health and safety when handling potentially infectious samples
- Transfusion and transplantation services (required on a 24/7 basis)

Principles and practice of transfusion and transplantation science

- Human anatomy with particular reference to major organs
- Macroscopic appearance of human blood and tissue samples
- Common methods for the collection, receipt and processing of samples of human blood and tissues; implications for sample integrity and clinical validity
- Application of traditional and molecular methods for the investigation of blood and tissues for infectious disease, including:
  - cytomegalovirus
  - human immunodeficiency virus
  - hepatitis B and C
  - West Nile virus
  - prion infection
- Overview of molecular, immunological and serological methods used in the examination of prepared blood and tissue samples
- Principles of DNA and RNA extraction chemistries

Transfusion and Transplantation Specialisms in Action (Year 3)
[60 credits]
Core blood, tissue and organ donation

- Overview of blood donation including donor marketing and donor screening and consent practices

- Overview of organ donation, range of donatable organs and their applications, and donor screening and consent practices
- Overview of tissue donation, range of donatable tissues and their applications, and donor screening and consent practices
- Overview of legislation/guidelines relevant to blood, tissue and organ storage and transportation practice

Core transfusion medicine
- Blood group systems – genes, antigens and antibodies
- Manual and automated techniques and technologies for ABO/D typing, serological cross-matching, red cell phenotyping, antibody screening and identification
- Overview of blood transfusion services, range of blood components/products manufactured and their applications
- Principles of pre-transfusion testing
- Normal ranges and predictive values for pathology tests used to inform transfusion support
- Aetiology and clinical features of conditions requiring transfusion support
- Overview of legislation/guidelines relevant to blood transfusion practice

Core immunology
- Components of the normal immune response
- Role of immunity in infection and cancer
- Tests of immunoglobulins, antibodies and other specific proteins
- Mechanisms of autoimmunity and tests for common autoimmune disorders
- Basics of cellular, complement and humoral immunodeficiency
- Tests for common immunodeficiency disorders

Specialised haematology
- Preparation and interpretation of blood films, including blood parasites
- Mechanisms and tests of haemostasis
- Monitoring programmes for new therapies and anticoagulation therapy
- Causes of haematological malignancy
- Tests for the diagnosis and management of haematological malignancy
- Minimal residual disease
- Antenatal screening tests for fetal abnormalities of haemolytic disease of the newborn
- Tests of feto-maternal haemorrhage

Specialised immunology, tissue and transplantation

- Immunogenetics and the major histocompatibility complex
- Transplantation immunology and histocompatibility testing
- Tests of transplant viability and rejection
- Tests of immunosuppressive therapy
- Stem cells
- Tissue banking
- The MDT approach to the management of tissue and organ transplantation

Specialised transfusion and transplantation microbiology

- Overview of the range and role of cellular and microbiology tests in assisting with viability diagnosis and prognosis in clinical transfusion and transplantation cases
- Overview of infectious disease in transfusion and transplantation practices
- Mechanism of transfusion-transmitted infection and investigation of patients suspected of having transfusion-transmitted infection
- Epidemiology of transfusion-transmitted infections
- Screening and confirmatory tests for transfusion-transmitted infections, including:
  - cytomegalovirus
  - human immunodeficiency virus
  - hepatitis B and C
  - West Nile virus
  - prion infection

SECTION 12: WORK-BASED SYLLABUS: LIFE SCIENCES

*This section describes the Learning Frameworks for the **Generic and Theme Components** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.*

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	Blood Science
SPECIALISM	Cellular Science
SPECIALISM	Infection Science[46]
SPECIALISM	Genetic Science
SPECIALISM	Transfusion and Transplantation Science

[46] Infection Science was extended for 2017 to include Decontamination Science

12.1 Generic Introduction to Work-based Learning

MODULE	Generic Introduction to Work-based Learning	Component	Generic Year 1
AIM	The aim of this module is to introduce the student to the workplace and enable them to apply and contextualise the knowledge and skills they have gained in the module 'Scientific Basis of Healthcare Science' and the Year 1 modules in each healthcare science theme. Students will be expected to perform some routine skills and develop and build their professional practice in accordance with *Good Scientific Practice*.		
SCOPE	On completion of this module the student will be able to perform basic life support and infection control techniques and use effective communication skills in the context of patient-centred care and recognising the role of the specialism in patient care. They will also be expected to adhere to health and safety procedures and work safely in the workplace adhering to the trust procedures and governance, including patient confidentiality and the Data Protection Act.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform a range of generic skills, including infection control, basic life support, communication and team working, adhering to health and safety regulations, and behaving in a professional manner in accordance with *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Observe how staff in the workplace communicate with patients and reflect on the importance of effective communication in the workplace with respect to patient-centred, compassionate care.
- Shadow a qualified HCSP and discuss the role of the practitioner in Life Sciences (either blood sciences, cellular sciences, reproductive science, infection science, decontamination science, genetic science or transfusion and transplantation science) and their contribution to healthcare and multiprofessional teams.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Control infection risks in accordance with departmental protocols, always washing hands in accordance with the six-stage hand-washing technique when necessary.	• Protocols and requirements for hygiene and infection control related to the relevant range of investigations, including preparation, conduct and completion of investigation. • Protocol for hand washing and how effective hand washing contributes to control of infection and local trust requirements.
1	Perform basic life support in accordance with current Resuscitation Council (UK) guidelines.	• Current Resuscitation Council (UK) guidelines.
1	Use effective communication skills within the healthcare environment.	• The principles of effective communication, including written and electronic, verbal and non-verbal. • The importance of introducing yourself and your role as a student HCS practitioner as part of the process of introduction and consent. • Patient-centred care and the importance of informed consent and involving patients in decisions about their healthcare. • The importance of ensuring the patient is aware of the role of the member of the HCS workforce. • The importance of introducing oneself and explaining one's role to the patient. • The way effective communication can assist in identifying problems accurately, increase patient satisfaction, enhance treatment adherence, and reduce patient distress and anxiety. • The importance of some key ideas, for example signposting, listening, language, non-verbal behaviour, ideas, beliefs, concerns, expectations and summarising in communication.
1	Adhere to safe working practice in the workplace.	• The relevant health and safety regulations specific to the workplace and investigations undertaken, the potential hazards and risks and the actions to be taken to minimise these.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Work professionally in the workplace at all times.	• Good Scientific Practice.

12.2 Introduction to Life Sciences

MODULE	Introduction to Life Sciences	Component	Division-Theme Year 1
AIM	This module will provide a foundation from which students will build their knowledge, skills, experience and attitudes throughout the three-year programme of study and enable them to transfer these skills to employment in healthcare science. It is expected that this period of initial work-based training will provide the opportunity to apply their learning from the modules 'The Building Blocks of Life', 'The Science Behind the Cure' and 'Professional Practice', and begin to integrate and embed many of the professional practice learning outcomes and enable students to practise safely in the workplace.		
SCOPE	This module will enable the student to understand and gain practical experience of working in laboratory medicine within one or more areas of Life Sciences and in decontamination science. Students would be expected to perform and demonstrate quality control compliance using a range of relevant methods and techniques. This module is linked to the learning outcomes in 'Life Sciences in Health and Disease'. There is flexibility for the work placements to be in blood sciences or across the other specialisms within Life Sciences. Students will also apply knowledge and develop and build their professional practice safely.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform, under direct supervision, basic procedures in accordance with local health and safety regulations and quality requirements.
2. Work in accordance with *Good Scientific Practice* and the Standards of Proficiency set by the AHCS and for Biomedical Scientists, the HCPC.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend a clinic or ward round in a healthcare setting and observe a patient pathway of a typical patient whose sample has been sent to the laboratory in which you are placed, or an item of reusable medical equipment sent for processing. Reflect on the experience of that patient and the contribution of Life Sciences to patient care, considering how your learning will influence your future practice as a HCSP.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Minimise risks and hazards in compliance with health and safety policies.	• The relevant health and safety regulations specific to the investigations, the potential hazards and risks, and the actions to be taken to minimise these.
1	Control infection risks in accordance with departmental protocols.	• Protocols and requirements for hygiene and infection control. • Protocol for hand washing and how effective hand washing contributes to control of infection and local trust requirements.
1	Undertake a health and safety risk assessment of a defined area identifying problems and seeking advice from your supervisor.	• Process of risk assessment. • Problem solving and when to seek advice.
1	Perform basic specimen receipt and preparation relevant to your placement.	• Standard operating procedure (SOP) for specimen receipt and handling. • Pre-analytical functions, including the selection, collection and processing of samples for investigation.
1	Use a range of basic laboratory equipment used in Life Sciences appropriate to the placement environment.	• SOP for the laboratory equipment used. • Analytical functions, including the processing of samples for investigation.
1	Observe and assist in a limited range of core methods within Life Sciences and techniques relevant to your placement.	• Quality assurance. • SOP for the core method and techniques. • Pre-analytical, analytical and post-analytical functions, including sample investigation.
2	Use effective communication skills within the healthcare environment, adapting communication style and language to meet the needs of the listener.	• The principles of effective communication, including written and electronic, verbal and non-verbal. • The way effective communication can assist in identifying problems accurately, increase patient satisfaction, enhance treatment adherence, and reduce patient distress and anxiety. • The importance of some key ideas, for example signposting, listening, language, non-verbal behaviour, ideas, beliefs, concerns, expectations and

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		summarising in communication.
2	Reflect on your practice during this period of work-based training and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How CPD can improve personal performance.

SECTION 13: WORK-BASED SYLLABUS: ALL SPECIALISMS

This section describes the Learning Frameworks for the work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Blood or Cellular or Infection[47] or Genetic Sciences or Transfusion and Transplantation Sciences**

[47] Infection Science was extended in 2017 to include Decontamination Science

MODULE	Life Sciences	Component	Division-Theme Years 2 and 3
AIM	This module will provide a foundation from which students will build their knowledge, skills, experience and attitudes throughout the three-year programme of study, and enable them to transfer these skills to employment in healthcare science. The aim of this module is to ensure that the student develops their workplace skills and experience, as appropriate to their work-placements. The student will be expected to apply and extend their knowledge, skills and experience from Year 1 and the Year 2 modules 'The Pathology and Laboratory Medicine Toolbox' and 'Methods for Investigating Disease; Partners in Investigation'.		
SCOPE	On completion of this module the student will be able to competently perform safe and secure receipt, handling, storage and disposal of biological specimens or/and medical devices, work with laboratory/department information systems and perform a range of basic laboratory[1] techniques. They will also be expected to be able to perform a range of core methods relevant to their placements, following SOPs to the required quality standard. The student will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD. ***Please Note: Whilst students training within Infection Science (Decontamination Science) will be expected to attain many of the learning outcomes and competences in a Decontamination Science setting, they will also be expected to spend some time in a pathology laboratory in order to gain a broad knowledge and understanding the underpinning science of infection.***		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform safe and secure receipt, handling, storage and disposal of biological specimens and/or medical devices.
2. Perform basic laboratory techniques[2] and/or basic decontamination processes[3], using a range of equipment as appropriate to the placement environment.[4]
3. Work with laboratory/departmental information systems.
4. Perform a range of core, point-of-care and specialised methods and techniques as appropriate to the specialism, and comply with required quality standards.[5]
5. Evaluate the performance of one or more methods, including IQC and EQA data, and recommend corrective action where appropriate.

6. Validate results from a range of procedures to inform repeat analysis or processing, e.g. of medical devices and the need for additional investigations and reporting.
7. Draft routine reports for validation, prioritise reports and identify cases for referral to appropriate senior colleague after initial basic interpretation.
8. Perform an audit of the effectiveness of one or more methods within your specialism, including the introduction of new methods, and evaluate the outcome in the context of meeting clinical requirements or quality standards application [6]
9. Prepare and make an oral presentation to peers using modern software, draw conclusions from data and discuss this with the audience.
10. Provide evidence of direct patient interaction, which may include laboratory medicine testing at the point of care or patients using medical devices in their home (e.g. renal dialysis, infusion devices), or hospital based practice, e.g. in endoscopy, and interaction with other healthcare professionals. This could be demonstrated, for example through assisting with phlebotomy at the phlebotomy clinic, or performing a point-of-care testing (POCT) test with the patient present. When performing POCT analysis, discuss the results obtained in the context of the clinical presentation of the patient with your supervisor.
11. Adhere to appropriate standards of professional practice, demonstrating competences, personal qualities and behaviours as defined in *Good Scientific Practice*.

[1]The term laboratory techniques includes those undertaken within a decontamination science setting.
[2]including weighing, centrifugation and the use of pipettes and microscopes
[3] including cleaning, inspection, packaging, terminal processing, storage and departmental environmental and equipment monitoring
[4]Competence could be acquired at university then reaffirmed in the workplace.
[5]Important note: complete this log for each of the specified core competences within each specialism. 6[4]This could be demonstrated via an audit report, e.g. a vertical audit, MHRA audit, etc., together with a reflective account and a witness statement from the supervisor/trainer.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Work directly with patients, which may include laboratory medicine testing at the point of care, the use of medical devices in hospital and the home, phlebotomy and interaction with other healthcare professionals, in order to gain an insight into the experience of patients whose samples are tested in the laboratory in which you are placed, or who undergo investigations, e.g. endoscopy, and discuss how your professional practice will be influenced by this experience.
- Critically appraise both IQC and EQA performance and the methods chosen, review the data obtained and discuss your findings with your supervisor.
- Participate in a range of meetings and other activities outside the laboratory and/or department, including those that involve patients and other healthcare professionals, maintain a reflective practice diary of each activity; include witness statements from key attendees, minutes, etc. and record the learning and actions you will use in your future practice as a Healthcare Science Practitioner.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

Competences to be assessed in the context of the specimen type and specimen preparation procedure; where a competence does not apply please enter Not Applicable (NA).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Maintain a professional relationship with your colleagues, different sections of the department, service users, and patients, where appropriate.	• *Good Scientific Practice*. • Patient-centred practice. • Principles and application of laboratory/departmental protocols relevant to a range of routine investigations (standard operating procedures; SOPs).
1	Handle specimens/medical devices/reusable instruments and request forms safely according to health and safety, quality assurance and trust governance procedures.	• Quality assurance. • The laboratory/departmental procedure for test requesting and sample receipt and (if appropriate) medical devices/reusable instruments as set out in departmental SOPs. • When and how to inform supervisory staff of situations beyond their scope of practice. • How and when to prioritise processing of specimens/devices **Decontamination Science** • Identify the families (categories) of medical devices and their specific design criteria • When and how to report a non-compliant medical device or set of devices and actions to be taken as set out in department SOPs
1	Identify the specimen, container, anticoagulant, preservative, or medical device type required for each test procedure and determine specimen/medical device-processing requirements.	
1	Prioritise specimens/medical devices according to specimen type/clinical need and local requirements, e.g. urgent, deteriorating specimens, clinical scheduling, maintaining patient confidentiality.	
1	Carry out procedures within your scope of practice for dealing with incorrect or inadequate specimens, forms, and medical devices e.g.	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	labelling, insufficient, incorrect preservative, unfixed, damaged, missing.	
1	Ensure other samples/medical devices are sent to the correct destination, e.g. other section of laboratory/other departments, safely and correctly splitting the sample if necessary.	• Correct procedures for dealing with: o known high-risk specimens. o paediatric and insufficient specimens. o retained products of conception where applicable. o post-mortem tissue where applicable. • Correct carry out procedure(s) for decalcification of tissue where applicable. • Legislation and regulations covering the transport of samples. • Legislation and standards covering the processing of medical devices and surgical instruments appropriate to specialism.
1	Use passwords to access laboratory/department information management system) and correctly enter patient and specimen data into LIMS according to laboratory procedure.	• Principles and application of laboratory/departmental protocols relevant to a range of routine investigations (SOPs). • Data protection and confidentiality. • Correct and safe operation of equipment. **Decontamination Science** • Legal requirements of the tracking and traceability of medical devices through the decontamination process • Tracking methods and requirements for high risk devices • Storage requirements and handling • Dispatching as required in departmental SOPs • Monitoring of environmental conditions • How and what to dispatch, checks to be carried according to departmental SOPs
1	Safely and correctly use specimen/equipment preparation equipment as appropriate to your placement.	
1	Place specimens/equipment in correct location and storage conditions before analysis or further processing.	
1	Identify and apply correct post-analytical storage conditions* or post sterilisation conditions to maintain	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	the quality of the product released. *for a range of specimens, including retention times, tissue retention requirements, for example: • room temperature • freezer • 4–8°C • 37°C. **for the range of medical devices • temperature range • humidity range • shelving specification	
1	Retrieve specimens/medical devices from storage and correctly deal with add-on requests, completing appropriate documentation.	
1	Identify specimens/medical devices for disposal and retrieve from storage; select correct disposal method according to specimen/medical device and dispose of specimens/medical device correctly and safely, completing necessary documentation.	• Human Tissue Act. • Principles and application of laboratory/departmental protocols (SOPs). • Safe disposal of specimens/contaminated single use medical devices including sharps • Safe disposal of reusable medical devices including documentation
2	Competently and safely use, carry out regular monitoring, checks and maintenance, completing	• Correct and safe operation of equipment. • The requirement for periodic testing, revalidation and commissioning of equipment

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	appropriate records relevant to your placement, which could include: • microscopes • centrifuges • cytocentrifuge • downflow benches • balances, range of types • water baths and other heating devices • safety cabinets • fume cupboards • plasma thawers • incubators • fridges and freezers • microtomes • sterilsers • Sterile Services Washer Disinfector • Sterile Services/endoscopy Ultrasonic Washers • Endoscopy washer disinfectors • Endoscope sealing systems • Endoscope storage and drying systems • Drying cabinets. • Tracking systems • Protein detection devices	• Role of the Authorised Person (decontamination) in management of equipment • Principles and application of laboratory/departmental protocols (SOPs). • How to identify operational status of equipment (e.g. ensure maintenance records are up to date). • How equipment is maintained by external agencies. • Difference between Planned Preventative maintenance, breakdown and testing and validation of equipment and their frequencies • Role of the user and their responsibilities
2	Use laboratory/departmental apparatus appropriately and safely.	• Principles and application of laboratory/departmental protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
2	Use, maintain and calibrate pH meter; use pH paper where applicable.	• Correct and safe operation of equipment. • Importance of carrying out maintenance and calibration of automatic pipettes. • The importance of temperature control and how to adjust as appropriate.
2	Prepare general laboratory/departmental reagents/ consumable or raw materials, completing appropriate records, paying due attention to lot numbers and expiry dates, and ensuring storage and health and safety requirements are met.	
2	Use manual and automatic pipettes accurately to prepare dilutions and prepare reagents appropriate to your placement.	
2	Accurately record conditions and identify if within required range, such as temperature, for storage facilities and report/respond to any errors/alarms.	
2	Store reagents/kits/consumables correctly and complete the required documentation, ensuring like lot numbers are stored together and stock rotation is practised.	
3	Use passwords to access laboratory/departmental information management systems and correctly enter patient and specimen or	• Principles and application of laboratory/departmental protocols (SOPs). • The range and application of clinical information systems used in the workplace.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	equipment data into the system according to laboratory/departmental procedure.	• Confidentiality and data protection.
3	File and archive data in accordance with data security and protection protocols.	
4	Perform a core technique relevant to the laboratory/departmental placement, locating specimens/medical device for analysis/processing as appropriate, ensuring a unique identifier is attached to the specimen, and identifying correct and incorrect sample types.	• Principles and applications of techniques used in standard profiles and tests (SOPs). • The correct and safe operation of equipment. • Importance of and how to complete documentation required for the procedure. • Health and safety procedures. • Importance of communicating effectively with fellow team members, supervisor/trainer while carrying out the procedure. • How to recognise specimen adequacy/inadequacy due to volume, artefact and integrity, and record and report inadequacy as appropriate. • Prioritisation of specimens for analysis as appropriate. • Preparation of the analytical environment as required. • Confirmation of operational status of equipment.
4	Undertake equipment maintenance and preparation as appropriate to the technique, completing required documentation. Maintenance may be: • daily • weekly • monthly • occasional.	• Correct and safe operation of equipment. • Principles and application of laboratory/departmental protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
4	Undertake required calibration and quality control procedures, identifying acceptable performance, e.g. IQC, staining checks, applying appropriate acceptability criteria, identifying unacceptable performance, taking corrective action and recommending preventative action.	• The correct and safe operation of equipment. • Principles and application of laboratory protocols (SOPs). • How to troubleshoot procedure to a basic level and what preventative action should be taken as necessary. • Laboratory/departmental quality control procedures.
4	Undertake the procedure with patient samples, monitor progress and recognise when limits to practice are reached, and seek appropriate guidance.	• Principles and application of laboratory/departmental protocols (SOPs). • When to initiate repeat testing. • When to add additional tests. • When to refer. • Data protection and confidentiality. • National and local guidelines.
4	Interpret to a basic level, identify action, limits, take appropriate action and report under supervision, referring results that are out of the student's scope of practice to appropriate staff if necessary.	
4	Report tests by telephone when appropriate.	
4	Under supervision, issue appropriate blood components and products/re-usable medical devices working within national/local guidelines and legislation where applicable to placement.	
5	Identify acceptable and	• Principles and application of laboratory/departmental protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	unacceptable performance for your chosen methods, e.g. IQC, staining checks, applying appropriate acceptability criteria and taking corrective action, recommending preventative action.	• The principles and practice of IQC and EQA.
6	*For chosen procedure* apply the correct quality parameters to determine the validity of the range of test results.	• Principles and application of laboratory/departmental protocols (SOPs). • Clinical features relevant to the results to be validated. • Local policy for repeat analysis and/or application of follow-up tests to validate results.
7	*For chosen procedure* undertake routine reporting using LIMS/departmental system, referring reports that are out of the student's scope of practice to appropriate staff if necessary.	• Principles and application of laboratory/departmental protocols (SOPs). • The routine reporting process and when reports require further validation. • Clinical features relevant to the results to be reported. • When and how to refer reports that are out of the student's scope of practice to appropriate staff. • Clinical impact of selecting incorrect reporting mechanism.
7	Identify and take appropriate action to report urgent tests results and report tests by telephone if appropriate.	
8	*In the context of the procedure c*arry out an audit and produce an audit report in the departmental form, drawing appropriate conclusions and making recommendations, and feed this back to the department.	• Principles and application of laboratory/departmental protocols (SOPs). • Audit cycle. • Trust audit governance processes.
8	Critically reflect on your and the departments learning and planned actions arising from this audit.	• Models of reflection including action planning • Audit cycle and action planning.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
9	Prepare and deliver an oral presentation, drawing appropriate conclusions from data and answering questions pertaining to the presentation.	• Verbal and written communication skills. • Data analysis. • Presentation methods.
10	Undertake Point of Care Testing or analysis and discuss the result obtained in the context of the clinical presentation of the patient. For example, blood glucose, INR, urine analysis, HbA1c, protein detection/transmission etc.	• Effective communication skills to explain complex scientific information in ways that can be understood by patients and practitioners in other areas. • Data security, confidentiality and consent in the use of the data. • Value of MDT working in the investigation of patients. • Principles of the requirement to use appropriate medical devices (single use and reusable) to manage instrument inventory • MDT working to ensure correct patient pathway • The requirement for managing the devices after use.
11	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How CPD can improve personal performance.
11	Where applicable to your placement, comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity	• Principles, guidance and law with respect to: o medical ethics o confidentiality o information governance o informed consent o equality and diversity o child protection • elder abuse

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	• use of chaperones • informed consent.	• use of chaperones • probity • fitness to practise.
11	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 14: WORK-BASED SYLLABUS: CLINICAL BIOCHEMISTRY

*This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.*

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Blood Sciences:** Clinical Biochemistry

MODULE	Blood Sciences: Clinical Biochemistry	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience, and gain experience in clinical biochemistry, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in clinical biochemistry and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform routine procedures in clinical biochemistry using automated clinical biochemistry to specified quality standards, recognising individual variations and sample integrity issues.
2. Perform common routine analysis using an immunoassay analyser, e.g. endocrine analyses (steroid/polypeptide); tumour markers; drugs (anti-epileptic drugs [AED], analgesics, cardiac, anti-asthmatics); special proteins (acute phase proteins, immunoglobulin fragment, etc.), to specified quality standards, recognising individual variations and sample integrity issues.
3. Perform blood gas analysis to specified quality standards, recognising individual variations and sample integrity issues.
4. Perform blood glucose and HbA1c analysis to specified quality standards, recognising individual variations and sample integrity issues.
5. Measure osmolality to specified quality standards, recognising individual variations and sample integrity issues.
6. Perform a biochemical urinalysis, e.g. dipstick testing, to specified quality standards, recognising individual variations and sample integrity issues.
7. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from blood science specialisms are presented; critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the blood sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Contribute to an audit of scientific and technical data and critically reflect on the impact of the audit outcomes and actions agreed on Life Science services; quality improvement and patient safety.
- Discuss the current and future contribution of genomics and clinical bioinformatics to blood sciences with your training officer.

It is also recommended that the student:

- Observe Point of Care Testing in a healthcare setting and discuss the method(s) and the patient benefit with your supervisor.

All of these experiences should be recorded in your e-portfolio.
The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1, 2, 3, 4, 5, 6	Use equipment in biochemistry to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Perform common routine tests on automated analysers, e.g. renal, liver, glucose, lipids, urine protein, cardiac markers, amylase and bone, to specified quality standards.	• Principles and application of laboratory protocols (SOPs). • Key method principles and relate to equipment layout. • Quality standards. • Underpinning principle of the chosen tests.
1	Recognise normal and abnormal automated clinical biochemistry results, interferences, individual variations and sample integrity issues.	• Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
2	Perform common routine analysis, e.g. endocrine analyses (steroid/polypeptide); tumour markers; drugs (AEDs, analgesics, cardiac, anti-asthmatics); special proteins (acute phase proteins, Immunoglobulin fragment, etc.).	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Basic reactions involved in routine immunoassay techniques, e.g. enzyme immunoassay (EIA), micro particle EIA, enzyme-multiplied immunoassay (EMIT), fluorescence polarisation immunoassay (FPIA), nephelometry and turbidometry and the relationship of these to the instrument layout.
2	Recognise normal and abnormal results from routine immunoassay techniques, interferences, individual variations and sample integrity issues.	• Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
3	Perform blood gas analysis on samples from a range of patients.	• Quality standards. • Underpinning principle of the chosen tests.
3	Recognise normal and abnormal results from blood gas analysis, interferences, individual variations and sample integrity issues.	• Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
4	Perform blood glucose and HbA1c analysis.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Diagnostic value of measurement in monitoring diabetic patients.
4	Recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
5	Measure osmolality to specified quality standards.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Underpinning principle of the chosen tests. • Diagnostic value of measurement in analyte (e.g. serum, urine, CSF, where appropriate).
5	Recognise normal and abnormal osmolality results, interferences, individual variations and sample integrity issues.	• Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
6	Perform a biochemical urinalysis, e.g. dipstick testing.	• Quality standards. • Underpinning principle of the chosen tests. • Analytes measured in biochemistry, e.g. metabolites, protein, glucose, pH. • Diagnostic value of measurement in patients with diabetes, renal disease.
6	Recognise normal and abnormal biochemical urinalysis results, interferences, individual variations and sample integrity issues.	• Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
7	Uphold high standards of professional practice as defined in *Good Scientific Practice*.	• *Good Scientific Practice*. • BSc professional practice module.
7	Reflect on your practice and generate a	• Personal values, principles and assumptions, emotions and prejudices,

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
7	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
7	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 15: WORK-BASED SYLLABUS: HAEMATOLOGY

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Blood Sciences:** Haematology

MODULE	Blood Sciences: Haematology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience, and gain experience in haematology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in haematology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform routine procedures in haematology to specified quality standards, recognising individual variations and sample integrity issues, including full blood count (FBC), ESR or plasma viscosity, coagulation screen prothrombin time (PT), activated partial thromboplastin time (APTT), fibrinogen, plasma correction test, INR, D-dimer, factor assay, blood film morphology, infectious mononucleosis (IM) screen, malaria, sickle cell.
2. Perform POCT, for example INR, haemoglobin (Hb), ESR, to specified quality standards, recognising individual variations and sample integrity issues.
3. Perform routine procedures in transfusion blood group and antibody screen, simple antibody identification and red cell phenotype to specified quality standards, recognising individual variations and sample integrity issues.
4. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from blood science specialisms are presented; critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the blood sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to blood sciences with your training officer.

It is also recommended that the student:

- Observe POCT in a healthcare setting and discuss the method(s) and the patient benefit with their supervisor.
- Observe the use of the Kleihauer test and, where available, discuss the principles of measurement, value and normal and abnormal results with their supervisor.

All of these experiences should be recorded in your e-portfolio.
The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1, 2, 3	Use equipment in haematology to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Measure a FBC on automated analysers following a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • How to assess that the instrumentation is correctly calibrated and quality controlled. • The principles of cell counting and differentiation, haemoglobin measurement and derivation of red cell indices for the instrument used. • Quality standards. • Underpinning principle of the chosen tests. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for FBC.	• EQA scheme.
1	Perform ESR or plasma viscosity using a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Underpinning principles of ESR or plasma viscosity measurement. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for ESR or plasma viscosity.	• EQA scheme.
1	Perform a coagulation screen using a defined protocol to specified quality standards and recognise normal and abnormal results,	• How to assess that the instrumentation is correctly calibrated and quality controlled. • Quality standards. • Measurement principles of a haemostasis analyser.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	interferences, individual variations and sample integrity issues.	• The definition and physiological basis of PT, APTT and fibrinogen tests. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for a coagulation screen.	• EQA scheme.
1	Perform correction tests following a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Underpinning principle of normal plasma corrections, thrombin times correction tests. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for correction tests.	• EQA scheme.
1	Perform international INR measurements following a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Underpinning principles of the INR system. • The value of the coagulometer (including point of care devices) in monitoring anticoagulated patients. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties. • Basis of therapeutic ranges and anticoagulant dosing practice.
1	Interpret performance in appropriate EQA scheme for INR.	• EQA scheme.
1	Perform D-dimer tests following a	• Principles and application of laboratory protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Quality standards, including quality control procedures. • Underpinning principles of the measurement of D-dimer. • The value of the coagulometer (including point of care devices) in monitoring anticoagulated patients. • Typical normal and abnormal results and the relevance of cut-off values in venous thromboembolism (VTE) exclusion. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for D-dimer tests.	• EQA scheme.
1	Perform a coagulation factor assay following a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Underpinning principles of the measurement of coagulation factor assay. • The value of the coagulometer (including point of care devices) in monitoring anticoagulated patients. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for coagulation factor assay.	• EQA scheme.
1	Prepare manual or automated blood films recognising the common morphological features of red cells, white cells and platelets, and perform a manual white cell differential following a defined protocol.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures.
1	Recognise normal and abnormal morphology and refer to senior	• Normal and abnormal morphology of red cells, white cells and platelets. • Interferences, individual variations and sample integrity issues.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	colleagues as per protocol.	• Protocol for referral of abnormal morphology to senior scientist or clinical staff.
1	Interpret performance in appropriate EQA scheme for blood films.	• EQA scheme.
1	Perform an IM screen to a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Principles of IM screening. • Clinical relevance of IM screening. • Normal and abnormal results. • How an IM screen result relates to blood film morphology.
1	Perform a malaria parasite screen to a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Principle of malarial parasite detection and its limitations for a specific Plasmodium species. • Importance and clinical relevance of malaria testing, and the different species infecting humans.
1	Recognise normal and abnormal results and how to relate these to thin and thick blood film investigation of malaria.	• Normal and abnormal malaria parasite screening. • The relationship of normal and abnormal results to thin and thick blood films investigations.
1	Interpret performance in appropriate EQA scheme for malaria parasite screen.	• EQA scheme.
1	Perform a haemaglobinopathy (e.g sickle cell, thalassaemia screen to a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Principle of haemaglobinopathy screening method. • The importance and clinical relevance of haemaglobinopathy screening. • Genetics of sickle cell disease.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	integrity issues.	
1	Interpret performance in appropriate EQA scheme for a haemaglobinopathy screen.	• EQA scheme.
2	Perform a POCT haemoglobin to a defined protocol after confirmation of required calibration and quality control, and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• The principle of haemoglobin analysis using a POCT device. • Situations where POCT haemoglobin investigation is valuable. • Normal and abnormal results and when further action is required.
2	Interpret performance in appropriate EQA scheme for a sickle cell screen.	• EQA scheme.
3	Perform indirect antiglobulin tests (IAT) and demonstrate and discuss the possible sources of error dependent on the technology used and the patient's clinical condition.	• Principles and application of laboratory protocols (SOPs). • The regulatory requirements and guidelines relevant to blood transfusion. • Sample acceptance criteria and demonstrate understanding of the risks associated with inadequately labelled samples.
3	Perform blood grouping and antibody screening tests using manual and automated methods, selecting and applying appropriate controls, recognise control failures and identify further actions required.	• Principles and application of laboratory protocols (SOPs). • The principles of serological tests used for blood grouping and antibody screening, and their appropriate use and limitations.
3	Document the results of blood grouping and antibody screening tests, use IAT and follow procedures to minimise the risk of transcription error.	• Principles and application of laboratory protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
3	Interpret blood grouping and antibody screening results, recognise anomalies and identify further actions required.	• The relevance of blood grouping and antibody screening anomalies and their implications in the pre-transfusion process.
3	Select and perform simple antibody identification using IAT, enzyme and direct agglutination tests, and select appropriate controls.	• Principles and application of laboratory protocols (SOPs). • The regulatory requirements and guidelines relevant to blood transfusion.
3	Interpret antibody identification results, so as to recognise antibodies that can be positively identified, be aware of antibodies that cannot be excluded, and to know further actions required.	• Principles and application of laboratory protocols (SOPs). • The significance of red cell antibody specificities identified and their implications in pre-transfusion and antenatal settings.
3	Identify patients suitable for red cell phenotyping and recognise situations where red cell phenotyping is required	• Principles and application of laboratory protocols (SOPs). • The regulatory requirements and guidelines relevant to blood transfusion.
3	Perform red cell phenotyping using IAT and direct agglutination tests, and demonstrate and discuss the possible sources of error, selecting appropriate controls for phenotyping tests, recognise control failures and identify further actions required.	• Principles and application of laboratory protocols (SOPs). • The principles of serological tests used for red cell phenotyping. • How to recognise anomalous red cell phenotyping results, and identify further actions required.
3	Interpret red cell phenotyping results and discuss their relevance in pre-transfusion and antenatal settings.	• Principles and application of laboratory protocols (SOPs). • Normal and abnormal findings.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
4	Uphold high standards of professional practice as defined in *Good Scientific Practice*.	• *Good Scientific Practice*. • BSc professional practice module.
4	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
4	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
4	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 16: WORK-BASED SYLLABUS: IMMUNOLOGY

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Blood Sciences: Immunology**

MODULE	Blood Sciences: Immunology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in immunology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in immunology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform routine procedures in immunology to specified quality standards, recognising individual variations and sample integrity issues, including protein electrophoresis, myeloma screening, ELISA, immunofluorescence (where available) and allergy testing, to quality standards.
2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from blood science specialisms are presented, critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the blood sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to blood sciences with your training officer.

It is also recommended that the student:

- Observe the use of immunofluorescence and discuss the principles of measurement, the value of including autoantibody screening, and normal and abnormal results with your supervisor.
- Observe the use of allergy testing and discuss the principles of measurement, the value of allergy testing in immunology, and normal and abnormal results with your supervisor.

All of these experiences should be recorded in your e-portfolio.
The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Use equipment in immunology to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Perform protein electrophoresis for myeloma screening using a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Underpinning principles of protein electrophoresis. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties. • The value of protein electrophoresis testing, including in myeloma screening.
1	Interpret performance in an appropriate EQA scheme for protein electrophoresis and myeloma screening.	• EQA scheme.
1	Perform the ELISA technique using a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Underpinning principles of ELISA. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for ELISA.	• EQA scheme.
2	Uphold high standards of professional practice as defined in *Good Scientific Practice*.	• *Good Scientific Practice*. • BSc professional practice module.
2	Reflect on your practice and generate a reflective diary that demonstrates how you take	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
2	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
2	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 17: WORK-BASED SYLLABUS: HISTOLOGY

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Cellular Sciences: Histology**

MODULE	Cellular Sciences: Histology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in histology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in histology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Use tissue processors and embedding equipment, including good laboratory practice and annual maintenance, to specified quality standards, recognise normal and abnormal results, and rectify any errors.
2. Use microtomes, including good laboratory practice and annual maintenance, to specified quality standards.
3. Assist in the use of relevant dissection equipment, e.g. knives and scalpels, to specified health and safety standards.
4. Use automated staining machines to specified quality standards.
5. Use automated immunohistochemistry instruments using a variety of antibodies to specified quality standards for a variety of tissue antigens, e.g. tumour markers.
6. Use molecular equipment and fluorescence microscopes to specified quality standards where available.
7. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from cellular science specialisms are presented; critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the cellular sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to cellular sciences with your training officer.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1, 2, 3, 4, 5, 6	Use equipment in histology to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Use tissue processors and embedding equipment, including good laboratory practice and annual maintenance, to specified quality standards, recognising interferences, individual variations and sample integrity issues, including troubleshooting the possible root causes.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • How to process and embed a variety of histology specimens, e.g. urgent diagnostic biopsies, skin biopsies, mega blocks, fatty breast tissue. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties. • The value of specimen processing in the patient pathway.
1	Recognise normal and abnormal results from a variety of histology specimens and rectify any errors.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.
2	Use of microtomes, including good laboratory practice and annual maintenance, to specified quality standards, recognising interferences, individual variations and sample integrity issues, including troubleshooting the possible root causes.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • How to cut sections from a diverse range of tissues, e.g. diagnostic core biopsies, uterus, skin, breast. • Value of section cutting in the patient pathway, e.g. renal biopsy, lymph nodes, bone biopsy.
2	Recognise normal and abnormal results while using microtomes, and rectify any errors.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.
3	Use relevant dissection equipment, e.g. knives and scalpels, to specified health and safety standards.	• Principles and application of laboratory protocols (SOPs). • Quality standards.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
3	Assist a scientist or pathologist in the dissection of a variety of specimens, both fresh and fixed in formalin, by accurately checking the patient's details and labelling cassettes, and begin to recognise normal and abnormal results and rectify any errors.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The value of specimen dissection in the patient pathway. • Interferences, individual variations and sample integrity issues, including troubleshooting the possible root causes.
4	Use automated staining machines to specified quality standards.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • How to perform haematoxylin and eosin (H&E) staining on a variety of sections, including gut, breast and large sections of prostate. • The value of H&E staining in the patient pathway.
4	Use H&E staining to identify normal and abnormal cells in different tissues of the body, using appropriate controls, and rectify any errors and recognise interferences, individual variations and sample integrity issues, including troubleshooting the possible root causes.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
4	Perform manual special staining to specified quality standards, recognising normal and abnormal results, using appropriate controls, under a light microscope and rectify any errors.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • How to perform 'special' staining for a variety of tissue components, e.g. pigments, connective tissues and infections, using a variety of tinctorial, histochemical and empirical methods. • The value of special staining in the patient pathway. • Interferences, individual variations and sample integrity issues, including

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		troubleshooting the possible root causes.
5	Use automated immunohistochemistry instruments using a variety of antibodies to specified quality standards for a variety of tissue antigens, e.g. tumour markers.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • How to perform immunohistochemistry techniques for a variety of tissue antigens, e.g. tumour markers. • The value of prognostic and predictive markers that influence patient treatment and outcomes.
5	Recognise normal and abnormal immunohistochemistry results, using appropriate controls, and rectify any errors.	• Interferences, individual variations and sample integrity issues, including troubleshooting the possible root causes. • Normal and abnormal immunohistochemistry results.
6	Use molecular equipment and fluorescence microscopes to specified quality standards where available.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • How to perform a variety of molecular techniques applied to tissue sections, e.g. in-situ hybridisation, DNA extraction and relevant downstream analysis, e.g. sequencing and mutation analysis. • The value of molecular techniques in the patient pathway.
6	Recognise normal and abnormal results generated using molecular techniques in histology, using appropriate controls, and rectify any errors.	• Normal and abnormal results generated using molecular techniques in histology. • Interferences, individual variations and sample integrity issues, including troubleshooting the possible root causes.
7	Uphold high standards of professional practice as defined in *Good Scientific Practice* and as applicable to histology.	• *Good Scientific Practice*. • BSc modules in professional practice.
7	Reflect on your practice and generate a reflective diary that demonstrates how you take	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
7	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
7	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 18: WORK-BASED SYLLABUS: CYTOLOGY

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Cellular Sciences: Cytology**

MODULE	Cellular Sciences: Cytology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in cytology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in cytology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform a range of common cervical cytology routine tests and preparation, e.g. sample production, liquid-based cytology (LBC) preparation (ThinPrep, SurePath and any other emerging techniques), Papanicolau (PAP) staining, screening, rapid review to specified quality standards.
2. Perform a range of non-gynaecological cytology techniques routine tests, e.g. preparation of fine needle aspiration cytology, serous fluids, urines and respiratory samples using a range of staining techniques, e.g. PAP, Romanowsky stains, H&E, wet preparations to specified quality standards.
3. Perform a range of common immunocytochemistry routine tests, e.g. preparation of cell block or slides, antigen retrieval techniques, staining to specified quality standards.
4. Perform special cytology staining using clinically relevant techniques to specified quality standards, recognising normal and abnormal results to specified quality standards.
5. Perform molecular techniques in cytology to specified quality standards, e.g. HPV testing instruments to specified quality standards.
6. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from cellular science specialisms are presented; critically reflect on the discussions and the impact for patient care and management.
- Critically reflect on the partnership between the cellular sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Observe the work of cervical cytology screeners in the department and discuss the role of cervical cytology in the NHS cervical screening programme with your training officer.
- Discuss the current and future contribution of genomics and clinical bioinformatics to cellular sciences with your training officer.
- Participate in immunocytochemistry testing in cytology if available or discuss the use of immunocytochemistry testing in cytology with your training supervisor (if unavailable)

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1, 2, 3, 4, 5	Use equipment in cytology to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Perform common cervical cytology routine tests and preparation e.g. sample production, LBC preparation (ThinPrep, SurePath and any other emerging techniques), Papanicolau (PAP) staining, screening, rapid review.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Aetiology of disease. • Reporting terminology. • Screener statistics. • KC61. • Call/recall programme. • Failsafe and the role of cytology within the programme. • The value of gynaecological techniques in cytology.
1	Recognise normal, inflammatory and abnormal cellular patterns microscopically (including metaplasia, lookalikes, infections, artefacts and contaminants).	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results, including inflammatory and abnormal cellular patterns microscopically (including metaplasia, lookalikes, infections, artefacts and contaminants). • Interferences, individual variations and sample integrity issues
2	Perform common non-gynaecological routine tests, e.g. preparation of fine needle aspiration cytology, serous fluids, urines and respiratory samples using a range of staining techniques, e.g. PAP, Romanowsky stains, H&E, wet preparations.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Aetiology of disease. • The value of non-gynaecological techniques in cytology, e.g. impact of cell type on staining, which cells are accessible using various sampling techniques, e.g. body cavity fluid analysis in the evaluation of suspected cancer patients. • Staining techniques required, e.g. PAP, Romanowsky stains, H&E, wet preparations.
2	Recognise normal and abnormal	• Principles and application of laboratory protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	results for urines, respiratory specimens and serous fluids; show an awareness of other non-gynaecological sample types.	• Quality standards. • Normal and abnormal results for urines, respiratory specimens and serous fluids; show an awareness of other non-gynaecological sample types. • Interferences, individual variations and sample integrity issues, e.g. specimen identification mismatch checks, stain checks.
3	Perform common immunocytochemistry routine tests, e.g. preparation of cell block or slides, antigen retrieval techniques, staining.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The value of immunocytochemistry techniques in cytology, e.g. its use for differential diagnosis of malignancy (immuno panels for benign vs malignant, mesothelioma, melanoma, lymphoma). • The principal techniques available, i.e. anti-alkaline phosphotase technique (APAAP), Avidin-Biotin complex (ABC,) direct vs indirect methods). • Typical normal and abnormal results.
3	Recognise appropriate staining for immunocytochemistry and discuss the use of controls, impact of poor quality, background staining, etc.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Appropriate staining for immunocytochemistry, e.g. show an understanding of the use of controls, impact of poor quality, background staining, etc. • Interferences, individual variations and sample integrity issues.
4	Perform special cytology staining, using clinically relevant techniques to specified quality standards, recognising normal and abnormal results.	• Principles and application of laboratory protocols (SOPs). • Quality standards • How to perform ‘special’ stains appropriate to your placement, e.g. Ziehl-Neelsen (ZN), Grocott and Periodic Acid-Schiff (PAS) +/- diastase. • The value of special stains in the identification of microorganisms, mucus, etc. • Typical normal and abnormal results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• Interferences, individual variations and sample integrity issues.
5	Use molecular technology equipment to specified quality standards.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The use of molecular technology equipment to specified quality standards, e.g. HPV testing instruments. • How to perform molecular techniques, e.g. in-situ hybridisation (ISH), PCR, hybrid capture 2 and invader technology. • The value of molecular techniques for gynaecological and non-gynaecological cytology, e.g. HPV triage and HPV test of cure; FISH/chromogenic in-situ hybridisation (CISH) analysis of urine samples; epidermal growth factor receptor (EGFR) testing of bronchial specimens. •
5	Recognise normal and abnormal results.	• Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues.
6	Uphold high standards of professional practice as defined in *Good Scientific Practice* and as applicable to cytology.	• *Good Scientific Practice*. • BSc modules in professional practice.
6	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
6	Comply with relevant guidance and laws, to include those relating to:	• Principles, guidance and law with respect to: ○ medical ethics

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	• your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
6	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 19: WORK-BASED SYLABUS: REPRODUCTIVE SCIENCE

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Cellular Sciences: Reproductive Science**

MODULE	Cellular Sciences: Reproductive Science	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in reproductive science, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform semen analysis and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Use instruments to specified quality standards, e.g. dilution instruments, microscopes, pH meters/papers.
2. Perform basic semen analysis techniques, e.g. motility, morphology, liquefaction, volume, etc., to specified quality standards.
3. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from cellular science specialisms are presented; critically reflect on the discussions and the impact for patient care and management.
- Critically reflect on the partnership between the cellular sciences specialisms in a range of patient pathways.
- Contribute to an audit of scientific and technical data and critically reflect on the impact of the audit outcomes and actions agreed on Life Science services; quality improvement and patient safety.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Attend a fertility clinic and critically reflect on the impact of infertility on a patient.
- Discuss the current and future contribution of genomics and clinical bioinformatics to cellular sciences with your training officer.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1, 2	Use instruments in reproductive science to specified quality standards.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Use incubators within reproductive science settings	• The requirements for safe working within a Cryopreservation Facility. • How to operate using sterile technique within a workstation to protect both the sample and the operator. • The indications for the use of incubators in reproductive science. • Standard Operating Procedure for the use of incubators.
1	Operate microscopes within reproductive science settings	• Standard Operating Procedure for the use of microscopes. • How to operate microscopes.
2	Correctly handle semen sample on receipt to ensure sample viability in accordance with the departmental standard operating procedures.	• The requirements of the Human Fertilisation and Embryology Authority Code of Practice relating to semen assessment • The local Health and Safety information and Risk Assessment(s) relating to semen assessment • How adherence to Standard Operating Procedures ensure that: o all relevant aspects of performing a semen assessment, including sample handling, are considered and undertaken o any discrepancies or omissions in any aspect of a semen assessment are noted, reported and followed up
2	Perform basic semen analysis techniques, e.g. motility, morphology, liquefaction, volume, etc., recognising normal and abnormal results. Including post-vasectomy samples and samples with very low numbers of sperm.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Aetiology of disease. • Reporting terminology. • Normal and abnormal results. • Interferences, individual variations and sample integrity issues. • The value of semen analysis techniques.
3	Uphold high standards of professional practice as defined in	• *Good Scientific Practice*. • BSc modules in professional practice.

	Good Scientific Practice and as applicable to reproductive science.	
3	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• *Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour.* • *The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes.* • *How continuous personal development can improve personal performance.*
3	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• *Principles, guidance and law with respect to:* ○ *medical ethics* ○ *confidentiality* ○ *information governance* ○ *informed consent* ○ *equality and diversity* ○ *child protection* ○ *elder abuse* ○ *use of chaperones* ○ *probity* ○ *fitness to practise.*
3	Work constructively and effectively as a member of a MDT.	• *The underpinning principles of effective teamwork and working within and across professional boundaries.*

SECTION 20: WORK-BASED SYLLABUS: MICROBIOLOGY

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Infection Sciences: Microbiology**

MODULE	Infection Science: Microbiology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in microbiology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in microbiology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform a range of routine microbiology tests, including urine analysis, swab samples, blood culture, CSF, sterile fluid and tissue samples, and enteric samples, to specified quality standards.
2. Perform microscopy on a range of samples to specified quality standards.
3. Perform a range of manual and automated techniques, including molecular testing techniques, e.g. chlamydia screening, where available, to specified quality standards.
4. Perform sample culture, pathogen/isolate identification, including mycology and parasitology where available, and antimicrobial susceptibility testing to specified quality standards.
5. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from infection science specialisms are presented; critically reflect on the discussions and the impact for patient care and management.
- Critically reflect on the partnership between the infection sciences specialisms in a range of patient pathways.
- Contribute to an audit of scientific and technical data and critically reflect on the impact of the audit outcomes and actions agreed on Life Science services; quality improvement and patient safety.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to infection sciences with your training officer.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Use equipment in microbiology to specified quality standards, including aseptic technique and identify and resolve problems, seeking advice as required.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Aseptic techniques. • Problem solving. • When to seek advice.
1	Perform urine analysis to specified quality standards using: • biochemical markers, e.g. for leucocytes, nitrites, blood, protein, glucose and pH • microscopy, culture and sensitivity • pathogen/isolate identification and antimicrobial susceptibility testing.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles of the tests used in urine analysis. • The procedure in the event of isolating a hazard group three organism. • Sample requirements, e.g. selection of appropriate media and incubation criteria.
1	Recognise normal and abnormal results from a variety of microbiology specimens and rectify any errors, including interferences, individual variations and sample integrity issues**.**	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues.
1	Process swabs, e.g. wound, genital, ear nose and throat, and MRSA, to specified quality standards.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles of microbiology specimen processes. • Sample requirements, e.g. selection of appropriate media and incubation criteria, pathogen/isolate identification and antimicrobial susceptibility testing. • Procedure in the event of isolating a hazard group three organism.
1	Recognise normal and abnormal	• Principles and application of laboratory protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	swab results and rectify any errors, including interferences, individual variations and sample integrity issues**.**	• Quality standards. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues.
1	Perform procedures for blood culture to specified quality standards.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles of testing blood cultures. • The tests used for blood culture, including manual, automated and microscopy. • Sample requirements, e.g. selection of appropriate media and incubation criteria, pathogen/isolate identification and antimicrobial susceptibility testing. • Procedure in the event of isolating a hazard group three organism.
1	Recognise normal and abnormal results for blood culture and rectify any errors, including interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.
1	Perform CSF microscopy and culture, including aseptic technique, pathogen/isolate identification and antimicrobial susceptibility testing.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles of testing CSF samples. • The basic investigation of CSF samples. • The basic investigation of sterile fluid • Sample requirements, e.g. selection of appropriate media and incubation criteria, pathogen/isolate identification and antimicrobial susceptibility testing. • Procedure in the event of isolating a hazard group three organism.
1	Recognise normal and abnormal CSF results and rectify any errors, including interferences, individual	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	variations and sample integrity issues.	
1	Perform microscopy and culture, including aseptic technique, pathogen/isolate identification and antimicrobial susceptibility testing.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles. • The basic investigation of sterile fluid and tissue samples. • Sample requirements, e.g. selection of appropriate media and incubation criteria.
1	Recognise normal and abnormal results from sterile fluid and tissue testing and rectify any errors, including interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.
2	Perform microscopy for ova cysts and parasites, enteric sample culture, pathogen/isolate identification and antimicrobial susceptibility testing.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles of testing enteric samples. • Basic investigation of enteric samples. • Sample requirements, e.g. selection of appropriate media and incubation criteria. • Procedure in the event of isolating a hazard group three organism.
2	Recognise normal and abnormal microscopy results for ova cysts and parasites and rectify any errors, including interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.
2	Perform microscopy for respiratory	• Principles and application of laboratory protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	samples, culture, pathogen/isolate identification and antimicrobial susceptibility testing.	• Quality standards. • The basic investigation of respiratory samples, e.g. sputum. • The underpinning principles of testing respiratory samples. • Sample requirements, e.g. selection of appropriate media and incubation criteria. • Procedure in the event of isolating a hazard group three organism.
2	Recognise normal and abnormal microscopy results on respiratory samples and rectify any errors, including interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.
2	Perform auramine and Ziehl-Neelsen (ZN) microscopy for respiratory samples in the investigation of tuberculosis (TB), where available.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles of testing for TB. • Good laboratory practice, containment level 2, risk assessments and Control of Substances Hazardous to Health (COSHH). • The laboratory procedures for working with hazard groups two and three. • The preparation of samples for mycobacterium culture and smear. • Sample requirements, e.g. selection of appropriate media and incubation criteria, including being able to describe the use of liquid culture media with associated clinical details, including the required atmospheric conditions. • The criteria and procedure for urgent specimens. • The procedure in the event of a spillage or breakage of sample.
2	Recognise, where available, normal and abnormal respiratory samples in the investigation of TB and rectify any errors, including interferences,	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	individual variations and sample integrity issues.	
3	Perform PCR techniques manually and using automated technology to specified quality standards, adjusting procedures to correct for poor PCR quality (troubleshooting) where available.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of samples for molecular analysis for chlamydia screening, including urine and swabs. • The underpinning principles of molecular testing in microbiology. • Sample requirements. • Procedures may be adjusted to correct for poor PCR quality (troubleshooting).
3	Recognise normal and abnormal samples for chlamydia screening and rectify any errors, including interferences, individual variations and sample integrity issues as factors that affect molecular testing quality.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results.
4	Perform mycology sample culture, pathogen/isolate identification and antimicrobial susceptibility testing, e.g. nail scrapings, bronchoalveolar lavage (BAL) and serum samples where available. Note: If mycology is not undertaken in your training department ensure that you identify Candida species for example isolated from high vaginal swab samples.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of mycology samples, e.g. nail scrapings. • The underpinning principles. • Sample requirements, e.g. selection of appropriate media and incubation criteria.
5	Uphold high standards of	• *Good Scientific Practice*.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	professional practice as defined in Good Scientific Practice and as applicable to microbiology.	• BSc professional practice module.
5	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
5	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
5	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 21: WORK-BASED SYLLABUS: VIROLOGY

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Infection Sciences: Virology**

MODULE	Infection Science: Virology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in virology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in virology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform a range of routine manual and automated virus detection tests, including virology antigen tests, manual and automated, to specified quality and safety standards.
2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from infection science specialisms are presented; critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the infection sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to infection sciences with your training officer.

All of these experiences should be recorded in your e-portfolio.
The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Use equipment in virology to specified quality standards, including aseptic technique and identify and resolve problems, seeking advice as required.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Aseptic techniques. • Problem solving. • When to seek advice.
1	Perform PCR and molecular virology antigen tests using manual and automated methods, where available.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles of the tests. • The basic investigation of virology samples, e.g. swabs, enteric samples and blood samples.
1	Recognise normal and abnormal results for virology antigen tests and rectify any errors, including interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues.
2	Uphold high standards of professional practice as defined in *Good Scientific Practice* and as applicable to virology.	• *Good Scientific Practice*. • BSc professional practice modules.
2	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
2	Comply with relevant guidance and	• Principles, guidance and law with respect to:

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
2	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 22: WORK-BASED SYLLABUS: SEROLOGY

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Infection Sciences: Serology**

MODULE	Infection Science: Serology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in serology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in serology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform diagnostic identification of antibodies and antigens by performing manual and automated serological tests, including, for example, ELISA, agglutination, haemagglutination and immunofluorescence, to specified quality standards and select tests according to clinical details.
2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from infection science specialisms are presented; critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the infection sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to infection sciences with your training officer.

All of these experiences should be recorded in your e-portfolio.
The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Use equipment in serology to specified quality standards, including aseptic technique and identify and resolve problems, seeking advice as required.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Aseptic techniques. • Problem Solving. • When to seek advice.
1	Perform manual and automated serological tests, including, for example, ELISA, agglutination, haemagglutination and immunofluorescence, selecting tests according to clinical details.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of samples for serological analysis. • Sample requirements.
1	Recognise normal and abnormal results from serology tests and rectify any errors, including interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues.
2	Uphold high standards of professional practice as defined in *Good Scientific Practice* and as applicable to serology.	• *Good Scientific Practice*. • BSc professional practice modules.
2	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
2	Comply with relevant guidance and	• Principles, guidance and law with respect to:

	laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
2	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 23: WORK-BASED SYLLABUS: DECONTAMINATION SCIENCE

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Infection Sciences: Decontamination Science**

MODULE	Infection Science: Decontamination Science	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in Decontamination Science, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in Decontamination Science and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

Safe working practice in Decontamination Science

1. Apply health, safety, quality assurance and risk management principles to all aspects of the role of a Healthcare Science Practitioner in Decontamination Science.

Specialist Skills in Decontamination Science

2. Perform the reprocessing of reusable medical devices recording all tasks in the Healthcare Science Information Systems (tracking and tracing) database, working in accordance with Standard Operating Procedures and Quality Management Systems.*
3. Perform daily and weekly testing of equipment to ensure that they are fit for safe use, as appropriate to the role of a HCSP.*
4. Assist in the assessment of medical device manufacturer's instructions for use (IFU's) that describe the reprocessing cycles/processes validated as safe for the device and take appropriate remedial action.
5. Review and analyse test reports and be accountable for the return of the equipment back into service implementing corrective action for any equipment that does not meet the required testing standards, referring to senior colleagues as necessary.
6. Provide professional advice to users of the service within the limits of your knowledge, referring to senior colleagues as necessary.
7. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module

***The range of equipment covered must include sterilisers, washer disinfectors, ultrasonic washers, heat sealers, fume cabinets, insulation testing machines*

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Observe the use of all equipment used to reprocess medical devices listed below*, identify the indications for use and compare and contrast each method. Produce a short presentation and deliver this at a departmental meeting.
    - Manual washing sinks
    - Ultra-sonic washer
    - Washer disinfector
    - Endoscope washer disinfector
    - Trolley washer
    - Drying cabinet
    - Endoscopy sealing storage systems
    - Services, medical gas
    - Insulated medical device tester
    - Magnifying inspection light
    - Fume cabinet
    - Heat sealer machine
    - Steriliser (porous load, plasma etc)

  **This may involve visit to other hospitals/departments*
- Observe quarterly testing of equipment to ensure that they are fit for safe use, as appropriate to the role of a HCSP and discuss the importance of the daily, weekly, quarterly testing programme to maintain standards.
- Attend a theatre and endoscopy clinic to observe the use of medical devices in clinical practice and, with permission, discuss the experience with the clinician including the role of decontamination science AND, if possible, a patient and critically reflect on how your experience will impact on your future practise as a healthcare science practitioner.
- Attend a multi-disciplinary meeting which includes decontamination sciences staff and microbiology services e.g Surgical Site investigation; critically reflect on the importance of the partnership between these two areas of infection science in infection control and identify positive aspects of the communication and aspects that could be improved.
- Meet with surgical colleagues to discuss the impact of decontamination sciences on patient care and critically reflect on how your experience will impact on your future practise as a healthcare science practitioner.
- Contribute to an audit of scientific and technical data and critically reflect on the impact of the audit outcomes and actions agreed on Life Science services; quality improvement and patient safety and discuss your learning from this experience with the audit lead.

- Shadow a colleague in Clinical Engineering to observe the equipment management cycle and the role of Healthcare Science Practitioners in equipment management including the choice of equipment, decontamination protocols during use, servicing and decommissioning. Discuss the importance of decontamination of medical devices with a senior member of the Clinical Engineering department.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of decontamination sciences with your training officer.
- Discuss the current and future contribution of genomics and clinical bioinformatics to infection sciences with your training officer.
- Observe the equipment management process through the department, identifying, recording and commenting on any appropriate documentation that may apply to each stage, including the passage of central alerting system through the department and explaining the processes that are followed.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Practise and promote the importance of health and safety standards in the workplace and wear the correct personal protective equipment (PPE) at all times.	• Health and safety standards in decontamination science • Types of PPE and when to wear each type. • Importance of wearing the correct PPE. • How to prioritise patient safety and the safety of all those working in or accessing decontamination science departments/areas • Procedure to be followed in the event of a breach in health and safety in the workplace.
1	Use equipment in decontamination science to specified quality standards, including aseptic technique and identify and resolve problems, seeking advice as required.	• The clinical range of medical devices and the common faults or problems that may be found in them. • Principles and application of Standard Operating Procedures SOPs). • Quality standards for each item of equipment/process used. • Problem solving. • When to seek advice.
1	Observe and perform a range of risk assessments appropriate to Decontamination Science.	• Theory of risk assessment using current statutory and professional guidance. • The kind of risk assessments that are performed, where the documentation is kept and how to access it.
1	Observe and perform a COSHH assessment appropriate to Decontamination Science	• How to carry out a Control of Substances Hazardous to Health (COSHH) assessment implement the required actions and the implications for the workplace and process. • The types of Hazard symbols, (pictograms) their meaning and implications these have, covering all aspects of the decontamination process and equipment
1	Perform an audit of an area of the department that process medical devices to assess compliance with required standards and validate and analyse the data collected e.g. wash	• The method to identify the topic and purpose of an audit and ensuring correct permissions are gained prior to commencement of it. • How to collect and analysis data and ensure its accuracy. • How to structure an action plan • Importance of ensure audits are carried out in accordance with local,

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	area, Inspection, Assembly and packing area, sterilisation, endoscopy wash area, endoscopy clean area.	national and international standards.
1	Prepare a written report of the audit cycle and present the results and recommendations at a departmental meeting.	• How to design, structure and deliver an oral presentation. • How to assess the effectiveness of the implemented action plan • How to carry out a re-audit, address any outstanding corrective actions and report these to both the Management Review Group and external audit bodies.
1	Perform a re-audit to ensure actions have been completed and are effective	
2	Receive a range of reusable medical devices, disassemble and prepare for the washing/disinfection process.	• The policies, SOPs and guidance that relate to receiving in and decontaminating reusable medical devices. • Different types of waste generated in the department and the appropriate methods of handling and disposal for each. • Factors that impact cleaning and disinfection of reusable medical devices. • How to select the appropriate cleaning and decontamination procedure. • How to disassemble medical devices to ensure compliance with Manufacturer's Instructions for Use (IFU). • How to identify and report any non-conformance against the checklist of the set content, endoscope or supplementary e.g. sharp damage, missing instrument. • The tracking requirements and how to use the information recorded into the tracking system.
2	Prepare medical devices for the washing/disinfection process.	• The validated cycles parameters for the washing and disinfection process. • The user operation and function of the reprocessing equipment. • The importance of monitoring the functioning of decontamination equipment while in use.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• The COSHH requirements in relation to chemicals used in reusable medical devices decontamination. • The tracking requirements and how to use the information recorded into the tracking system.
2	Release products from the cleaning process and take appropriate remedial action if required.	• How to carryout cycle release process ensuring that predetermined critical parameters are met. • The tracking requirements and how to use the information recorded into the tracking system. • The role of the Independent Monitoring System on medical equipment.
2	Perform, review and analyse the inspection assemble, and pack processes.	• The policies, SOPs and guidance that relate to the inspection, assembly and packing room. • Action to be taken if devices are in need of repair/replacement. • How a check list is written and the importance of completion of check list for audit/recall process. • Different methods of pack closure – using wraps. • Identify the different packaging systems container systems, tray wraps and their advantages and disadvantages. • Health and Safety limitations relating to weight of finished pack.
2	Perform, review and analyse the processes within the sterilizer load acceptance area.	• The policies, SOPs and guidance that relate to the sterilisation area. • Inspection of the sterilization cycle to ensure all parameters have been met including time, temperature etc. • Actions to be taken if the cycle parameters have not been met.
2	Perform, review and analyse the product release from sterilizer, and dispatch process	• The policies, SOPs and guidance that relate to the sterilisation area. • Identify why products must be correctly inspected prior to product release • The criteria for release and the impact on patient safety if they are not met
2	Perform, review and analyse the chemical storage processes	• The policies, SOPs and guidance that relate to the chemical store area. • How chemicals should be stored including stock rotation, expiry dates and the effect on the efficacy of the decontamination process.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• The policies relating to the safe disposal of the chemicals in compliance with safety data sheet information
2	Perform, review and analyse the storage of finished goods processes	• The policies, SOPs and guidance that relate to the sterilisation area. • How to identify the correct storage conditions, stock rotation to ensure finished back remains fit for use. • How to identify any packs that become damage whilst in storage and implement remedial action.
2	Perform, review and analyse the raw material storage processes	• The policies, SOPs and guidance that relate to the raw materials store. • The correct storage conditions, stock rotation to ensure raw materials remains fit for use. • How to identify any materials that become damage whilst in storage and implement remedial action. • Record keeping of raw materials so that product recall can be implemented if required.
2	Take appropriate reporting action when faults or breakdowns occur with processing equipment.	• How to respond appropriately when faults or breakdowns occur to ensure staff safety and maintain patient safety. • The documentation that should be completed for all faults and breakdowns and its importance. • How to release repaired equipment into operational status. • People who should be notified of equipment failure, most crucially where it will impact of service delivery.
2	Record all tasks in the Healthcare Science Information Systems (tracking and tracing) database	**With respect to the Healthcare Science Information Systems (tracking and tracing) database** • Purpose. • Data entry. • Validation and analysis of data. • Alternative methods of data collection in case of system failure.
3	Perform daily testing and	• How identify all daily tests for all equipment as detailed in manufacturer's

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	housekeeping of equipment to ensure that they are fit for safe use, as appropriate to the role of a HCSP.	instructions and as required in accordance with National and International standards • Record all testing data into department information system. • Acceptance procedure for returning equipment back to service after successful testing. • Identify who should be notified of equipment failure, most crucially where it will impact of service delivery.
3	Perform weekly testing of equipment to ensure that they are fit for safe use, as appropriate to the role of a HCSP.	• Weekly tests for all equipment as detailed in manufacturer's instructions and national guidance. • Process for recording all testing data into department information system. • The acceptance procedure for returning equipment back to service after successful testing. • The personnel who should be notified of equipment failure. • The potential impact of equipment failure on service delivery.
3	Record all testing data into department information system and notify the appropriate personnel in the event of an equipment failure.	
3	Perform the acceptance procedure for returning equipment back to service after successful testing.	
4	Assist in the assessment of medical device manufacturer's Instructions For Use (IFU's) that describe the reprocessing cycles/processes validated as safe for the device.	• How to assess whether the reprocessing instructions can be complied with using the department processing equipment or if specialist reprocessing is required. • Following medical device standards, how to assess if a risk assessment is required. • How to communicate with the manufacturer relating to non-compliant IFU's. • How to identify why and when a new and validated IFU needs to be developed. • The action to be taken if a device is rejected, write a report and inform users.
4	Take appropriate remedial action. if	• How to refer back to manufacturer for clarification so they can validate any

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	the Manufacturer's Instructions are inadequate	new IFU's. • When to request the manufacturer to provide further evidence of Manufacturer's instruction and/or share validation reports
5	Review and analyse test reports from internal and external companies.	• How to identify any developing trends in equipment performance. • How to compare test results to commissioning data, to evaluate equipment performance. • If in need of further information discuss with the Authorised Engineer (Decontamination). • If satisfied, accept equipment back into use by signing off test reports.
5	Return of the equipment back into service, seeking advice from senior staff as appropriate.	
5	Implementing corrective action for any equipment that does not meet the required testing standards, referring to senior colleagues as necessary.	• Identify the appropriate internal or external engineer for remedial action and ensure the equipment is made safe until a successful test is achieved. • Identify who should be notified of equipment failure, most crucially where it will impact of service delivery. • Inform users if failure will lead to service interruption. • Evaluate the need to implement the Business Continuity Plan to ensure that service provision is maintained.
6	Provide professional advice to users of the service within the limits of your knowledge.	• Identify the information that users of the service will need to be aware with regard to the life cycle of a medical device as required e.g. purchase to disposal and identify when to refer to a senior person. • Differences and principles between reusable, single patient use and single use medical devices and circumstance in which each should be used.
6	Refer to senior colleagues as necessary within the limits of your practice.	• Limits of your practice and when it would be appropriate to discuss information with Microbiologist (decontamination) or Authorised Engineer (Decontamination). • Identify the type of communication which would need to be shared with clinical divisions/directorates.
7	Uphold high standards of professional practice as defined in	• *Good Scientific Practice*. • BSc professional practice modules.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	Good Scientific Practice and as applicable to Decontamination Science.	
7	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
7	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
7	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 24: WORK-BASED SYLLABUS: GENETIC SCIENCES

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Genetic Sciences**

MODULE	Genetic Sciences	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in genetics, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in genetics and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform a range of routine procedures in genetics, including G-band analysis, FISH and mutation analysis sequencing, to specified quality standards.
2. Perform a range of PCR techniques manually and using automated technology to specified quality standards.
3. Observe new sequencing technologies, e.g. array CGH and NGS, where available
4.
4. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from genetic sciences are presented; critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the genetic sciences and other life sciences specialisms in a range of patient pathways.
- Contribute to an audit of scientific and technical data and critically reflect on the impact of the audit outcomes and actions agreed on Life Science services; quality improvement and patient safety.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical genetic disorders.
- Observe the use of array testing in genetic and sample requirements and discuss the basic investigation of samples for nucleic acid extraction, including urine, blood, swabs and tissue, as appropriate to the department.
- Discuss the current and future contribution of genomics and clinical bioinformatics to cellular sciences with your training officer.
- Observe new sequencing technologies, eg array Comparative Genomic Hybridisation (CGH) and Next Generation Sequencing (NGS) and discuss the potential impact of new sequencing technologies on laboratory practice.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1, 2	Use equipment to specified quality standards	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Set up MLPA reactions to detect dosage differences in a variety of clinical settings.	• The principles of MLPA to detect gene dosage. • Sample requirements.
1	Apply correct software to analyse MLPA data.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Perform constitutional chromosome analysis across a range of clinical settings to specified quality standards, recognising situations when additional banding techniques or FISH would provide extra beneficial information.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The investigation of samples for G-band analysis, analyse G-banded metaphase preparations accurately within an acceptable timescale. • Sample requirements, e.g. recognise chromosomes of the appropriate level for the reason for referral. • Situations when additional banding techniques or FISH would provide extra beneficial information.
1	Recognise the range of polymorphic chromosome variation and normal and abnormal results.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The range of polymorphic chromosome variation. • Typical normal and abnormal results, including inflammatory and abnormal cellular patterns microscopically (including metaplasia, lookalikes, infections, artefacts and contaminants). • Interferences, individual variations and sample integrity issues.
1	Perform FISH to specified quality standards on constitutional preparations.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of samples for in-situ hybridisation probes, e.g. chromosome enumeration probes, locus specific probes and whole chromosome paints. • Sample requirements, e.g. which category of FISH probe to use in common

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		genetic diagnosis – the advantages and limitations of each.
1	Recognise normal and abnormal results, including suboptimal FISH preparations and recognise interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues.
1	Use equipment to specified quality standards, e.g. perform amplification refractory mutation system (ARMS), oligonucleotide ligation assay (OLA) and, if available, scanning techniques such as high-resolution melting (HRM) or denaturing high-performance liquid chromatography (dHPLC) to detect unknown mutations.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of samples for mutation analysis sequencing, including the range of commonly used mutation detection techniques. • Sample requirements sample requirements.
1	Recognise normal and abnormal results and interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Typical normal and abnormal results. • Quality standards. • Interferences, individual variations and sample integrity issues.
2	Perform a range of PCR techniques manually and using automated technology to specified quality standards, making adjustments to correct for poor PCR quality (troubleshooting) as necessary.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of samples for molecular analysis. • Sample requirements. • How the procedures may be adjusted to correct for poor PCR quality (troubleshooting).
2	Recognise normal and abnormal results, interferences, individual variations and sample integrity	• Principles and application of laboratory protocols (SOPs). • Typical normal and abnormal results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	issues as factors that affect PCR quality.	• Quality standards. • Interferences, individual variations and sample integrity issues. • When to seek advice.
3	Recognise normal and abnormal results/good quality and poor quality data using defined quality parameters and perform necessary troubleshooting.	• Principles and application of laboratory protocols (SOPs). • Typical normal and abnormal results. • Quality standards. • Interferences, individual variations and sample integrity issues.
4	Uphold high standards of professional practice as defined in *Good Scientific Practice* and as applicable to genetic science.	• *Good Scientific Practice*. • BSc professional practice module.
4	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
4	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		○ probity ○ fitness to practise.
4	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 25: WORK-BASED SYLLABUS: TRANSFUSION AND TRANSPLANTATION

This section describes the Learning Framework for the **Specialist Component** of work-based learning covering the Learning Outcomes, Clinical Experiential Learning, Competence, and Applied Knowledge and Understanding.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Transfusion and Transplantation Sciences:** Haematology

MODULE	Transfusion and Transplantation Sciences: Haematology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in haematology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in haematology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform routine procedures in haematology to specified quality standards, recognising individual variations and sample integrity issues, including FBC, ESR or plasma viscosity, coagulation screen prothrombin time PT, APTT, fibrinogen, plasma correction test, INR, D-dimer, factor assay, blood film morphology, IM screen, malaria, sickle cell.
2. Perform POCT, for example INR, haemoglobin (Hb), ESR, to specified quality standards, recognising individual variations and sample integrity issues.
3. Perform routine procedures in transfusion blood group and antibody screen, simple antibody identification and red cell phenotype to specified quality standards, recognising individual variations and sample integrity issues.
4. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from blood science specialisms are presented; critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the blood sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to blood sciences with your training officer.

It is also recommended that the student:

- Observe POCT in a healthcare setting and discuss the method(s) and the patient benefit with their supervisor.
- Observe the use of the Kleihauer test and, where available, discuss the principles of measurement, value and normal and abnormal results with their supervisor.
- Observe the manufacturing and production of blood products and critically reflect of the importance of the process in regard to the patient and the donor
- Observe the movement of blood stock from a stock holding unit to the hospital setting; this should include blood, plasma and platelets. It should lead to an awareness of the important role transport play in movement of blood stock.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1, 2, 3	Use equipment in haematology to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Measure a FBC on automated analysers following a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • How to assess that the instrumentation is correctly calibrated and quality controlled. • The principles of cell counting and differentiation, Hb measurement and derivation of red cell indices for the instrument used. • Quality standards. • Underpinning principle of the chosen tests. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for FBC.	• EQA scheme.
1	Perform ESR or plasma viscosity using a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Underpinning principles of ESR or plasma viscosity measurement. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for ESR or plasma viscosity.	• EQA scheme.
1	Perform a coagulation screen using a defined protocol to specified quality standards and recognise normal and abnormal results,	• How to assess that the instrumentation is correctly calibrated and quality controlled. • Quality standards. • Measurement principles of a haemostasis analyser.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	interferences, individual variations and sample integrity issues.	• The definition and physiological basis of PT, APTT and fibrinogen tests. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for a coagulation screen.	• EQA scheme.
1	Perform correction tests following a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Underpinning principle of normal plasma corrections, thrombin times correction tests. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for correction tests.	• EQA scheme.
1	Perform INR measurements following a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Underpinning principles of the INR system. • The value of the coagulometer (including point-of-care devices) in monitoring anticoagulated patients. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties. • Basis of therapeutic ranges and anticoagulant dosing practice.
1	Interpret performance in appropriate EQA scheme for INR.	• EQA scheme.
1	Perform D-dimer tests following a	• Principles and application of laboratory protocols (SOPs).

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Quality standards, including quality control procedures. • Underpinning principles of the measurement of D-dimer. • The value of the coagulometer (including point-of-care devices) in monitoring anticoagulated patients. • Typical normal and abnormal results and the relevance of cut-off values in VTE exclusion. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for D-dimer tests.	• EQA scheme.
1	Perform a coagulation factor assay following a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Underpinning principles of the measurement of coagulation factor assay. • The value of the coagulometer (including point-of-care devices) in monitoring anticoagulated patients. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for coagulation factor assay.	• EQA scheme.
1	Prepare manual or automated blood films, recognising the common morphological features of red cells, white cells and platelets, and perform a manual white cell differential following a defined protocol.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures.
1	Recognise normal and abnormal morphology and refer to senior	• Normal and abnormal morphology of red cells, white cells and platelets. • Interferences, individual variations and sample integrity issues.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	colleagues as per protocol.	• Protocol for referral of abnormal morphology to senior scientist or clinical staff.
1	Interpret performance in appropriate EQA scheme for blood films.	• EQA scheme.
1	Perform an IM screen to a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Principles of IM screening. • Clinical relevance of IM screening. • Normal and abnormal results. • How an IM screen result relates to blood film morphology.
1	Perform a malaria parasite screen to a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Principle of malarial parasite detection and its limitations for a specific Plasmodium species. • Importance and clinical relevance of malaria testing, and the different species infecting humans.
1	Recognise normal and abnormal results and how to relate these to thin and thick blood film investigation of malaria.	• Normal and abnormal malaria parasite screening. • The relationship of normal and abnormal results to thin and thick blood films investigations.
1	Interpret performance in appropriate EQA scheme for malaria parasite screen.	• EQA scheme.
1	Perform a haemaglobinopathy (e.g sickle cell, thalassaemia) screen to a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample	• Principles and application of laboratory protocols (SOPs). • Quality standards, including quality control procedures. • Principle of haemaglobinopathy screening method. • The importance and clinical relevance of haemaglobinopathy screening. • Genetics of sickle cell disease.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	integrity issues.	
1	Interpret performance in appropriate EQA scheme for a haemaglobinopathy screen.	• EQA scheme.
2	Perform a POCT haemoglobin to a defined protocol after confirmation of required calibration and quality control, and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• The principle of haemoglobin analysis using a POCT device. • Situations where POCT haemoglobin investigation is valuable. • Normal and abnormal results and when further action is required.
2	Interpret performance in appropriate EQA scheme for a sickle cell screen.	• EQA scheme.
3	Perform IATs and discuss the possible sources of error dependent on the technology used and the patient's clinical condition.	• Principles and application of laboratory protocols (SOPs). • The regulatory requirements and guidelines relevant to blood transfusion. • Sample acceptance criteria and demonstrate understanding of the risks associated with inadequately labelled samples.
3	Perform blood grouping and antibody screening tests using manual and automated methods, selecting and applying appropriate controls, recognise control failures and identify further actions required.	• Principles and application of laboratory protocols (SOPs). • The principles of serological tests used for blood grouping and antibody screening, and their appropriate use and limitations.
3	Document the results of blood grouping and antibody screening tests, use IAT and follow procedures to minimise the risk of transcription error.	• Principles and application of laboratory protocols (SOPs).
3	Interpret blood grouping and	• The relevance of blood grouping and antibody screening anomalies and their

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	antibody screening results, recognise anomalies and identify further actions required.	implications in the pre-transfusion process.
3	Select and perform simple antibody identification using IAT, enzyme and direct agglutination tests, and select appropriate controls.	• Principles and application of laboratory protocols (SOPs). • The regulatory requirements and guidelines relevant to blood transfusion.
3	Interpret antibody identification results, so as to recognise antibodies that can be positively identified, be aware of antibodies that cannot be excluded, and to know further actions required.	• Principles and application of laboratory protocols (SOPs). • The significance of red cell antibody specificities identified and their implications in pre-transfusion and antenatal settings.
3	Identify patients suitable for red cell phenotyping and recognise situations where red cell phenotyping is required.	• Principles and application of laboratory protocols (SOPs). • The regulatory requirements and guidelines relevant to blood transfusion.
3	Perform red cell phenotyping using IAT and direct agglutination tests, and discuss the possible sources of error, selecting appropriate controls for phenotyping tests, recognise control failures and identify further actions required.	• Principles and application of laboratory protocols (SOPs). • The principles of serological tests used for red cell phenotyping. • How to recognise anomalous red cell phenotyping results, and identify further actions required.
3	Interpret red cell phenotyping results and discuss their relevance in pre-transfusion and antenatal settings.	• Principles and application of laboratory protocols (SOPs). • Normal and abnormal findings.
4	Uphold high standards of	• *Good Scientific Practice*.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	professional practice as defined in *Good Scientific Practice*.	• BSc professional practice module.
4	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
4	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
4	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Transfusion and Transplantation Sciences: Immunology**

MODULE	Transfusion and Transplantation Sciences: Immunology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in immunology, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in immunology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform routine procedures in immunology to specified quality standards, recognising individual variations and sample integrity issues, including protein electrophoresis, myeloma screening, ELISA, immunofluorescence and allergy testing, to quality standards.
2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from blood science specialisms are presented, critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the blood sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to blood sciences with your training officer.

It is also recommended that the student:

- Observe the use of immunofluorescence and discuss the principles of measurement, the value including autoantibody screening, and normal and abnormal results with your supervisor.
- Attend a stem cell collection or infusion and critically reflect on the importance of product integrity for the patient.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Use equipment in immunology to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards.
1	Perform the ELISA technique using a defined protocol to specified quality standards and recognise normal and abnormal results, interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Underpinning principles of ELISA. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues. • Limitations of measurement and common difficulties.
1	Interpret performance in appropriate EQA scheme for ELISA.	• EQA scheme.
2	Uphold high standards of professional practice as defined in *Good Scientific Practice*.	• *Good Scientific Practice*. • BSc professional practice module.
2	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
2	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	• equality and diversity • use of chaperones • informed consent.	○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
2	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Transfusion and Transplantation Sciences: Microbiology**

MODULE	Transfusion and Transplantation Science: Microbiology	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in transfusion microbiology, becoming competent in a range of serology and virology procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in infection serology and virology and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform a range of routine virology tests, including virology antigen tests, manual and automated, to specified quality standards.
2. Perform diagnostic identification of antibodies and antigens by performing manual and automated serological tests, including, for example, ELISA, agglutination, haemagglutination and immunofluorescence, to specified quality standards and select tests according to clinical details.
3. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from infection science specialisms are presented; critically reflect on these discussions and the impact for patient care and management.
- Critically reflect on the partnership between the infection sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical disorders.
- Discuss the current and future contribution of genomics and clinical bioinformatics to infection sciences with your training officer.
- Discuss with the clinicians the role of the donor relations team and their role with donors with positive serology results.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Use equipment in virology to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Aseptic techniques.
1	Recognise normal and abnormal results for virology antigen tests and rectify any errors, including interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues.
1	Perform PCR and molecular virology antigen tests using manual and automated methods, where available.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The underpinning principles of the tests. • The basic investigation of virology samples, e.g. swabs, enteric samples and blood samples.
2	Use equipment in serology to specified quality standards, including aseptic technique.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Aseptic techniques.
2	Perform manual and automated serological tests, including, for example, ELISA, agglutination, haemagglutination and immunofluorescence, selecting tests according to clinical details.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of samples for serological analysis. • Sample requirements.
2	Recognise normal and abnormal results from serology tests and rectify any errors, including interferences, individual variations and sample integrity issues.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • Typical normal and abnormal results. • Interferences, individual variations and sample integrity issues.
3	Uphold high standards of	• *Good Scientific Practice*.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	professional practice as defined in *Good Scientific Practice* and as applicable to infection sciences.	• BSc professional practice modules.
3	Reflect on your practice and generate a reflective diary that demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
3	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
3	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

DIVISION	Life Sciences
THEME	Life Sciences
SPECIALISM	**Transfusion and Transplantation Sciences:** Immunogenetics

MODULE	Transfusion and Transplantation Sciences: Immunogenetics	Component	Specialist Years 2 and 3
AIM	The aim of this module is for the student to build on their knowledge, skills and experience and gain experience in immunogenetics, becoming competent in a range of procedures relevant to their placement.		
SCOPE	On completion of this module the student will be able to competently perform routine procedures in histocompatibility and immunogenetics and they will be expected to build their professional practice and practise safely in the workplace. Students will be expected to use critical reflection to review and improve their performance in the workplace and develop skills to promote CPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform a range of routine procedures in immunogenetics in relation to the investigation of histocompatibility cases.
2. Perform a range of PCR techniques manually and using automated technology to specified quality standards.
3. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice* in this work-based module.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend review meetings at which results obtained from genetic sciences are presented; critically reflect on these discussions and the impact for patient care and management.
- Contribute to an audit of scientific and technical data and critically reflect on the impact of the audit outcomes and actions agreed on Life Science services; quality improvement and patient safety.
- Critically reflect on the partnership between the genetic sciences and other life sciences specialisms in a range of patient pathways.
- Review and discuss **at least two** examples of the interpretation and reporting of laboratory results in the context of common clinical transfusion and transplantation cases.
- Discuss the current and future contribution of genomics and clinical bioinformatics to cellular sciences with your training officer.

All of these experiences should be recorded in your e-portfolio.

The following section details the competence and knowledge and understanding each student must gain. Each competence is linked to the relevant learning outcomes and students must demonstrate achievement of each competence for each linked learning outcome.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Use equipment to perform a range of histocompatibility tests	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of samples for mutation analysis sequencing, including the range of commonly used mutation detection techniques. • Sample requirements sample requirements.
2	Perform a range of PCR techniques manually and using automated technology to specified quality standards, making adjustments to correct for poor PCR quality (troubleshooting) as necessary.	• Principles and application of laboratory protocols (SOPs). • Quality standards. • The basic investigation of samples for molecular analysis. • Sample requirements. • How the procedures may be adjusted to correct for poor PCR quality (troubleshooting).
2	Recognise normal and abnormal results, interferences, individual variations and sample integrity issues as factors that affect PCR quality.	• Principles and application of laboratory protocols (SOPs). • Typical normal and abnormal results. • Quality standards. • Interferences, individual variations and sample integrity issues.
1,2	Recognise normal and abnormal results/good quality and poor quality data using defined quality parameters and perform necessary troubleshooting.	• Principles and application of laboratory protocols (SOPs). • Typical normal and abnormal results. • Quality standards. • Interferences, individual variations and sample integrity issues.
3	Uphold high standards of professional practice as defined in *Good Scientific Practice* and as applicable to immunogenetic science.	• *Good Scientific Practice*. • BSc professional practice module.
3	Reflect on your practice and generate a reflective diary that	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal judgement and

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	demonstrates how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	behaviour. • The role of critical reflection and reflective practice and the methods of reflection that can be used to maintain or improve knowledge, skills and attitudes. • How continuous personal development can improve personal performance.
3	Comply with relevant guidance and laws, to include those relating to: • your scope of practice • research ethics and governance • patient confidentiality • data protection • equality and diversity • use of chaperones • informed consent.	• Principles, guidance and law with respect to: ○ medical ethics ○ confidentiality ○ information governance ○ informed consent ○ equality and diversity ○ child protection ○ elder abuse ○ use of chaperones ○ probity ○ fitness to practise.
3	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

SECTION 25: APPENDICES

Appendix 1: Contributor List

Contributors to BSc (Hons) curriculum in Life Sciences

The BSc curriculum for Physiological Sciences in the Life Sciences theme has been co-ordinated by the Modernising Scientific Careers (MSC) team working with professional colleagues in Life Sciences in each of the specialisms of Life Sciences within this programme.

To 2015

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Simon Rattenbury	Royal Free Hospital, London
Steve Sheil	Ashford and St Peter's NHS Foundation Trust
Robert Simpson	Queen Alexandra Hospital, Portsmouth
David Stirling	Scottish Blood
Janice Tew	Ashford and St Peter's NHS Foundation Trust
Tracy Thurgood	NHS Blood and Transplant
Mel Watson	Bristol Infirmary
Jenny White	West Hertfordshire Hospitals NHS Trust
Sue Woodcock	Guy's and St Thomas' NHS Foundation Trust, London
Tim Wreghitt	Cambridge University Hospitals
Sara Wright	NHS Blood and Transplant

Professional Bodies

Association of Biomedical Andrologists
Association for Clinical Biochemistry (ACB)
Association for Clinical Biochemistry: Immunology Section ACB (Immunology)
Association of Clinical Cytogeneticists (ACC)
Association of Clinical Embryologists (ACE)
Association of Clinical Microbiologists (ACM)
Association of Genetics Technologists (AGT)
British Association for Tissue Banking (BATB)
British Blood Transfusion Society (BBTS)
British Society for Clinical Cytology (BSCC)
British Society for Haematology (Clinical Science Section) (BSH)
British Society for Haemostasis and Thrombosis (BSHT)
British Society for Histocompatibility & Immunogenetics (BSHI)
Clinical Molecular Genetics Society (CMGS)
Institute of Biomedical Science (IBMS)
Royal College of Pathologists (Clinical Science)

2015 Revisions

Nicky Fleming	**Lead Editor; National School of Healthcare Science**
Mark Allen	Oxford University Hospitals NHS Foundation Trust
Jenny Bell	University Hospitals Birmingham NHS Foundation Trust
Michelle Bishop	Genomics Education Centre
Vicki Chalker	Public Health England, Colindale
Craig Donaldson	Council for Health Care Science in Higher Education
Deidre Durow	University Hospitals Bristol NHS Foundation Trust
Ruth Evans	NHS Blood and Transplant
Jackie Hitchins	University Hospitals Bristol NHS Foundation Trust
Georgina Lewis	University Hospitals Bristol NHS Foundation Trust
Nicky Monks	Salisbury NHS Foundation Trust
Mark Orrell	University Hospitals Bristol NHS Foundation Trust
Eileen Roberts	North Bristol NHS Trust

Andrew Usher	Gloucestershire Hospital NHS Foundation Trust
Melanie Watson	University Hospitals Bristol NHS Foundation Trust
Georgina Wilson	Microbiology, PHE Laboratories, Bristol
Graham Wilson	Gloucestershire Hospital NHS Foundation Trust

In addition to the professionals detailed above, 23 patient groups, 54 professional bodies/groups and 26 PTP accredited higher education institutions were alerted to the opportunity to feedback on the proposed revisions to the scientific content between December 2015 and February 2016.

2016 Extension of PTP in Life Sciences to include Decontamination Science

Trevor Garcia	**Lead Editor for Decontamination Science Surrey and Sussex Healthcare NHS Trust**

Jakub Cesak	Southend University Hospital
Alan Clarke	Institute of Decontamination Science
Nicky Fleming	National School of Health Care Science
Sharon Fox	University Hospitals Birmingham NHS Foundation Trust
Susan Meredith	Institute of Decontamination Science
Tom Redfern	Institute of Decontamination Science
Geoff Sjogren	Western Sussex Hospitals NHS Foundation Trust
Andrea Wadey	Western Sussex Hospitals NHS Foundation Trust
Tony Young	Southend University Hospital and President of the Institute of Decontamination Science

In addition to the professionals detailed above, patient groups, professional bodies/groups and PTP accredited higher education institutions were alerted to the opportunity to feedback on the extension of this PTP to include Decontamination Science between 28 March 2017 and 19 May 2017 and this feedback has shaped the final version.

Appendix 2: BSc (Hons) Healthcare Science Amendments

Amendments: March 2014

A fifth specialism of Transfusion and Transplantation Science (for NHSBT) was added utilising curriculum from other specialist routes in this programme.

For any queries regarding this change please email: nshcs@wm.hee.nhs.uk

Generic changes

The BSc (Hons) curriculum has been amended and is now presented in a single document which includes both the BSc syllabus and the work-based Learning Guide.

The Introduction (Section 1) has been updated and amended to reflect the totality of the curriculum and apprenticeships. A background to the Modernising Scientific Career (MSC) programme has been added and the importance of *Good Scientific Practice* (GSP) in setting the standards of practice in healthcare science has been emphasised. There has been additional information and emphasis in areas such as: entry routes, progression, patient and public involvement, accreditation through the National School of Healthcare Science, programme delivery and monitoring, student support and mentoring and clarity about a number of issues around programme delivery.

Key professional practice learning outcomes have been added through the GSP syllabus (Section 3), which embeds the standards of professionalism set out in GSP in all aspects of the delivery and assessment of the programme. The GSP syllabus is a common component of all PTP curricula and must be followed throughout the whole training period, with engagement at the appropriate level, depending on the stage of training.

The Professional, Scientific and Technical modules (Section 4) have been revised.

Life Sciences

Where recommendations were made regarding the update of content to align with current and future service delivery these have been incorporated, e.g. new techniques in Genetics, storage and harvesting of eggs in Reproductive Science, etc.

Year 3 LSG Genetic Specialism 60-credit module now includes new technologies as recommended.

Year 2 (LSiii) now clarifies the work-based experiential learning:

‘Students will gain experience predominantly in the techniques of their main specialist area, e.g. blood science, cellular science, etc.’

The Year 3 knowledge section within each specialism has had a minor change to clarify what is required for report preparation:

'*Explain how to prepare reports for validation and identify how to prioritise those that require referral to senior colleagues.'*

For any queries regarding this change please email: nshcs@wm.hee.nhs.uk

Amendments: July 2017

In 2016 it was agreed by Public Health England and Health Education England that a new Healthcare Science curriculum in Decontamination Science should be developed, to enable the establishment of a structured set of competencies and outcomes for entry level Decontamination Scientists.

The new curriculum content has been incorporated into the existing Infection Sciences route in the PTP Life Sciences. Academic and work-based content in Decontamination Science is now part of the following modules:

Year 1:
The Science Behind the Cure.
Introduction to Life Sciences.

Year 2:
The Pathology and Laboratory Medicine Toolbox: Methods for Investigating Disease.
Partners in Investigation.
Infection Sciences in Health and Disease.

Year 3:
Infection Science Specialisms in Action.

NB: Students who specialise in Decontamination Science will graduate with a BSc but because they do not complete all of the Infection Science curriculum components, will not have completed the HCPC registration requirements. They will therefore not be eligible for registration with the HCPC as Biomedical Scientists.

Appendix 3: Abbreviations

Generic abbreviations

AHCS	Academy for Healthcare Science
AO	Assessment Organisation
APL	Accreditation of Prior Learning
BSc	Bachelor of Science
CAS	Central Alerting System
CBD	Case Based Discussion
CEL	Clinical Experiential Learning
COSHH	Control of Substances Hazardous to Health
CPD	Continuing Professional Development
CPPD	Continuing Personal and Professional Development
CSO	Chief Scientific Officer
CT	Computer Tomography
DH	Department of Health
DICOM	Digital Image and Communications in Medicine
DfE	Department for Education
DOPs	Direct Observation of Practical skills
EPA	End-point Assessment
ETSG	Education and Training Scrutiny Group
ETWG	Education and Training Working Group
EU	European Union
FHEQ	Framework for Higher Education Qualifications
FtP	Fitness to Practise (FtP)
GCP	Good Clinical Practice
GM	Generic Module (Professional, Scientific and Technical)
GSP	Good Scientific Practice
HCPC	Health and Care Professions Council
HCS	Healthcare Science
HCSP	Healthcare Science Practitioner
HEE	Health Education England

HEI	Higher Education Institutions
HL7	Health Level 7
IBMS	Institute of Biomedical Science
ICT	Information and Communication Technologies
IOE	Institute of Education
IT	Information Technology
LETB	Local Education and Training Board
MDA	Medical Device Alerts
MDT	Multidisciplinary Team
MHRA	Medicines and Healthcare products Regulatory Agency
MRI	Magnetic Resonance Imaging
MSC	Modernising Scientific Careers
NES	NHS Education for Scotland
NICE	National Institute for Health and Care Excellence
NIHR	National Institute for Health Research
NHS	National Health Service
NSHCS	National School of Healthcare Science
OCE	Observed Clinical Event
OLAT	Online Assessment Tool
PACS	Picture Archiving and Communications Systems
PSA	Professional Standards Authority
PTP	Practitioner Training Programme
QA	Quality Assurance
QAA	Quality Assurance Agency
QC	Quality Control
QMS	Quality Management System
RoAAO	Register of Apprenticeship Assessment Organisations
RoATP	Register of Apprenticeship Training Providers
SCQF	Scottish Credit and Qualifications Framework
SFA	Skill Funding Agency
SJT	Situational Judgement Test
SPECT	Single Photon Emission Computed Tomography
UCAS	The Universities and Colleges Admissions Service

UK	United Kingdom

Programme Specific Abbreviations (Life Sciences)

AED	Anti-epileptic Drugs
ARMS	Amplification Refractory Mutation System
BAL	Bronchoalveolar Lavage
BS	British Standard
BS EN	UK version in English of a European harmonised standard..
BSI	British Standard Institute
CE	Conformité Européenne
CGH	Comparative Genomic Hybridisation
CISH	Chromogenic In-Situ Hybridisation
CNV	Copy-Number Variations
CSF	Cerebrospinal Fluid
dHPLC	Denaturing High Performance Liquid Chromatography
DNA	Deoxyribonucleic Acid
DRA	Deliberate Release Agents
EC	European Commission
EGFR	Epidermal Growth Factor Receptor
EIA	Enzyme Immunoassay
ELISA	Enzyme Linked Immunoassay
EMIT	Enzyme Multiplied Immunoassay Technique
EQA	External QA
ESR	Erythrocyte Sedimentation Rate
FBC	Full Blood Count
FISH	Fluorescence In-Situ Hybridisation
FPIA	Fluorescence Polarisation Immunoassay
H&E	Haematoxylin and Eosin
HAI	Hospital Acquired Infection
HER-2	Human Epidermal Growth Factor Receptor 2
HGVS	Human Genome Variation Society

HFEA	Human Fertilisation and Embryology Authority
HPV	Human Papilloma Virus
HRM	High-Resolution Melting
IAT	Indirect Antiglobulin Tests
IFU	Instructions For Use
IM	Infectious Mononucleosis
INR	International Normalised Ratios
ISO	International Organization for Standardization
IQC	Internal Quality Control
ISCN	International System for Human Cytogenetic Nomenclature
ISH	In-situ hybridisation
JAG	Joint Advisory Group on Gastrointestinal Endoscopy
LBC	Liquid-Based Chromatography
LIMS	Laboratory Information Management System
LSB	Life Sciences: Blood Sciences
LSC	Life Sciences: Cellular Sciences
LSG	Life Sciences: Genetic Sciences
LSI	Life Sciences: Infection Sciences
LST	Life Sciences: Transfusion and Transplantation Science
MLPA	Multiplex Ligation-dependent Probe Amplification
MHRA	Medicines and Healthcare products Regulatory Agency
MRSA	Methacillin Resistant Staphylococcus Aureus
NHSBT	NHS Blood and Transplant
PCR	Polymerase Chain Reaction
POCT	Point-of-Care Testing
PT	Prothrombin Time
RIA	Radioimmunoassay
RNA	Ribonucleic acid
SI	International System of Units
SNV	Single Nucleotide Variation
STI	Sexually Transmitted Infection
TB	Tuberculosis
UKAS	United Kingdom Accreditation Service

VTE	Venous Thromboembolism
ZN	Zeihl-Neelson

Appendix 4: Glossary

Term	Definition
Clinical experiential learning	The cyclical process linking concrete experience with abstract conceptualisation through reflection and planning.
Clinical experiential learning outcomes	The activities that the student will undertake to enable and facilitate their learning in the workplace.
Competence	The ability of an individual to perform a role consistently to required standards, combining knowledge, understanding, skills, attitudes, behaviour and values.
Competence statements	Active and outcome-based statements that provide a further breakdown of the work-based Learning Outcomes – reflecting what the student will be able to do in the workplace at the end of the programme. Each competence should be linked back to the numbered Learning Outcomes.
Component	An indication of the type of module within the curriculum, i.e. Generic, Theme or Specialist.
Curricula	An outline of the expected educational outcomes across a subject area. The learning that is expected to take place during the Practitioner Training Programme described in terms of knowledge, skills, attitudes, behaviours and values.
Division	A high-level description of an area of practice within healthcare science. There are four divisions: Life Sciences, Physical Sciences, Physiological Sciences and Clinical Bioinformatics.
Domains of learning	Cognitive (knowledge and intellectual skills), affective (feelings and attitudes), interpersonal (behaviour and relationships with others) and psychomotor (physical skills).
Feedback	Specific information about the comparison between a student's observed performance and a standard, given with the intent of improving the student's performance (van de Ridder JMM, Stokking KM, McGaghie WC and ten Cate OT. What is feedback in clinical education? *Medical Education* 2008: 42: 189–197).
Good Scientific Practice	Non-statutory guidance on the minimum requirements for good practice for the healthcare science workforce.
Job	A specific definition of the work activities, requirements and skills required to undertake work activities within a local context. This differs from a role – see below.
Key learning outcome	A defined learning outcome linked to relevant competence(s) within the work-based Learning Framework.
Learning framework	The specification for work-based learning contained within the work-based syllabus.
Learning outcome	A high-level, outcome-based statement that describes what a student will be able to do at the end of the module.

Term	Definition
Mentoring	Mentoring is *a process in which a trainer (mentor) is responsible for overseeing the career and development of the student.* The emphasis is therefore on the relationship (rather than the activity).
Module aim	The overall objective of a module – defining the intended learning achievements of the student. The aim works together with the 'Scope' statement to define the overall objectives and scope of the module.
Module scope	A statement within a module that defines the range/limits of the learning undertaken by the student in a module – patients/investigations/equipment/modalities, etc.
National Occupational Standards	Nationally recognised standards of expected workplace performance and level of competence for a role. The standards are outcome based, defining what the role holder should to be able to do, as well as what they must know and understand to demonstrate competent work performance. National Occupational Standards are supported by nationally agreed frameworks of expected attitudes, behaviours and skills.
Practical skill	A cognitive, psychomotor, physical, or communicative ability that supports performance of the required role.
Programme	The package of learning, teaching assessment and quality assurance leading to an award.
Provider	An organisation that delivers required training and learning activities to specified quality assurance requirements.
Role	A collection of functions undertaken in the workplace that represent the main broad areas of work for all similar workers at national level. A role differs from a job, the latter being defined specifically for a local context.
Specialism	A focused area of practice within a division of healthcare science.
Trainer	A qualified individual who provides learning and development support for students.
Theme	A group of related specialisms usually within a division of healthcare science.
Work-based learning	Learning that takes place in a real work setting and involves the application of academic learning to real work activities.
Work performance	The requirements of satisfactory and consistent demonstration of competence in specified functions for a work role.
Workplace	A real work setting in which the student can apply learning.

Appendix 5: Assessment Proformas

A5.1: Direct Observation of Practical/Procedural Skills Template

Student identification data			
Procedure			
Clinical context	**Insert module title**	**Insert module title**	**Insert module title**

Assessor's name					
Assessor's position				**Insert**	**Insert**

Difficulty of the procedure		**Low**	**Average**	**High**
Number of times procedure performed by student		**1–4**	**5–9**	**>10**

Please grade the following areas using the scale below	**Below expectations**	**Borderline**	**Meets expectations**	**Above expectations**	**Unable to comment**[1]
1. Understands scientific principles of procedure, including basic science underpinning it					

Please grade the following areas using the scale below	Below expectations	Borderline	Meets expectations	Above expectations	Unable to comment[1]
2. Has read, understands and follows the appropriate standard operating procedures, risk and COSHH assessments, and any other relevant health and safety documentation					
3. Understands and applies the appropriate internal and external quality control associated with the procedure					
4. Understands the risks associated with items of equipment and uses them appropriately					
5. Completes associated documentation accurately					
6. Output meets accepted laboratory/professional standards					
7. Carries out the procedure within the appropriate time frame					
8. Is aware of the limitations of the test					

Please grade the following areas using the scale below	Below expectations	Borderline	Meets expectations	Above expectations	Unable to comment[1]
9. Demonstrates awareness of the limits of responsibility and when to seek advice					
10. Professionalism					

[1]Please mark this if you have not observed the behaviour.

FEEDBACK AND DOCUMENTATION OF LEARNING NEEDS	AGREED ACTION

Outcome	Satisfactory Unsatisfactory	Date of assessment		Time taken for assessment	
Signature of assessor		Signature of student		Time taken for feedback	

A5.2: Case-based Discussion Template

Student identification data			
Brief description of output and focus of scenario discussed			
Module	**Insert title**	**Insert title**	**Insert title**
Complexity of the scenario	**Low**	**Average**	**High**

Assessor's name	
Assessor's position	

Please grade the following areas using the scale below	**Below expectations**	**Borderline**	**Meets expectations**	**Above expectations**	**Unable to comment**[1]
1. Understands clinical and/or scientific principles relevant to scenario					
2. Can discuss relevant health and safety issues					

Please grade the following areas using the scale below	Below expectations	Borderline	Meets expectations	Above expectations	Unable to comment[1]
3. Can discuss the procedures used to obtain the results					
4. Can discuss the quality control procedures to ensure the result is accurate					
5. Demonstrates a knowledge of relevant 'Best Practice' guidelines and other policies relevant to the scenario					
6. Can discuss the significance of routine patient results with reference to the reason for referral					
7. Is aware of, and can use as required, appropriate resources to aid in the interpretation of results					
8. Is aware of the importance of the audit trail and can complete the audit trail accurately					
9. Demonstrates awareness of the limits of responsibility and when to seek advice					

Please grade the following areas using the scale below	Below expectations	Borderline	Meets expectations	Above expectations	Unable to comment[1]
10. Professionalism					

[1]Please mark this if you have not observed the behaviour.

FEEDBACK AND DOCUMENTATION OF LEARNING NEEDS	AGREED ACTION

Outcome	Satisfactory Unsatisfactory		Date of assessment		Time taken for assessment	
Signature of assessor		Signature of student			Time taken for feedback	

A5.3: Observed Clinical Event Template

Student identification data

Brief description of output and focus of scenario discussed			
Module	**Insert title**	**Insert title**	**Insert title**
Complexity of the scenario	**Low**	**Average**	**High**

Assessor's name	
Assessor's position	

Please grade the following areas using the scale below	**Below expectations**	**Borderline**	**Meets expectations**	**Above expectations**	**Unable to comment**[1]
1. History taking *Does the student obtain the information required prior to undertaking a procedure from the patient or a clinical colleague?*					
2. Communication skills *e.g. Does the student use language appropriate to the situation (verbal and/or body language) when explaining or discussing an aspect of clinical care (test results, diagnostic procedure, equipment repair at the bedside), do they check the understanding of the patient or their colleague?*					

Please grade the following areas using the scale below	Below expectations	Borderline	Meets expectations	Above expectations	Unable to comment[1]
3. Clinical examination skills *e.g. Does the student undertake a clinical skill, such as locating a vein for phlebotomy, performing a diagnostic test appropriately and accurately?*					
4. Clinical judgement *e.g. Is the procedure correct for the required outcome?*					
5. Scientific judgement *e.g. Was the choice of equipment appropriate for the required outcome, has it been correctly calibrated and any necessary settings correctly applied?*					
6. Professionalism *e.g. Did the student introduce themselves and their role or did they discuss the procedure/result with a colleague using appropriate language, considering any patient confidentiality or ethical issues?*					
7. Organisation and efficiency *e.g. Was the student well organised and efficient, ensuring all record keeping was appropriate and accurate; did they keep to time and ensure accurate recording of results; did they process the results in a timely fashion?*					
8. Overall clinical care *e.g. Did the student show respect, empathy and compassion for the patient and/or recognise the importance of the procedure/test within the care pathway for the patient or colleagues where the test contributes to a diagnosis, treatment or management?*					

For specific examples of opportunities where an OCE may be appropriate please visit the National School of Healthcare Science website (www.nshcs.org.uk/).

Appendix 6: Further Information

NHS Networks

An open network to share curricula produced for the Modernising Scientific Careers (MSC) programme.
www.networks.nhs.uk/nhs-networks/msc-framework-curricula/

Details of the Practitioner Training Programme including curricula from 2010/11 to 2015/16 can be found at:
https://www.networks.nhs.uk/nhs-networks/msc-framework-curricula/ptp-1

Details of the Practitioner Training Programme including curricula from 2016 onwards can be found at:
https://www.nshcs.hee.nhs.uk/

National School of Healthcare Science (NSHCS)

As part of the Modernising Scientific Careers (MSC) programme, the National School of Healthcare Science (the School) was established in October 2011 to support the implementation and delivery of the new healthcare science education and training programmes and to comply with the structures within 'Liberating the NHS: Developing Healthcare Workforce - Policy 16977 (January 2012)' acting on behalf of the Chief Scientific Officer (CSO) for England. It also provides some elements of support for the three other UK health departments.

On 1st April 2013, the School became part of Health Education England (HEE) and is hosted within the West Midlands.
The role of the NSHCS includes:

- Curricula management including assessment (new developments; review; fitness for purpose; version control etc);
- Coordination and monitoring of MSC Education and Training implementation;
- Quality management including accreditation of academic and work-based training environments;
- Monitoring and supporting the progress of trainees through the NSHCS themed boards (STP/HSST).

https://www.nshcs.hee.nhs.uk/

Chief Scientific Officer (CSO)

Source of information and news, including the CSO Bulletin, latest press releases, publications and consultations can be found at:
https://www.england.nhs.uk/tag/chief-scientific-officer/

Academy for Healthcare Science (AHCS)

The Academy for Healthcare Science (AHCS) brings together the UK's diverse and specialised scientific community who work across the health and care system including; NHS Trusts, NHS Blood and Transplant, Public Health England, independent healthcare organisations, and the academic sector across the UK.

The AHCS runs a Professional Standards Authority accredited Register for Healthcare Science Practitioners not covered by statutory regulation.
www.academyforhealthcarescience.co.uk/

Council of Healthcare Science in Higher Education (CHSHE)

The Council of Healthcare Science in Higher Education builds a unified identity of academic healthcare science by representing the interests of the sector. Working to improve and maintain quality in healthcare science education and training, the Council itself is made up of senior members of the academic healthcare science team. The work of the Council is also informed by two special interest groups made up of staff involved in the delivery and implementation of MSC programmes the PTP SIG and STP SIG.
www.councilofhealthcarescience.ac.uk/

Health and Care Professions Council (HCPC)

The Health and Care Professions Council is a regulator set up to protect the public. It keeps a register of health professionals who meet the HPC standards for their training, professional skills, behaviour and health.
www.hpc-uk.org/

Last Accessed 27th February 2017