National School of Healthcare Science

NHS
Health Education England

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

Neurosensory Sciences 2016/17

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)

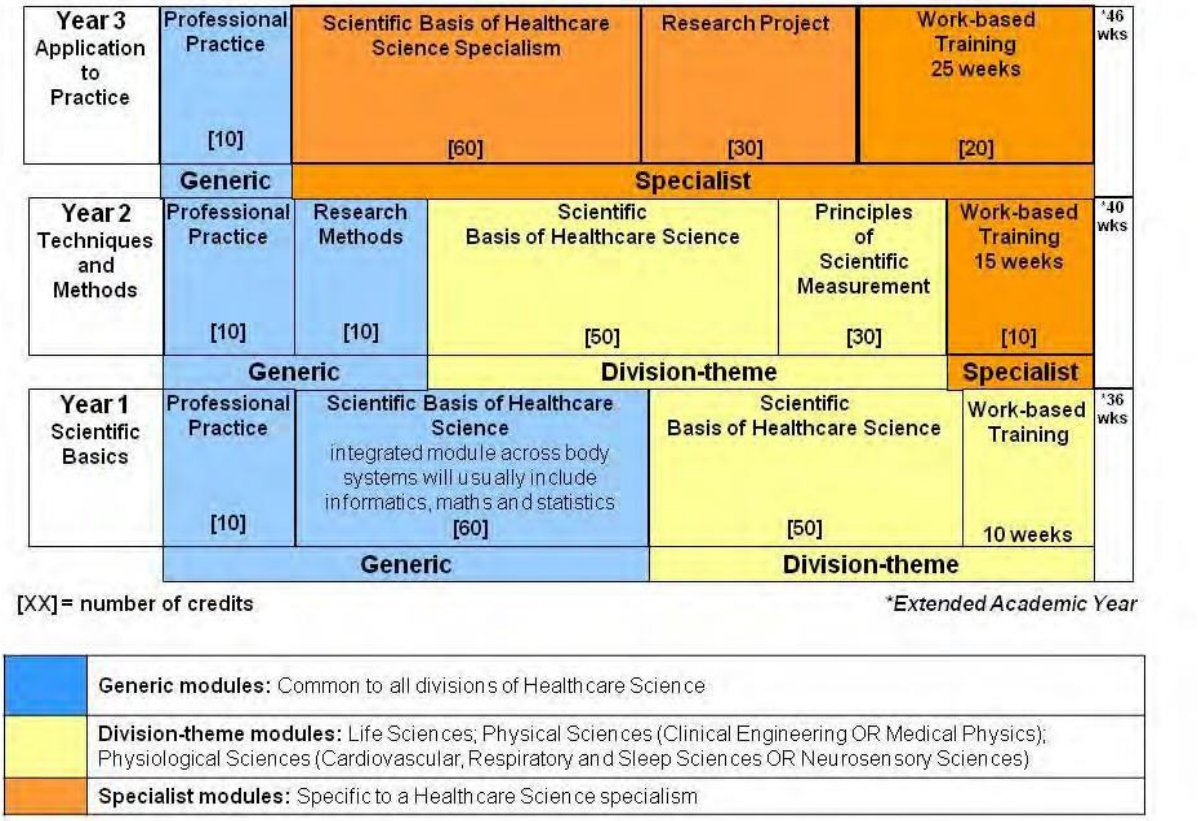
4. The HCS Practitioner Training Programme (HCS PTP) is a degree programme that has 2 routes of delivery:
   i. *On-site academic route:* an academic degree programme in which the learner[4] undertakes work-based placements but is not employed
   ii. *Apprenticeship route:* an in-service degree where 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, patient-centred education and training in a specialist area of HCS. The overall aim of

[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.

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



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]

[5] Although at the current time there is no PTP in Clinical Bioinformatics.
[6] http://hee.nhs.uk/2015/03/26/modernising-scientific-careers-accredited-scientific-practice-asp/

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;
    - 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

[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
[13] https://www.ucas.com

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 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;

[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

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

[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/

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.
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.

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

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.
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

[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

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;
    - 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

[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

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 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

[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.

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.
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;

[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)

- 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 DOPs 1 CBD Competence	4 DOPs 1 CPD 1 OCE Competence	4 DOPs 2 CBDs 2 OCEs 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 learners 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

[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.

overall 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

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

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.

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;

[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.

- taking the central role in the sponsorship of the registers to achieve 'accredited' status as set out by the PSA;
- 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.

[38] and the HCPC in the Life Sciences

Scientific and Clinical Practice

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

xv. 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).
xvi. 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.
xvii. 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

xviii. 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 NEUROSENSORY SCIENCES

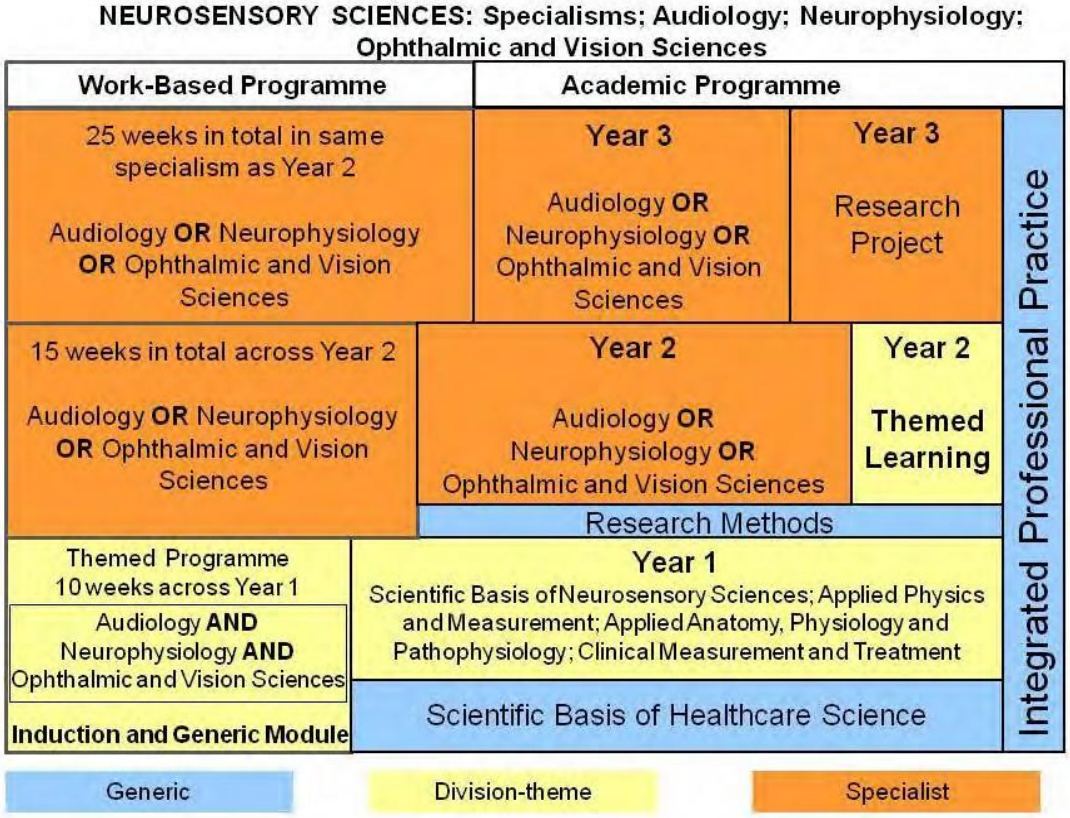
2.1 Details of the PTP Curriculum in Neurosensory Sciences

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. In the later stages of Year 1 students will be introduced to the scientific basis of Audiology, Neurophysiology and Ophthalmic and Vision Science in three modules: 'Applied Physics and Measurement'; 'Applied Anatomy, Physiology and Pathophysiology'; and 'Clinical Measurement and Treatment'. During Year 1 students will undertake 10 weeks of work-based learning across all three specialisms.

In Year 2, the students will continue to develop their learning in 'Applied Physiological Measurement and Instrumentation' and then specialise in either 'Audiology', 'Neurophysiology', or 'Ophthalmic and Vision Science'. They will also continue to develop their professional practice and complete the generic 'Research Methods' module. In Year 3, they 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. The emphasis will be on 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 Neurosensory 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

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	Applied Physics and Measurement	20
1	Applied Anatomy, Physiology and Pathophysiology	20
1	Clinical Measurement and Treatment (including work-based training)	10
2	Professional Practice	10
2	Research Methods	10
2	Applied Physiological Measurement and Instrumentation	20
AUDIOLOGY		
2	Audiological Science I	70
2	Work-based training	10
3	Professional Practice	10
3	Audiological Science II	60
3	Work-based training	20
3	Research Project in Audiology	30
NEUROPHYSIOLGY		
2	Pathophysiology of the Central and Peripheral Nervous System	40
2	Clinical Neurophysiology I	30
2	Work-based training	10
3	Professional Practice	10
3	Clinical Neurophysiology II	60
3	Work-based training	20
3	Research Project in Neurophysiology	30
OPHTHALMIC AND VISION SCIENCES		
2	Visual System in Ocular and Systemic Disease and the Detection of Pathology by Clinical Assessment	50
2	Ophthalmic Imaging and Measurement	20
2	Work-based training	10
3	Professional Practice	10
3	Neurophysiology of Vision and Vision Assessment	20
3	Assessment and Monitoring of Ophthalmic Disease	20
3	Ophthalmic Pharmacology	10
3	Option module	10
3	Work-based training	20
3	Research Project in Ophthalmic and Vision Science	30

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 (HCSPs) 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.

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.

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

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.	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
	10. Understand the need, where appropriate, to hold indemnity insurance.	
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	1.1.1– 1.1.10 1.2 1.3.1 2.2.3 2.2.6 2.2.7 2.2.8

Topic	Professional Practice	GSP reference
	local ethical, legal and governance requirements. 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.	4.1.2 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 HCS 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.	1.1.5 1.4.5 2.1.2 2.1.3 2.2.2 2.2.3 2.2.4 2.2.6

Topic	Scientific Practice	GSP reference
	4. Master the use of ICT in relevant areas of healthcare science. 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.	2.2.7 2.2.8 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. 5. Describe typical behaviours of team members and evaluate the clinical effectiveness of the team, and suggest areas for improvement as appropriate. 6. 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.	1.3.2 1.3.6 2.1.3 2.1.4

Topic	Clinical Practice	GSP reference
	2. Apply in practice consistently high standards in the technical skills required in the investigation and 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.	2.1.5 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:	1.1.4 1.1.5 4.1.1

Topic	Research, Development and Innovation	GSP reference
	1. Work with appropriate research and development governance, legal and ethical frameworks. 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. 2. Identify conflict style and develop skills in negotiating and mediating conflicts.	

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

Topic	Clinical Leadership	GSP reference
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.

- Years 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.	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
	7. Discuss the principles, guidance and law with respect to medical ethics, patient confidentiality (the 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	

Topic	Professional Practice [10 credits per year]	GSP reference
	that promote shared leadership and apply this knowledge within the work base. **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 HCS and discuss in	1.1.4 1.1.5 1.1.6 2.1.6

Topic	Scientific Basis of Healthcare Science [60 credits]	GSP reference
	relation to patients referred to HCS services. 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

Neurosensory Sciences

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 following learning outcomes should be achieved, as appropriate to the modules within the Neurosensory Sciences syllabus:

- 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*
- Treat patients, carers and their families with respect, kindness and compassion, putting them at their ease.
- Show understanding of the patient's anxiety and be sympathetic and kind, respecting and understanding individuals' beliefs and ways of coping with illness.
- Appreciate the empathy and sensitivity needed when dealing with the patient experience of long-term conditions and terminal illness.
- Appreciate the impact of neurosensory services on the patient pathway and outcome.
- Appreciate the emotional and psychological impact the patient, relatives and carers might experience when undergoing investigations, diagnosis and treatment.
- Act in a calm, controlled and reassuring manner.
- Behave in a professional manner in matters of attendance and appearance.
- Recognise the limits of professional competence, seeking help and support and referring to colleagues appropriately.
- Maintain confidentiality of patient information and data.
- Value social diversity and its relationship to service provision in healthcare.
- Work effectively within a MDT, developing and maintaining professional relationships.
- Develop a balance between reflective practice and active exploration in personal learning and take responsibility for personal learning.
- Develop, maintain and improve personal knowledge and skills.
- Consistently work safely, demonstrating being precise and paying attention to detail.
- Communicate effectively within the healthcare environment and clinical team, adapting communication to meet varying needs and overcoming barriers to understanding.
- Communicate scientific and engineering information at a level appropriate to the audience, including the public.

- Use correct terminology appropriate to healthcare, healthcare science, neurosensory sciences and the specialist areas where work placements are undertaken.
- Listen and extract relevant information.
- Encourage feedback from the public, patients and staff, welcome it and use it to improve services.
- Establish and influence the culture of health and safety in the workplace.
- Recognise, where necessary, the urgency of a situation and seek help and advice.
- Show a positive attitude to lifelong learning and professional development.
- Bring the highest levels of knowledge and skill at times of basic human need when care and compassion are what matters most.

The PTP syllabus for Neurosensory Science follows.

5.2 Division-theme Modules

This section covers the four division-theme modules that will be studied by all students undertaking the PTP in Neurosensory Science:

NS (i): Applied Physics and Measurement (Year 1)
NS (ii): Applied Anatomy Physiology and Pathophysiology (Year 1)
NS (iii): Clinical Measurement and Treatment, including work-based learning (Year 1)
NS (iv): Applied Physiological Measurement and Instrumentation (Year 2)

Year 1
NS(i): Applied Physics and Measurement
[20 credits]

Topic	Applied Physics and Measurement [20 credits]	GSP reference
Learning objective	This module will provide students with a background of the concepts of instrumentation used in the Neurosensory Sciences together with an appreciation of the physical and mathematical principles that underpin these concepts and measurements.	
Knowledge	By the end of this module the student will be able to: 1. Explain the principles of physics and mathematics that underpin physiological measurement. 2. Describe measuring systems in terms of their physical characteristics. 3. Discuss how these characteristics affect the quality of measured data. 4. Explain the importance of physics and measurement in Neurosensory Sciences and the wider clinical environment. 5. Describe the health and safety systems that underpin physiological measurements. 6. Describe the current quality assurance systems for example Improving Quality in Physiological Services.	1.1.3 1.1.4 1.1.5 2.2.3 2.2.7 3.2.1 2.3.1
Technical and clinical skills	By the end of this module the student will be able to: 1. Use appropriate units, prefixes and exponential notation when describing data. 2. Apply analytical techniques and logic to solve a range of physical problems. **The Year 1 work-based learning outcomes can be found in module NS(iii): Clinical Measurement and Treatment, including 10 weeks of work-based training.**	2.2.9 2.2.7

Year 1
NS(ii): Applied Anatomy, Physiology and Pathophysiology
[20 credits]

Topic	Applied Anatomy, Physiology and Pathophysiology [20 credits]	GSP reference
Learning objective	This module will enable the student to build on learning in the scientific basis of healthcare science to gain a deeper understanding of anatomy, physiology and pathophysiology within the Neurosensory Sciences.	
Knowledge	By the end of this module, with respect to the auditory, visual, central and peripheral nervous systems, the student will be able to: 1. Describe the anatomy and physiology, and explain the pathophysiological mechanisms that underpin disease. 2. Explain the maturation of neurosensory systems. 3. Discuss the impact of common diseases on the patient and their families.	1.1.4 3.1.6
Technical and clinical skills	By the end of this module the student will evaluate clinical case studies with reference to current anatomy, physiology and pathophysiological mechanisms and will be able to: 1. Use correct terminology when discussing scientific issues. 2. Use a range of study skills, including time management, organisational skills, using the library, search engines, self-directed learning and critical analysis. 3. Discuss complex scientific information in ways that can be understood by practitioners in other areas. **The Year 1 work-based learning outcomes can be found in module NS(iii): Clinical Measurement and Treatment, including 10 weeks of work-based training and the work-based syllabus.**	2.2.9 2.1.5 1.4.1

Year 1
NS(iii): Clinical Measurement and Treatment
[10 credits]

Topic	Clinical Measurement and Treatment, including 10 weeks of work-based training [10 credits]	GSP reference
Learning objective	The overall aim of this module is to ensure that the student understands the basic measurement procedures within the Neurosensory Sciences and is able to work safely and professionally within these environments. It is also expected that the student understands and gains experience of the importance of evidence-based practice, clinical audit and MDT working. Integral to this module and all work-based learning is working in partnership with patients and ensuring students are respectful of and responsive to individual patient preferences, needs and values, and ensuring that patient values guide all of the work undertaken. In the work base 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 'Applied Physics and Measurement'; 'Applied Anatomy, Physiology and Pathophysiology'; and 'Clinical Measurement and Treatment' in each neurosensory theme. Students will be expected to perform some routine skills and develop and build their professional practice in accordance with *Good Scientific Practice*. The overall aim of the work base training placements within Year 1 is to provide the student with a broad appreciation of the range of clinical work undertaken within healthcare science. Students will begin the process of the development of the skills and attitudes relevant to the HCSP, building on learning in the academic environment, including practical sessions, clinical skills sessions, reflection on development, etc. Additionally, it should help students learn in the context of practice and real-life experience and have a motivational element as they work towards a career in the NHS. This module will provide a foundation from which the student will build their knowledge, skills, experience and attitudes throughout the three-year programme of study and transfer these skills to employment in healthcare science. It is expected that this period of initial work-based training will provide the opportunity to begin to integrate and embed many of the professional practice learning outcomes and enable the student to practise safely in the work base. Students will be expected to begin to maintain a portfolio of evidence and the relevant sections of the work-based syllabus.	

Topic	Clinical Measurement and Treatment, including 10 weeks of work-based training [10 credits]	GSP reference
	Note: Work-based training in Years 2 and 3 does not have to be confined only to the work base. However, while elements may be taught in other environments, e.g. a clinical skills laboratory or simulation centre, it is expected that all students will spend the majority of the time in a clinical environment within a healthcare setting.	
Knowledge	On successful completion of this module the student will: 1. Compare and contrast the role of Audiology, Neurophysiology, and Ophthalmic and Vision science in relevant patient pathways. 2. Extend and apply basic clinical sciences knowledge to Audiology, Neurophysiology, and Ophthalmic and Vision Science in relevant patient pathways. 3. Explain the basic principles underpinning the routine investigations and procedures carried out in the diagnosis, treatment and rehabilitation of patients referred to Audiology, Neurophysiology, and Ophthalmic and Vision Science. 4. Discuss the importance of patient-centred care, patient safety and quality management and the steps that can be taken within the Neurosensory Sciences to facilitate this policy. 5. Describe and evaluate a range of communication methods and media, in both the educational environment and the workplace, with a focus on patient-centred care. 6. Evaluate the value of MDT working in the investigation of patients. 7. Appraise the use of evidence-based medicine in the Neurosensory Sciences. 8. Discuss the value of clinical audit in service development and improvement optimise and quality assure services. 9. Evaluate the skills necessary for successful team working in Physiological Sciences.	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.10 1.2.1 1.2.5 1.3.2 1.3.5 3.1.7 3.1.11 3.2.1 3.1.16 3.1.5 2.2.2 3.1.17 2.3.1 2.3.4
Technical and clinical skills	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 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, and behaving in a professional manner in accordance with *Good Scientific Practice*.	1.1.2 1.1.3 1.2.1

Topic	Clinical Measurement and Treatment, including 10 weeks of work-based training [10 credits]	GSP reference
	2. Observe and assist, where practically possible, with and perform routine adult diagnostic investigations in Audiology, adhering to current guidelines *and all other appropriate national,* departmental and NHS trust procedures. 3. Observe and assist, where practically possible, with routine repairs in an adult hearing aid repair clinic. 4. Observe and assist, where practically possible, in preparing the environment, set-up and calibration of equipment ready for routine electroencephalogram (EEG) recordings. 5. Observe and assist where practically possible with visual acuity and visual field testing. 6. Observe and assist where practically possible with either optical coherence tomography (OCT) or fundus photography. 7. Observe and assist where practically possible with preparation and set up for routine adult visual electrophysiological investigations (evoked potentials [VEP], electroretinogram [ERG], electro-oculogram [EOG]). 8. Adhere to standards of professional practice as defined in *Good Scientific Practice*.	1.2.5 2.2.3 2.2.4 2.2.7 3.2.1 2.1.3 3.1.11 3.2.2

Year 2
NS(iv): Applied Physiological Measurement and Instrumentation
[20 credits]

Topic	Applied Physiological Measurement and Instrumentation [20 credits]	GSP reference
Learning objective	The overall aim of this module is to ensure that the student understands the principles of physiological and psychophysical measurements within the Neurosensory Sciences and is able to work safely within these environments. The module also investigates the principles and applications of a wide range of physiological techniques, delivers descriptive methodology and application of digital signal acquisition, storage and analysis.	
Knowledge	By the end of this module the student will be able to: 1. Discuss the effects of amplifier characteristics on the quality of the recorded signal and their influence on recording methodology. 2. Discuss the operation, specification, advantages and limitations of filters. 3. Outline the principles of signal digitisation. 4. Explore the methods and applications of computer acquisition, storage and analysis of signals in clinical physiology. 5. Explain the principles and methods of electrophysiological measurement. 6. Explain the principles and methods of psychophysical measurement. 7. Investigate principles and applications of biomedical imaging techniques.	1.1.4 1.1.5 2.2.3 2.2.4 2.2.9 3.1.5
Technical and clinical skills	By the end of this module the student will be able to evaluate and select appropriate recording protocols to optimise clinical measurements in accordance with the clinical question and the recording environment. **The Years 2 and 3 work-based learning outcomes can be found in the specialist syllabus that follows and the work-based syllabus.**	

SECTION 6: AUDIOLOGY TECHNICAL AND SCIENTIFIC SYLLABUS

6.1 Specialist Modules for Audiology

Interpretation of the high-level framework for Neurosensory Sciences specialising in Audiology

<table>
<tr><th></th><th colspan="8">Module Title</th></tr>
<tr><td>Year 3 Application to Practice</td><td>Professional Practice
[10]</td><td colspan="3">Audiological Science II
[60]</td><td colspan="2">Research Project
[30]</td><td>Work-based training 25 weeks
[20]</td></tr>
<tr><td>Year 2 Technologies and Methodologies</td><td>Professional Practice
[10]</td><td>Research Methods
[10]</td><td colspan="2">Applied Physiological Measurement and Instrumentation
[20]</td><td colspan="3">Audiological Science I
[70]</td><td>Work-based training 15 weeks
[10]</td></tr>
<tr><td>Year 1 Scientific Basics</td><td>Professional Practice
[10]</td><td colspan="4">Scientific Basis of Healthcare Science – integrated module across body systems
[60]</td><td>Applied Physics and Measure-ment
[20]</td><td>Applied Anatomy, Physiology and Pathophysiology
[20]</td><td>Clinical Measurement and Treatment, including work-based training)
[10]</td></tr>
</table>

[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
A(i): Audiological Science I
[70 credits]

Topic	Audiological Science I [70 credits], including Year 2 and 3 work-based learning [30 credits]	GSP reference
Learning objective	The aim of this module is to ensure that the student has the subject-specific underpinning knowledge and understanding to undertake the role of a HCSP in Audiology. This module develops and extends the learning from Year 1.	
Knowledge	On successful completion of this theme the student will: 1. Explain the fundamental principles of adult aural audiological rehabilitation and counselling. 2. Explain and appraise psychophysical methods and the psychophysics of hearing and the perceptual effects of deafness and their impact on speech detection and processing. 3. Evaluate advanced features of hearing aids. 4. Explain the fundamental principles of audiological assessment and demonstrate their application.	1.1.1 1.1.2 1.1.4 3.1.5
Technical and clinical skills	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 will be able to: **Adult diagnostic assessment** 1. Perform and interpret not-masked pure tone audiometry. 2. Perform and interpret masked pure tone audiometry. 3. Perform and interpret tympanometry. 4. Perform and interpret full acoustic reflex threshold. 5. Set up and perform transient evoked oto-acoustic emissions. 6. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*. **Adult hearing aid clinic** 1. Obtain a comprehensive patient history from a range of patients referred to the clinic. 2. Perform real ear measurements (REM) according to standard operating procedures (SOPs) and	1.1.1 1.1.2 1.1.3 1.1.6 1.1.10 1.2.1 1.2.5 3.2.4 3.1.3 3.2.1

Topic	Audiological Science I [70 credits], including Year 2 and 3 work-based learning [30 credits]	GSP reference
	current published recommended procedure in a range of adult patients. 3. Use a hearing aid test box according to SOPs. 4. Perform an adult hearing assessment according to SOPs and current published recommended procedure in a range of adult patients. 5. Perform a hearing aid fitting with an adult patient who has not previously worn a device, including hearing aid selection, programming, explanation of its functionality and initial adaptation period. 6. Perform a re-assessment of a patient who already wears a hearing aid, including hearing aid selection, programming, explanation of its functionality and initial adaptation period. 7. Based on the patient reported outcome measures, produce as appropriate, a hearing loss information/advice plan. This will be as part of a hearing assessment or hearing aid selection, programming, fitting, or the long-term rehabilitative healthcare, of a patient who is experiencing a hearing impairment, according to current guidelines. 8. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*. **Adult hearing aid repair clinic** 1. Perform otoscopy in a range of adult patients referred to the hearing aid repair clinic. 2. Take an aural impression under supervision from a range of adult patients referred to the hearing aid repair clinic. 3. Perform routine hearing aid maintenance and checks. 4. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.	3.1.4 2.1.5 2.2.1

Year 3
A(ii): Audiological Science II
[60 credits]

Topic	Audiological Science (II) [60 credits], including Years 2 and 3 work-based learning [30 credits]	GSP reference
Learning objective	The aim of this module is to ensure that the student has the specialist underpinning knowledge and understanding and gains the accompanying graduate transferable skills and attitudes to undertake the role of a HCSP in Audiology.	
Knowledge	By the end of this module the student will: 1. Explain the developmental milestones in the development of hearing in children. 2. Explain the fundamental principles of assessment for balance disorders. 3. Analyse the psychosocial implications of hearing loss and tinnitus. 4. Discuss the basic principles of epidemiology in relation to hearing/balance disorders and tinnitus. 5. Critically appraise the assessment and management needs of particular specialist populations in Audiology, to include the challenges of ageing, dementia, culture and language. 6. Critically reflect on how their personal communication skills have developed to support high-quality, patient-centred care. **Specialist hearing instruments** 1. Appraise the referral options for hearing impaired adults and children who do not benefit from conventional hearing instruments. 2. Evaluate the role of implantable auditory prostheses. 3. Evaluate the assessment protocols of candidature for implantation. 4. Describe the assessment, fitting and management of bone-anchored hearing aids (BAHA). 5. Critically evaluate the advantages and disadvantages of cochlear implants and brainstem implants. 6. Describe the current range of specialist hearing instruments available. 7. Critically evaluate the use of specialist hearing instruments and assistive technologies. **Introduction to tinnitus**	1.1.4 1.1.5 1.1.1 1.1.10 1.2.1 1.2.4 3.1.6 3.1.7 3.1.1 3.1.4 2.3.2 3.1.11 2.2.3 2.2.5

Topic	Audiological Science (II) [60 credits], including Years 2 and 3 work-based learning [30 credits]	GSP reference
	1. Describe the current theories of tinnitus generation and perception. 2. Describe methods used to assess and evaluate the impact of tinnitus on individuals. 3. Explain habituation and psychological management models. 4. Describe the role of hearing aids and sound therapy in tinnitus management. 5. Describe the role of stress management in tinnitus management. 6. Identify the services available to people who experience tinnitus. 7. Critically appraise the functions and roles of other healthcare and social care staff involved in the assessment and management of tinnitus. **Paediatric assessment** 1. Explain the different paediatric hearing test procedures used in the assessment of a child's hearing. 2. Describe the relationship between developmental age and hearing test selection. 3. Discuss the differences between behavioural testing and objective measures. 4. Describe the ethos of newborn hearing screening. 5. Appraise the management options available for hearing impaired children. 6. Describe the links between health, education and social services on providing services for hearing impaired children.	
Technical and clinical skills	**The Years 2 and 3 work-based learning outcomes can be found in module A(i): Audiological Science (I) and the work-based syllabus.**	

SECTION 7: NEUROPHYSIOLOGY TECHNICAL AND SPECIALIST SYLLABUS

7.1 Specialist Modules for Neurophysiology

Interpretation of the high-level framework for Neurosensory Sciences in Neurophysiology

	Module Title						
Year 3 Application to Practice	Professional Practice [10]	Clinical Neurophysiology II [60]			Research Project [30]	Work-based training 25 weeks [20]	
Year 2 Technologies and Methodologies	Professional Practice [10]	Research Methods [10]	Applied Physiological Measurement and Instrumentation [20]	Pathophysiology of the Central and Peripheral Nervous System [40]		Clinical Neurophysiology I	Work-based training 15 weeks [10]
Year 1 Scientific Basics	Professional Practice [10]	Scientific Basis of Healthcare Science – integrated module across body systems [60]			Applied Physics and Measurement [20]	Applied Anatomy, Physiology and Pathophysiology [20]	Clinical Measurement and Treatment, including work-based training [10]

[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
N(i): Pathophysiology of the Central and Peripheral Nervous System
[40 credits]

Topic	Pathophysiology of the Central and Peripheral Nervous System [40 credits]	GSP reference
Learning objective	The module is designed to build on the learning in Year 1 and provide a basis for the exploration of cell biology, immunology, microbiology and genetics related to disease processes, and to provide the necessary background in physiology, pathology and pharmacology relevant to Neurophysiology.	
Knowledge	On successful completion of this module the student will: 1. Recall the normal structure and function of the brain and spinal cord. 2. Explain the epidemiology of commonly referred pathophysiology to clinical neurophysiology services. 3. Describe the types of genetic error responsible for common abnormalities affecting the brain and spinal cord. 4. Discuss the immunological basis of diseases, with particular emphasis on conditions in patients commonly referred to clinical neurophysiology, e.g. epilepsy. 5. Describe major abnormalities of physiological control mechanisms in diseases of the brain and spinal cord. 6. Describe cellular, tissue and systems responses to diseases of the brain and spinal cord, e.g. brain haemorrhage, cerebral infarction, brain tumours and dementia. 7. Describe the basis of common infections of the brain and spinal cord, e.g. meningitis, encephalitis, brain abscess. 8. Describe the principles of drug action and pharmacokinetics and correlate these to drug therapy, with specific reference to conditions in patients commonly referred to clinical neurophysiology services. 9. Discuss the principle non-pharmaceutical treatments relevant to patients commonly referred to clinical neurophysiology to include diet, surgery and cognitive behavioural therapy.	1.1.4 3.2.3 3.1.15
Technical and clinical skills	**The Years 2 and 3 work-based learning outcomes can be found in module N(iv): Clinical Neurophysiology and the work-based syllabus.**	

Year 2
N(ii): Clinical Neurophysiology I
[30 credits]

Topic	Clinical Neurophysiology I [30 credits]	GSP reference
Learning objective	This module will give the student an appreciation of the fundamental skills and attitudes required by all healthcare professionals. The module will provide the student with a background of the concepts of instrumentation used in clinical neurophysiology, together with an understanding of the methodology of recording practices in EEG and visual, auditory and somatosensory evoked potentials (VEP, AEP, SSEP). The module will support and develop the work base training by providing a description of normal EEG phenomena together with the effect of routine activation procedures.	
Knowledge	On successful completion of this module the student will: 1. Discuss the specific requirements of instrumentation used in clinical neurophysiology. 2. Describe and evaluate recording techniques in EEG and evoked potentials used in clinical neurophysiology (visual, auditory and somatosensory). 3. Describe and annotate the features of a normal adult EEG.	1.1.4 3.1.5 2.2.3 2.1.5 3.1.9
Technical and clinical skills	On successful completion of this module the student will be able to evaluate the instrumentation and recording parameters required for EEG and evoked potential measurements across a range of recording situations and conditions. **The Years 2 and 3 work-based learning outcomes can be found in module N(iv): Clinical Neurophysiology and the work-based syllabus.**	

Year 3
N(iii): Clinical Neurophysiology II, including Year 2 and Year 3 work-based learning [90 credits]

Topic	Clinical Neurophysiology II [60 credits] and Years 2 and 3 work-based learning [30 credits]	GSP reference
Learning objective	The overall aim of this module is to ensure that the student has the specialist underpinning knowledge and understanding, and gains the accompanying graduate transferable skills and attitudes necessary to undertake the breadth of practice expected of a newly qualified HCSP in Neurophysiology. The indicative content for the work base training modules in Year 2 is defined in the Year 3 module content to be achieved across Years 2 and 3. ***Note: Work-based training in Years 2 and 3 does not have to be confined only to the work base. However, while elements may be taught in other environments, e.g. a clinical skills laboratory or simulation centre, it is expected that all students will spend the majority of their time in a clinical environment within a healthcare setting.***	
Knowledge	On successful completion of this module the student will: 1. Correlate stimuli characteristics with the effect on recorded waveforms. 2. Distinguish normal from abnormal waveforms and phenomena in adult EEG. 3. Evaluate the current definition, classification and treatment of adult epilepsy. 4. Appraise common neurological conditions and the evidence base that underpins treatment decisions. 5. Describe the physiology of the blood–brain barrier and the cerebrospinal fluid (CSF) circulatory system. 6. Explain the relationship between the dysfunction of subcortical structures and neurological symptomology. 7. Evaluate the effect of levels of awareness and an abnormally altered patient psyche on the reliable measurement of physiological variables. 8. Characterise the features of a normal paediatric EEG and provide a technical description of an example measurement. 9. Explain the process of factual report writing and EEG interpretation. 10. Characterise the effects of activation techniques and drugs on the adult EEG. 11. Describe the adult VEP, brainstem evoked potential (BSEP) and SSEP, and the	1.1.4 1.1.5 1.1.6 3.1.5 3.2.3 2.2.4 3.1.9 3.2.4 3.1.12 3.1.14 2.2.9 2.1.5 2.3.2

Topic	Clinical Neurophysiology II [60 credits] and Years 2 and 3 work-based learning [30 credits]	GSP reference
	annotation of the waveforms. 12. Interpret abnormal findings of the VEP. 13. Describe a range of neurological conditions, their pathology and treatment for which the EEG and evoked potentials have a diagnostic or monitoring role. 14. Appraise the value of the EEG and evoked potential in the intensive care unit (ICU). 15. Critically appraise the assessment and management needs of particular specialist populations in Neurophysiology, to include the challenges of ageing, dementia, culture and language. 16. Critically reflect on how their personal communication skills have developed to support high-quality, patient-centred care.	
Technical and clinical skills	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 will be able to: **Electroencephalography and evoked potentials** 1. Perform the internal and external calibration procedure on neurophysiological recording equipment. 2. Plan, prepare and record a resting adult EEG. 3. Implement and monitor hyperventilation and photic stimulation. 4. Factually report an adult EEG, recognising biological and non-biological artefact. 5. Assist with the planning, preparation and recording of an adult VEP under supervision. 6. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.	1.2.5 1.1.3 1.1.4 1.1.6 1.3.3 1.3.5 2.2.4 2.2.3 2.1.4 2.2.7

SECTION 8: OPHTHALMIC AND VISION TECHNICAL AND SPECIALIST SYLLABUS

8.1 Specialist Modules for Ophthalmic and Vision Science

Interpretation of the high-level framework for Neurosensory Sciences in Ophthalmic and Vision Science

	Module Title						
Year 3 Application to Practice	Professional Practice [10]	Neurophysiology of Vision and Vision Assessment [20]	Assessment and Monitoring of Ophthalmic Disease [20]	Ophthalmic Pharmacology [10]	Optional Module [10]	Research Project [30]	Work-based training 25 weeks [20]
Year 2 Technologies and Methodologies	Professional Practice [10]	Research Methods [10]	Applied Physiological Measurement and Instrumentation [20]	Visual System in Ocular and Systemic Disease and the Detection of Pathology by Clinical Assessment [50]		Ophthalmic Imaging and Measurement [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]			Applied Physics and Measurement [20]	Applied Anatomy, Physiology and Pathophysiology [20]	Clinical Measurement and Treatment, including work-based training [10]

[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
OVS(i): Visual System in Ocular and Systemic Disease and the Detection of Pathology by Clinical Assessment [50credits]

Topic	Visual System in Ocular and Systemic Disease and the Detection of Pathology by Clinical Assessment [50 credits]	GSP reference
Learning objective	The aim of this module is to provide students with knowledge and understanding of diseases and disorders of the eye, ocular adnexae and visual pathway; and systemic diseases that have important ophthalmic manifestations. The module also includes the principles of epidemiology and disease screening with particular reference to diabetes, glaucoma and age-related macular degeneration (ARMD), and microbiology and infection control relevant to ophthalmic practice. The module will provide students with an understanding of the assessment principles starting from clinical history eliciting signs and symptoms, to the elements that comprise a systematic assessment of the function and structure of the visual pathway. The purpose and method of triage will be understood.	
Knowledge	On successful completion of this module the student will: 1. Explain the relationship between visual pathway pathology and assessment of visual function. 2. Classify and describe common diseases and disorders of the visual system. 3. Describe a range of systemic diseases that have ocular manifestations and explain the mechanism of this association. 4. Relate symptoms and signs of disease to clinical manifestations; understand the impact on the patient's health and wellbeing. 5. Explain the rights, expectations and needs of patients, including those who have sensory or cognitive impairment, children and other patients with special needs. 6. Describe the application of consent in these circumstances. 7. Describe the purpose and methods of obtaining patient history, ascertaining general health, ocular health and family history. 8. Describe common refractive errors and how they are assessed and corrected with spectacles. 9. Describe the alternative acuity tests available for assessment of patients who have low vision, communication difficulties or are children. 10. Describe methods of contrast sensitivity assessment. 11. Describe tests of colour vision and relevance to retinal and optic nerve disease, and congenital	1.1.1 1.1.5 1.1.4 1.1.9 1.1.10 3.1.5 3.1.1 2.2.3 2.2.9

Topic	Visual System in Ocular and Systemic Disease and the Detection of Pathology by Clinical Assessment [50 credits]	GSP reference
	colour deficiency. 12. Describe principles and measurement of visual fields using static and kinetic perimetry, manual and automated perimeter. 13. Describe measurement of pupil size and assessment of pupil responses, including afferent pupil defect. 14. Describe principles and methods of slit lamp examination of the eye, in particular assessing anterior chamber depth. 15. Describe principles and methods of tonometry and pachymetry. 16. Describe different methods of direct and indirect ophthalmoscopy. 17. Explain the purpose and methods for ophthalmic triage. 18. Describe measures for infection control in clinical practice and explain how they reduce disease transmission. 19. Describe the influence of family history and lifestyle factors that contribute to the disease likelihood and identify 'at risk' patients. 20. Describe and explain the principles of screening of ophthalmic disease, including primary care screening of diabetic retinopathy, ARMD monitoring, glaucoma screening and how partnerships with community optometry determine referral criteria locally.	
Technical and clinical skills	**The Years 2 and 3 work-based learning outcomes can be found in module OVS(ix): Work-based Learning and further details can be found in the work-based syllabus.**	

Year 2
OVS(ii): Ophthalmic Imaging and Measurement
[20 credits]

Topic	Ophthalmic Imaging and Measurement [20 credits]	GSP reference
Learning objective	This module will give the student a comprehensive grounding in the function, operation and characteristics of instruments used to image and measure structures of the eye. The module also delivers descriptive methodology and application of computer acquisition, storage and analysis of data. In particular, the student will learn principles and methods for capturing, recording, archiving and transmitting images and measurements of the eye using a variety of modalities and techniques, including fundus photography, scanning laser tomography, topography and polarimetry, A and B-scan ultrasonography. The student will learn how to assess the quality of the images and measurements and recognise artefacts, and to adjust techniques to obtain the most appropriate results for the clinical purpose.	
Knowledge	By the end of this module the student will: 1. Describe and explain the principles and techniques for obtaining images of the fundus with a fundus camera, digital processing of images, brightness, saturation and hue, additive and subtractive colour mixing/colorimetry, and fundus autofluorescence 2. Discuss the various principles, modalities and applications for imaging and measuring structures of the anterior and posterior segment of the eye. 3. Discuss the principles of ultrasonography, A- and B- scan modalities, and applications for imaging and measuring structures of the anterior and posterior segment of the eye. 4. Describe methods and techniques for biometry (axial length measurement and calculation of power of intraocular lens). 5. Describe methods of corneal measurement, keratometry and corneal topography. 6. Explore the methods, applications and clinical governance of computer acquisition, analysis, storage, and disposal of ophthalmic imaging and measurement data. 7. Discuss technological developments in the field.	1.1.4 1.1.5 2.2.3 2.2.4 2.2.7
Technical and clinical skills	**The Years 2 and 3 work-based learning outcomes can be found in module OVS(ix): Work-based Learning and further details can be found in the work-based syllabus.**	

Year 3
OVS(iii): Neurophysiology of Vision and Vision Assessment
[20 credits]

Topic	Neurophysiology of Vision and Vision Assessment [20 credits]	GSP reference
Learning objective	The aim of this module is to provide the student with understanding of the neurophysiology of vision, and the principles and methods of psychophysical and visual electrophysiological assessment of visual function. The module will also enable students to obtain an understanding of how different assessment modalities complement each other and are required to give a complete picture, e.g. assessment of the visual field and optic nerve imaging for glaucoma, or in providing an understanding of binocular vision and its disorders, including strabismus and amblyopia, the principles of assessment of ocular movement and binocular vision. It will build on the knowledge of pathology and clinical assessments presented in Year 2.	
Knowledge	On successful completion of this module the student will: 1. Describe the relationship between the anatomy of the retina and visual pathway and the various aspects of visual function, including visual acuity and contrast sensitivity, visual field, colour vision, dark adaptation and motion detection, and visual electrophysiology. 2. Describe how diseases of the visual pathway affect visual function and how this relates to everyday life tasks away from the clinic. 3. Describe techniques of obtaining psychophysical thresholds and the importance of understanding which threshold methods are used for visual acuity measures in adults and children, visual field sensitivity, contrast sensitivity, colour vision and dark adaptation. 4. Describe the concept of scotoma, spatial localisation and mapping of the visual field, how visual field output plots of sensitivity and reliability are interpreted and their relationship with retinal imaging, e.g. of retinal nerve fibre layer thickness or fundus autofluorescence. 5. Describe the methods for routine visual electrophysiology assessment (EOG, flash and pattern ERG and VEP). 6. Explain visual development, its influence on visual pathway function and its effect on different measures of visual function, e.g. visual acuity and visual electrophysiology. 7. Describe common disorders of development, including strabismus, suppression and amblyopia. 8. Describe basic principles and methods of assessment of ocular movement, binocular vision and stereopsis.	1.1.4 1.1.5 2.2.3 2.2.4 2.2.7 3.2.4

Topic	Neurophysiology of Vision and Vision Assessment [20 credits]	GSP reference
Technical and clinical skills	The Years 2 and 3 work-based learning outcomes can be found in module OVS(ix): Work-based Learning and further details can be found in the work-based syllabus.	

Year 3
OVS(iv): Assessment and Monitoring of Ophthalmic Disease
[20 credits]

Topic	Assessment and Monitoring of Ophthalmic Disease [20 credits]	GSP reference
Learning objective	This module will provide the student with an understanding of standard pathways and protocols for managing common ophthalmic conditions of cataract, glaucoma, medical retinal diseases including diabetic retinopathy and Age-Related Macular Degeneration (ARMD), and low vision and vision rehabilitation. The student will learn about the genomic initiatives across the UK and the importance of careful and deep phenotyping that combines outcomes of all ophthalmic assessment techniques (e.g. patient selection for translation clinical trials of stem cell therapy and gene replacement therapy to treat and ameliorate visual loss due to inherited retinal conditions).	
Knowledge	On successful completion of this module the student will: 1. Describe different forms of cataract, their effects on vision and refraction, principles and techniques of cataract surgery, and correction of refraction with intraocular lens (IOL) insertion. 2. Explain when IOL may not be appropriate and the alternatives of contact lenses or aphakic spectacles and how to support the management of patient expectations. 3. Describe methods, techniques, difficulties and sources of error in biometry and how to overcome them. 4. Describe methods and techniques for assessment of a patient with glaucoma, how these can distinguish different forms of glaucoma, and standard protocols for the medical and surgical (including laser) treatment and monitoring of glaucoma. 5. Describe methods and techniques for assessment of a patient with medical retinal diseases, including diabetic retinopathy and ARMD, how these methods can distinguish different forms of medical retinal disease, and standard protocols for the medical and surgical (including laser) treatment of these conditions. 6. Describe the use of statistics and test-retest variability in monitoring disease progression. 7. Appraise initiatives such as UK Vision Strategy for reducing incidence of avoidable blindness, and understand how these may be implemented. 8. Describe registration for vision impairment and severe vision impairment, impact of vision loss on patients' health and wellbeing, and know pathways for assessment and delivery of low vision rehabilitation.	1.1.1 1.1.4 1.1.5 1.1.3 1.1.6 1.1.10 2.2.3 2.2.4 2.2.7 2.2.9 3.2.4 3.1.6 3.2.3 1.1.9 3.1.4

Topic	Assessment and Monitoring of Ophthalmic Disease [20 credits]	GSP reference
	9. Describe UK initiative for genome-wide association studies (GWAS) screening and the ethical considerations of family phenotyping that are essential for translation of novel therapies yet may not have immediate therapeutic benefit to a patient. 10. Critically reflect on how their personal communication skills have developed to support high-quality, patient centred care. 11. Critically appraise the assessment and management needs of particular specialist populations in Ophthalmic and Vision Sciences, to include the challenges of ageing, dementia, culture and language.	
Technical and clinical skills	**The Years 2 and 3 work-based learning outcomes can be found in module OVS(ix): Work-based Learning and further details can be found in the work-based syllabus.**	

Year 3
OVS(v): Ophthalmic Pharmacology
[10 credits]

Topic	Ophthalmic Pharmacology [10 credits]	GSP reference
Learning objective	The aim of this module is to provide students with an understanding of the principles of pharmacology, drugs used for the investigation and treatment of ophthalmic disease, and the interaction of some of these drugs with the function of the autonomic nervous system. The module will also provide students with a background in the chemical nature of biological reactions to support their understanding of pharmacology and the biological processes of diseases affecting the eye.	
Knowledge	On successful completion of this module the student will: 1. Explain the categories of drugs used for the assessment, diagnosis and treatment of eye diseases, and describe the commonly used drugs and their modes of action. 2. Describe different forms of preparation and composition of drugs, routes of administration, and how topically applied drugs penetrate into the eye and are absorbed systemically. 3. Explain the principles of drug adverse effects and describe common ocular and systemic adverse effects of commonly used ophthalmic drugs. 4. Explain the regulations for prescription, supply and administration and storage of drugs. 5. Discuss the principles of patient concordance and compliance.	3.1.6 3.1.7 2.3.1 2.2.7 1.1.10 1.1.5 1.1.4
Technical and clinical skills	**The Years 2 and 3 work-based learning outcomes can be found in module OVS(ix): Work-based Learning and further details can be found in the work-based syllabus.**	

Year 3
OVS(vi): Optional Module: students to select one 10-credit module
[10 credits]

Topic	Optional Module: Ocular Angiography [10 credits]	GSP reference
Learning objective	**Optional Module: students will choose either this or another of the four optional modules (notionally 10 credits) in order to gain further knowledge** This module will provide the student with knowledge of methods and techniques to undertake angiographic investigations with the ophthalmic patient, including angiographic imaging of the anterior and posterior segment using fluorescein sodium and indocyanine green contrast mediums. The student will also learn how to perform angiographic imaging using fundus camera and confocal scanning laser ophthalmoscope. The student will gain an understanding of anatomic concepts of angiography, angiographic principles and the clinico/pathological correlation of the angiographic image. In addition, the module will provide the student with knowledge of pharmacology of contrast medium for ocular angiography, intravenous (IV) cannulation, administration of IV contrast medium, and management of adverse reactions and anaphylaxis.	
Knowledge	On successful completion of this module the student will: 1. Describe and explain the principles and techniques for obtaining angiographic images of the anterior segment and fundus with a fundus camera and scanning laser ophthalmoscope, digital processing of images and image analysis for treatment. 2. Discuss the anatomic concepts of fluorescein and indocyanine green (ICG) angiography. 3. Discuss the physical and pharmacological properties of fluorescein sodium and ICG fluorescent contrast media. 4. Describe methods and techniques for angiographic recording. 5. Describe the process of angiographic interpretation. 6. Describe the method for IV cannulation and administration of IV contrast medium. 7. Evaluate methods and techniques for assessment of a patient with medical retinal disease, including diabetic retinopathy and ARMD, how these can distinguish different forms of medical retinal disease, and standard protocols for the medical and surgical (including laser) treatment of these conditions.	1.1.1 1.1.3 1.1.4 1.1.5 1.1.6 3.1.6 3.2.4 3.1.9 3.1.12 3.1.15 3.2.3 2.2.3 2.3.2
Technical and clinical	**The Years 2 and 3 work-based learning outcomes can be found in module OVS(ix): Work-based Learning and further details can be found in the work-based syllabus.**	

Topic	Optional Module: Ocular Angiography [10 credits]	GSP reference
skills		

Year 3
OVS(vii): Visual Electrophysiology
[10 credits]

Topic	Optional Module: Visual Electrophysiology [10 credits]	GSP reference
Learning objective	**Optional Module: students will choose either this or another of the four optional modules (notionally 10 credits) in order to gain further knowledge.** This module will provide the student with knowledge of the methods and techniques to undertake visual electrophysiological investigation of an ophthalmic patient. The student will also learn how to perform the following electrophysiology tests: VEP, ERG, EOG, and may include more specialised tests. The student will gain an understanding of the anatomic and physiological concepts of electrophysiology, electrophysiology principles and the clinico-pathological correlation of the results. In addition, the module will provide the student with knowledge of the range of equipment and electrodes used in electrophysiological testing.	
Knowledge	On successful completion of this module the student will: 1. Evaluate the differential diagnostic value of the recording of a VEP, full-field flash ERG, EOG, pattern ERG multifocal ERG and other specialised tests. 2. Discuss anatomic concepts of electrophysiological tests. 3. Describe the methods, techniques and technologies of the electrophysiology tests (VEP, ERG, EOG, pattern electroretinogram [PERG], etc). 4. Appraise the electrode types available, their characteristics and how to recognise and rectify artefacts during testing. 5. Describe the types and purposes of stimulators and their correct use. 6. Describe the possible confounding effects of factors such as co-operation or age on electrophysiology test results and know how to check response reproducibility. 7. Appraise electrophysiology test result interpretation. 8. Evaluate the likely electrophysiological consequences of a range of clinical conditions that are investigated (medical retina, neuro-ophthalmology, unexplained visual loss in children, functional vision loss).	1.1.3 1.1.4 1.1.5 1.1.6 3.1.6 3.2.4 3.1.9 3.1.12 3.1.15 3.2.3 2.2.3 2.3.2 3.1.7
Technical and clinical	**The Years 2 and 3 work-based learning outcomes can be found in module OVS(ix): Work-based Learning and further details can be found in the work-based syllabus.**	

Topic	Optional Module: Visual Electrophysiology [10 credits]	GSP reference
skills		

Year 3
OVS(viii): Low Vision
[10 credits]

Topic	Optional Module: Low Vision [10 credits]	GSP reference
Learning objective	**Optional Module: students will choose either this or another of the four optional modules (notionally 10 credits) in order to gain further knowledge.** This module will provide the student with knowledge of the methods and techniques for assessment of patients with low vision, and for training low vision patients in the use of optical and electronic low vision aids. The student will gain understanding of the impact of vision loss on the health and wellbeing of the patient, the role of rehabilitation officers and other professionals in supporting patients to develop daily living and mobility skills, and the agencies that provide financial and practical support for patients with low vision. Students will also acquire knowledge of the epidemiology of vision impairment in the UK and worldwide, the social and economic consequences of vision impairment, and national and international initiatives to reduce the incidence of preventable vision loss.	
Knowledge	On successful completion of this module the student will: 1. Explain the different forms of vision impairment, how they are assessed, and different strategies and methods for vision rehabilitation. 2. Advise patients on the use of prescribed optical and electronic low vision aids. 3. Know the criteria for registration for vision impairment and severe vision impairment and be aware of occupational standards. 4. Recognise the consequences of vision loss on the patients' health, wellbeing and social interaction, and know where to seek advice from members of the rehabilitation team or other professionals or services as appropriate. 5. Critically reflect on how personal communication skills have developed to support high-quality, patient centred care. 6. Describe the range of resources available to support individuals with visual impairment in education and the workplace. 7. Appraise the role of social services and other agencies that provide financial and other support to patients with vision impairment. 8. Know the epidemiology of vision impairment in the UK and worldwide, the social and economic	1.1.1 1.1.3 1.1.4 1.1.5 1.1.6 3.1.6 3.2.4 3.1.9 3.1.12 3.1.15 3.2.3 2.2.3 2.3.2 3.1.7 3.1.10 3.1.4 3.1.5

Topic	Optional Module: Low Vision [10 credits]	GSP reference
	consequences of vision impairment, and national and international initiatives to reduce the incidence of preventable vision loss. 9. Explain how statistics about visual impairment and Low Vision Assessment (LVA) provision are gathered and how these data are stored, accessed and may be used.	2.1.6 1.2.1 1.1.2
Technical and clinical skills	**The Years 2 and 3 work-based learning outcomes can be found in module OVS(ix): Work-based Learning and further details can be found in the work-based syllabus.**	

Years 2 and 3
OVS(ix): Work-based Learning
[30 credits]

Topic	Work-based Learning [30 credits]	GSP reference
Learning objective	The overall aim of the work-based learning over two years is to ensure each student gains sufficient patient-facing experience to provide the transferable skills and attitudes that ensure the student can undertake the breadth of practice expected of a newly qualified HCSP in Ophthalmic and Vision Practice. The learning outcomes within the module will: • encourage the student to identify and develop the individual skills required for high-quality, patient-centred, safe and efficient clinical practice that respects the needs of both patients and the organisation; • enable the student to translate and apply their specialist knowledge as they learn to perform a range of technical skills in clinical practice. The work-based learning topics are some examples of the practical application of the underpinning modular learning themes. Throughout the work-based learning the student is encouraged to reflect on past and current learning and focus on how they may develop the requisite patient-oriented, practical, technical and organisational skills to successfully apply and report Ophthalmic and Vision Science assessments. It is anticipated that the student at this level will be operating mainly under supervision ***Note: Work-based training in Years 2 and 3 does not have to be confined only to the work base. However, while elements may be taught in other environments, e.g. a clinical skills laboratory or simulation centre, it is expected that all students will spend the majority of their time in a clinical environment within a healthcare setting.***	
Knowledge	On successful completion of this module the student will understand the ophthalmic patient pathway and the roles of the MDT in general and specialist clinics. They will gain knowledge and apply local protocols of clinical governance, patient safety and infection control. Within a patient-centred environment the student will be able to instruct and prepare patients to perform a battery of visual function tests successfully. The student will have the practical skills and knowledge to acquire optimised results from the routine tests. They will be able to present these outcomes meaningfully in a technical report that informs the clinical consultation and subsequent management decisions of the wider clinical team.	

Topic	Work-based Learning [30 credits]	GSP reference
Technical and clinical skills	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 will be able to: **Assessment of the ophthalmic patient** 1. Gather an ophthalmic patient history to assist with diagnosis and treatment planning. 2. Instill eye medication for the purpose of investigation or treatment.[1] This is likely to be under a local Patient Group Direction (PGD) group directive and/or check patient compliance with their ocular medication regimen. 3. Clinically examine the anterior segment of the eye and ocular adnexae, and assessment of pupil responses using a torch or slit lamp. 4. Measure intraocular pressure and pachymetry.[2] 5. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*. *[1]Individuals performing such instillation must have relevant authority or may work under supervision. They should ensure that a current drug history has been obtained from the patient prior to administration.* *[2]It may include other more specialised procedures such as measurement of ocular blood flow and tonography.* **Assessment of the visual field** 1. Perform investigations to test the visual field, including automated and non-automated static and kinetic perimetry, and tests for central field. 2. Perform a range of investigations to measure the dimensions of the eye, including corneal thickness and curvature, anterior chamber depth, axial length and pupil diameter used for the clinical management of patients undergoing cataract or corneal refractive surgery and the management of glaucoma. 3. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*. **Structural measurements of the eye** 1. Measure the dimensions of the eye, including corneal thickness and curvature, anterior chamber depth, axial length and pupil diameter. These measurements may be used for the clinical management of patients undergoing cataract or corneal refractive surgery and the management of glaucoma.	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7 1.1.10 1.2.1 1.2.5 3.1.7 3.1.11 3.1.10 2.2.3 2.2.4 3.2.2 2.1.3 3.1.4

Topic	Work-based Learning [30 credits]	GSP reference
	2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*. **Imaging the eye using light or lasers** 1. Obtain images of the eye and supporting structures using light or lasers. 2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*. **Optional modules (students to select one module)** **Angiographic imaging of the eye using contrast media** 1. Obtain angiographic images of the eye using contrast media. 2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*. **Assessment of the electrophysiological function of the visual system** 1. Assess electrophysiological function of the visual system. 2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*. **Low vision** 1. Advise in the use of optical and electronic low vision aids and/or suggest home/work environmental modifications. 2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.	

SECTION 9: INDICATIVE CONTENT: KNOWLEDGE

9.1 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 healthcare science 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 Medicines and Healthcare products Regulatory Agency (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 issue
- Develop and maintain appropriate coping mechanisms for a range of potential issues, including stress, and seek help if appropriate and evaluate 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, 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 using 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 limits work or stops 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
- Adapting 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 being 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 healthcare science
- 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

9.2 Division-theme modules

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

NS(i): Applied Physics and Measurement

- Atomic structure: the Bohr atom, charge, concept of free electrons, isotopes
- Electricity: current, potential difference, resistance, Ohm's Law, resistivity, capacitors, rectification, circuits with resistors and capacitors, AC/DC, period, RMS values, static and dynamic instrument characteristics, measurement errors
- Magnetism and electromagnetism: induction, electromagnetic radiation
- Light and lasers: electromagnetic spectrum, wave and quantum theories, polarisation, lasers, refraction, reflection
- Sound and ultrasound: wave formation, simple harmonics, propagation, transmission through different media, diffraction/scatter, absorption, frequency, amplitude, velocity, acoustic interface and impedance, intensity, gain, decibel scale, measurement of sound
- Fluid flow through tubes: Poiseuille's Law, laminar and turbulent flow

- Body mechanics: limb movement and levers, BMR, energy power and work
- Statistics: descriptive, sampling, distribution, parametric/non-parametric, errors, variance, logarithms, graphs: use of in clinical practice
- Safety relating to all aspects of applied physics, i.e. electrical, ionising radiation, MRI, electromagnetic radiation

NS(ii): Applied Anatomy, Physiology and Pathophysiology

Overview of nervous system

- Organisation, structure and functions of the nervous system
- Histology of nervous tissue
- Electrical signals in neurons: biopotentials; resting potentials; action potentials (neurone type, characteristics, propagation)
- Signal transmission at synapses, neurotransmitters
- Sensory, integrative and motor functions of the nervous system, afferent and efferent pathways, reflex vs voluntary activity

Central nervous system

- Anatomical components of the brain and their functions: brainstem (medulla, pons and mid brain); cerebellum; diencephalon (thalamus and hypothalamus); cerebrum (limbic system, basal ganglia, cerebral hemispheres, lobes, cerebral white matter); cranial nerves
- The ventricles of the brain, brain membranes (meninges), CSF circulation, blood–CSF barrier
- Blood supply to the brain and blood–brain barrier
- Brain waves, principles of electroencephalography
- Anatomical components and functions of the spinal cord

Peripheral nervous system

- Structure and function of the autonomic nervous system
- Structure and function of the somatic nervous system, somatic motor and sensory pathways, common peripheral nerves
- Histology and function of skeletal, smooth and cardiac muscle
- Excitation-contraction coupling of skeletal, smooth and cardiac muscle
- Motor units and receptors, comparison of smooth and skeletal muscle contraction
- Common muscle groups

The ear

- Anatomy of ear, including outer, middle and inner ear (osseous labyrinth and membranous labyrinth)
- Afferent, efferent auditory pathways, cranial nerves with specific emphasis on vestibular-cochlear nerve
- Neural coding, including the generation of action potentials and synaptic transmission
- Hair cell and cochlear nerve physiology and sound transduction
- Overview of pathophysiology, clinical and practical aspects of central, peripheral and vestibular disorders

The visual system

- Anatomy of the eye and ocular adnexae, including: lacrimal apparatus, orbit, extraocular muscles, eyelids, conjunctiva, cornea, sclera, trabecular meshwork, iris, ciliary body, lens, vitreous, retina, choroid and optic nerve head, cranial nerves pupil extra-ocular muscle, facial nerve
- Physiology of the eye and ocular adnexae, including: production and drainage of tears, production and drainage of aqueous humour, pupil responses, retina receptor functioning and neural processing
- Optical functions of the eye: cornea, lens, accommodation, errors of refraction
- Visual pathway: optic nerve, chiasm, optic tract, optic radiation, visual cortex
- Visual perception: visual acuity, colour vision, field of vision

NS(iii): Clinical Measurement and Treatment

This module centres on the importance of patient-centred care, quality management and patient safety and the steps that can be taken within the Neurosensory Sciences to facilitate this policy. Patient-centred communication methods and media, both within the educational environment and the workplace are a focus of this module.

Audiology

- Investigations and procedures carried out in the diagnosis, treatment and rehabilitation of hearing disorders
- Physiological measurement systems in the evaluation of hearing and balance
- Reasons for referral
- Analysis of patient needs

Neurophysiology

- Investigations and procedures carried out in the diagnosis and treatment of neurological disease
- Physiological measurement systems in the evaluation of brain and nervous system function
- Reasons for referral

- Analysis of patient needs

Ophthalmic and Vision Science

- Investigations and procedures carried out in the diagnosis and treatment of disorders of the visual system
- Physiological measurement systems in the evaluation of vision
- Reasons for referral
- Analysis of patient needs

NS(iv): Applied Physiological Measurement and Instrumentation

Instrumentation

- Electronic circuits: definition, basic concepts
- Amplifiers: power supply, gain, dynamic range, single-ended, differential, common mode rejection ratio (CMRR), internal impedance, source impedances, impedance matching
- Noise: biological, non-biological, random, deterministic, methods of noise reduction (e.g. screening, buffer amplifiers, active cancellation, twisted pairs, filters, averaging), signal-to-noise ratio, Fourier analysis
- Filters: active, passive, digital, frequency response, corner frequency, bandwidth, advantages, disadvantages
- Digitisation: AC/DC, DC/AC, sampling theories, x-resolution, y-resolution, aliasing, sampling skew
- Computer acquisition, analysis of data, storage and archiving
- Different type of biological and non-biological artefacts
- Non-biological: electrical interference; electrode
- Biological: movement; myogenic potentials; physiological factors, i.e. pulse; respiration; sweat; sway; eye movement
- Principles of calibration and maintenance of test equipment following national and international standards

Imaging

- Techniques: ultrasound, X-ray, computed tomography (CT), MRI, isotopes, laser, biological hazards, safety

Basic principles and methods of electrophysiology

- Biological generation of electrical fields
- Signal detection theory
- Electrodes
- Recording techniques
- Electrophysiology measures, i.e. cochlear, visual, brain and nerve pathways

- Stimulation

Basic principles and methods of psychophysics, psychoacoustics and sound perception

- Vision and somatosensory
- Principles of thresholds
- Stimulus/response
- Detection threshold
- Discrimination, resolution
- Travelling wave theory
- Tuning curves
- Application to audiological measurements:
  - acoustic reflexes
  - loudness and intensity coding

9.3 Specialist Modules for Audiology

A(i): Audiological Science

- Process of adult aural rehabilitation, including:
  - a patient-centred relationship, the role of behavioural change in managing chronic illness/disability, and the identification of the learning needs of patients
  - the role of rehabilitation and counselling
  - particular needs of hearing impaired groups (deafness vs hearing impairment, dual and multisensory impairment, communication disability, tinnitus)
  - communication skills of practitioners working with hearing impaired people
  - communication disability and its impact on hearing impaired peoples' lives
  - technological needs of hearing impaired people
  - hearing impairment in the context of the World Health Organization International Classification of Functioning, Disability and Health (WHO ICF)
  - goal setting and outcome measures in rehabilitation
- Psychophysical methods and the psychophysics of hearing and perceptual effects of deafness
- Models of pitch perception and frequency selectivity; the perception of loudness, masking, temporal processing and the perceptual effects of binaural stimulation

- Speech production and speech perception
- Clinical assessment of auditory function, appropriate selection of test strategy, test procedures and interpretation of results according to recommended clinical procedures, including BSA/BAA recommended procedures. Test procedures include:
  - perform and interpret tuning fork tests
  - perform and interpret pure tone audiometry
  - uncomfortable loudness levels
  - Stenger test
  - acoustic admittance tests
  - speech audiometry
  - otoacoustic emissions and evoked response audiometry
- Hearing aid provision and patient/client pathways, including the NHS and commercial sector:
  - the role of hearing aid provision within a patient management plan
  - impression taking: ear mould acoustics, selection and modification
  - hearing aid types, technology and performance, including routine and specialist aids; features of hearing aids; assessment of candidacy for hearing aids
  - selection, fitting and verification of hearing aids, including prescription formulae, real ear measurements and objective/subjective testing of hearing aid performance
  - assistive devices, including loop systems and FM systems
  - evaluation and follow-up of hearing aid fitting, including outcome measures, problem solving, fine tuning, maintenance and servicing, with reference to the patient management plan
- Calibration and maintenance of auditory test equipment following national and international standards
- Advanced hearing aids, to include:
  - features of hearing aids; signal processing (compression, multichannel processing, feedback suppression, noise reduction algorithms, directional microphones); outcome measures
  - recent developments in hearing aid technology
  - hearing aids for specialist groups (e.g. learning difficulties, severe to profound losses, tinnitus, etc.)
  - clinical decision making
- Epidemiology of hearing/balance disorders and tinnitus, to include: population demographics: age, gender, socioeconomic status, ethnic background
  - public health problems related to demography

- prevalence of hearing/balance disorders and tinnitus in relation to demographic characteristics (including age, gender, socioeconomic status, ethnic background)
- Prevention of common disorders
- Health screening and application to hearing/balance/tinnitus
- Health education principles to improve health of the population, related to hearing/balance/tinnitus
- Psychosocial aspects of hearing loss, to include:
  - communication needs of hearing impairment people (lip-reading, communication skills training, assertiveness training, hearing tactics); involvement of significant others
  - impact on family, social relationships and employment
  - implications for mental health and wellbeing
  - societal attitudes to disability

A(ii): Audiological Science

- Patient-centred care:
  - critical appraisal of the assessment and management needs of particular specialist populations in Audiology, to include the challenges of ageing, dementia, culture and language
  - critical reflection of personal communication skills to support high-quality, patient-centred care

Specialist hearing instruments

- Referral criteria and pathways for consideration of specialist hearing instruments and/or implantation
- Range of specialist hearing devices and their advantages and disadvantages
- Assessment processes, including audiological, psychosocial, psychological, communication needs of hearing impaired adults and children
- Speech testing
- Assistive technologies
- Benefit and outcomes

Introduction to tinnitus

- Epidemiology of tinnitus
- Theories of tinnitus generation and perception
- Pathophysical/pathophysiological aspects of tinnitus
- Methods of assessment and evaluation of tinnitus

- Psychosocial effects of tinnitus
- Psychological management of tinnitus
- Role of amplification and sound therapy in tinnitus management
- Stress management and relaxation therapies
- Drug therapies in tinnitus management

Paediatric assessment

- Normal developmental milestones in hearing in children, including the development of communication, speech and language, motor control and social development
- Distraction and performance testing
- Visual reinforced audiometry
- Co-operative and McCormack toy tests:
  - essential components history from parent/carer
  - the role of the first tester and the second tester
  - different test stimuli and conditioning techniques
  - determination of audible levels
  - recognise errors
  - how to use dB (A); dB (SPL); correction factors
  - different services involved in the care of children with hearing impairment
- Management options for hearing impaired children

Vestibular assessment

- Anatomy, physiology, pathophysiology of the vestibular system
- Essential component of history taking and their relationship to pathology set-up/calibration of equipment
- Infection prevention and control and health and safety issues
- Routine tests of vestibular function and balance – oculomotor testing, caloric, positional, vestibuloocular reflex testing ‘office’ and ‘bedside’ testing
- Assessment and treatment of benign paroxysmal positional vertigo (BPPV)
- Vestibular rehabilitation
- Interpretation of assessment findings
- Management of vestibular disorders, vestibular rehabilitation, stress management, relaxation therapies and drug therapies

9.4 Specialist Modules for Neurophysiology

N(i): Pathophysiology of the Central and Peripheral Nervous System

- Cell biology, immunology, microbiology and genetics related to disease processes
- Immunology
- Innate immunity:
  - physical
  - chemical and cellular (including skin, mucous membranes, cilia, connective tissue, inflammation, natural killer cells, acute phase proteins, complement, interferons, fever)
- Adaptive immunity:
  - humoral
  - cellular
  - naturally acquired
  - artificially acquired
- Specialist immunoglobulins:
  - types
  - structures and functions
  - antigens
  - epitopes
  - haptens
  - detection and measurement
- Essential cells and their roles:
  - macrophages
  - neutrophils
  - monocytes
  - B-cells
  - T-cells
  - dendritic cells
  - self and non-self
  - clonal selection theory

    - central and peripheral lymphoid tissues
    - tolerance
    - autoimmunity
- Hypersensitivities: types I, II, III, IV and V allergic reactions
- Transplant immunology:
    - types of graft
    - histocompatibility
    - graft rejection
    - immunosuppression
- Immunodeficiency, e.g. HIV
- Neoplasia: tumour immunity, immunotherapy
- Diagnosis:
    - immunohistochemistry
    - immunocytochemistry
    - production of monoclonal and polyclonal antibodies
    - labelling techniques for the identification of organisms, tissues, receptors or chemicals
- Treatment:
    - antibodies
    - gamma globulins
    - serum therapy
    - vaccination
    - production of vaccines
    - adjuvant
    - administration

N(ii): Clinical Neurophysiology I

In this module students will build on the Year 1 learning and begin detailed learning that underpins the following routine practical techniques.

- Recording of the EEG:
    - electrode placement systems

    - use of machine controls
    - application of localisation techniques to EEG practice
    - sources of artefact and elimination
    - quality assurance processes
- Activation procedures, their effect on the EEG and indications/contraindications for their use:
    - hyperventilation
    - photic stimulation
    - sleep:
        - sleep deprivation
        - drug-induced sleep
- The effects of the EEG on patient safety and the effects of drugs on the EEG
- How to obtain a clear and concise patient history
- The origin of the EEG and its maturation from paediatric to adult
- The normal phenomena and normal variants in the awake and sleep EEG:
    - the normal EEG from paediatric to adult
    - normal waveforms – awake and sleep
    - normal variants
    - waveform annotations
- The effect of stimulus characteristics on the visual evoked potential:
    - contrast
    - luminance
    - check size
    - field size
- The recording of a VEP:
    - electrode placement
    - electrode impedance
    - artefacts and their elimination
    - patient vigilance
    - waveform reproduction
    - monitoring input signal
- The major components of a normal pattern reversal VEP:

    - latency
    - amplitude
    - morphology
    - inter-ocular latency difference
- Derivation and montage design:
    - bipolar derivation
    - common reference derivation
    - common average reference derivation
    - source derivation
    - montage design
- Electrode characteristics
- Components of a digital EEG machine and post signal acquisition of data:
    - schematic of digital EEG machine
    - post-signal acquisition:
        - re-montaging:
            - sampling skew
            - basic Fourier analysis
- The components of an evoked potential (EP) system and their function:
    - schematic of EP machine:
        - signal averaging
        - artefact rejection
- The recording parameters used for VEPs, AEPs and SSEPs and the reason for their use:
    - high frequency filters
    - low frequency filters
    - sensitivity
    - time base
- The function of stimulators used in clinical neurophysiology:
    - visual pattern stimulators
    - visual photic stimulators
    - auditory stimulators
    - electrical stimulators

- the internal and external calibration on equipment used in clinical neurophysiology to national standards as specified by the Association of Neurophysiological Scientists (ANS)
- EEG machine

N(iii): Clinical Neurophysiology II

- Neuroanatomy and physiology and pathophysiology
- Major and subdivisions of the brain
- Peripheral nervous system: cranial and peripheral nerves, neuropathies and myopathies, roots and muscles
- Embryology: neural tube, origins of neurones and glia, neural crest, cell migration, formation of brain and spinal cord, myelination
- Cerebral circulation: control of cerebral circulation, effect of altered blood gases, measurement of cerebral blood flow, CSF production, constituents, circulation and pressure
- Control of consciousness, reticular activating system, sleep/wake circulation, influence of brainstem, levels of consciousness defined by electroencephalogram
- Functions of subcortical structures: extrapyramidal and pyramidal systems, cerebellum and related pathways, disorders of movement
- The adult EEG and recording of other physiological variables and common adult EEG abnormalities:
  - waveform measurement and annotation
  - effect of stimuli or activation techniques on the EEG
  - common adult EEG abnormalities
  - generalised
  - focal
  - repetitive/intermittent
  - localisation of abnormalities
  - polygraphy – respiration, movement, ECG, eye movement
- Factual report and the interpretation of the EEG
- VEP, AEP and SSEP and the annotation of the waveforms
- VEP and interpretation of abnormal findings
- Neurological conditions, their pathology and treatment:

    - epilepsy classification
    - treatment
    - infective
    - degenerative
    - cerebrovascular
    - space-occupying lesion (SOL)
    - metabolic
    - demyelinating conditions
    - non-organic disorders
- Psychology of disease
- Psychosocial
- Psychological

9.5 Specialist Modules for Ophthalmic and Vision Science

OVS (i): Visual System in Ocular and Systemic Disease and Detection of Pathology by Clinical Assessment
Basic principles of health, disease, illness, wellbeing, epidemiology, disease screening, including diabetic retinopathy screening

- Embryology of the eye
- Principles of pathological processes applied to diseases of the visual system
- Diseases and disorders of eye, ocular adnexae and visual pathway
- Systemic diseases with ocular manifestations, e.g. diabetes, cardiovascular disease, thyroid disease, giant cell arteritis, sarcoidosis, rheumatoid arthritis and other autoimmune diseases, multiple sclerosis, herpes zoster, AIDS, blood dyscrasias and metastatic carcinomas
- Common congenital and hereditary disorders affecting the visual system

Assessment of the ophthalmic patient

- The rights, expectations and needs of patients with sensory impairment, children and other patients with special needs
- Purpose and procedures for taking a patient history

- Comprehensive ophthalmic examination, including external examination of ocular adnexae and assessment of tear production and patency of nasolacrimal passage, assessment of pupil size and reactions, examination of anterior segment with a slit lamp, fundus examination and tonometry
- Common refractive errors and how they are assessed and corrected with spectacles:
  - accommodation for hyperopia and near vision tasks and the need for additional refractive correction of presbyopia or near working distance required for some vision test
  - neutralisation of spectacles by focimetry to determine the spectacle prescription
  - the use of a pinhole and assessment of LogMAR distant and near visual acuity
  - advantages of LogMAR, its relationship to the historical Snellen acuity and the nomenclature used in different countries, e.g. 20/20, 6/6, decimal percentage, etc.
- Different methods of direct and indirect ophthalmoscopy
- Purpose and methods for ophthalmic triage, immediate management of ophthalmic emergencies, including chemical burns, penetrating or severe blunt trauma, sudden painless loss of vision, acute rapid onset of pain or discomfort
- Principles and measurement of visual fields using static and kinetic perimetry, manual and automated perimeter and the relationship of the test chosen to specific visual pathway pathology, e.g. glaucoma

OVS (ii): Ophthalmic Imaging and Measurement

Imaging of the posterior segment

- Fundus cameras: instrumentation, technique, focusing, difficulties and troubleshooting, artefacts, principles of angiography, use of filters, digital processing, principles of brightness, saturation and hue, additive and subtractive colour mixing/colourimetry, fundus autofluorescence
- Optical coherence tomography: principles of low coherence interferometry, instrumentation, techniques, image acquisition, presentation and analysis, artefacts and troubleshooting, clinical applications and interpretation
- Scanning laser ophthalmoscopy: confocal principle, instrumentation, image acquisition, presentation and analysis, artefacts and troubleshooting, clinical applications and interpretation
- Scanning laser polarimetry: principles of polarisation and birefringence, instrumentation, image acquisition, presentation and analysis, clinical applications and interpretation, limitations, artefacts and troubleshooting
- Ultrasonography: principles of ultrasound, A- and B-scan modalities, clinical applications

Imaging of the anterior segment

- Principles and methods to include slit lamp photography, OCT, Scheimpflug imaging

Measurement of ocular structures

- Pachymetry and biometry

Data management and processing

- Computer acquisition, analysis, storage, and disposal of ophthalmic imaging and measurement data

Technological developments in the field

- Optical coherence tomography (OCT)
- Angiography,
- Femtosecond laser cataract surgery
- Multifocal and toric intraocular lenses

OVS (iii): Neurophysiology of Vision and Vision Assessment

- Visual functions, including visual acuity and contrast sensitivity, visual field, colour vision, dark adaptation and motion detection, and the neural structures and pathways that serve these functions
- Principles and methods for assessment of visual functions
- Disease processes of the visual pathway and their effect on visual functioning
- Spatial localisation and mapping of the visual field, concept of scotoma, principles of static and kinetic perimetry, manual and automated perimetry
- Ocular movement: versions and vergence eye movements, higher motor control systems, efferent pathways, binocular reflexes, fusion and stereopsis, visual development
- Disorders of visual development and binocular vision, including squint, suppression and amblyopia
- Principles and methods for assessment of ocular movement and binocular vision, and assessment of visual acuity in children

OVS (iv): Assessment and Monitoring of Ophthalmic Disease

- Assessment of patient with cataract, including symptoms and types of cataract, methods of cataract surgery, assessment of visual acuity and effects of glare, principles and techniques of biometry with A-scan ultrasound and optical coherence interferometry and determination of power of intraocular lens insertion
- Assessment of patient with glaucoma: tonometry, different methods for assessment of anterior chamber angle,

different methods for performing pachymetry and the relationship between corneal thickness and tonometry, assessment of retinal nerve fibre layer thickness and optic disc, assessment of visual field, use of different assessments for long-term monitoring of glaucoma patient, different treatments for glaucoma

- Assessment of patient with medical retinal disease, to include assessment of macular function and imaging of the retina, and protocols for monitoring of medical retinal disease, including diabetic retinopathy and ARMD
- Prevalence of vision impairment in UK and initiatives for reducing the incidence of avoidable blindness, registration of patients with vision impairment and severe vision impairment, impact of vision loss on patients' health and wellbeing, methods for assessment and delivery of low vision rehabilitation
- Genome-wide association studies (GWAS) and the ethical considerations of family phenotyping that are essential for translation of novel therapies yet may not have immediate therapeutic benefit to a patient

OVS (v): Ophthalmic Pharmacology

- Cholinergic and adrenergic receptors and neurotransmission in the eye
- Categories of drugs used in ophthalmic practice
- Drug preparations, administration, absorption and penetration into the eye
- Systemic and topical drug adverse effects: side effects, toxicity and allergy
- Regulations for prescription, supply and administration and storage of ophthalmic drugs
- Patient concordance and compliance

OVS (vi): Optional Modules

Ocular Angiography

Angiographic imaging of the posterior segment

- Fundus camera and scanning laser ophthalmoscope: instrumentation, technique, focusing, difficulties and troubleshooting, artefacts, principles of angiography, use of filters, digital processing
- Scanning laser ophthalmoscopy: confocal principle and its application in angiography. Still and video angiographic technique
- Fluorescein and ICG angiography of the ocular fundus

Angiographic imaging of the anterior segment

- Principles and methods of fluorescein and ICG angiography

Measurement of ocular structures

- Identification of lesions and measurement for Age-related Macular Degeneration (ARMD) therapy

Visual Electrophysiology

Electrophysiological assessment of visual function

- VEP, ERG, PERG EOG: instrumentation, techniques, difficulties and troubleshooting, normal findings, artefact reduction, principles of electrophysiology
- Patient preparation: electrode selection, correct positioning and application, removal and sterilisation
- Test selection and protocols: consider clinical question, patient age, co-operation and ability

Data preparation for reporting

- Annotate recordings with relevant settings, clinical status, etc.
- Prepare data to provide factual assessment of the results

Low Vision

- Causes and forms of vision impairment and strategies and methods for vision rehabilitation
- Assessment of vision in low vision patient, including visual acuity, contrast sensitivity, field of vision
- Types of optical and low vision aid and training of patients in their use
- Criteria for registration for vision impairment and severe vision impairment
- Impact of vision loss on health, wellbeing and social interaction of patients
- Rehabilitation for vision impairment, including mobility and daily living skills, and role of professions and social agencies
- Epidemiology of vision impairment, economic and social consequences, initiatives to reduce incidence of preventable blindness
- How statistics about visual impairment and LVA provision are gathered and how these data are stored, accessed and how these data may be used

SECTION 10: WORK-BASED SYLLABUS: NEUROSENSORY 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	Physiological Sciences
THEME	**Neurosensory Sciences**
SPECIALISM	Audiology
SPECIALISM	Neurophysiology
SPECIALISM	Ophthalmic and Vision Science

10.1 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 HCS 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 Neurosensory Sciences and their contribution to healthcare and multiprofessional teams.

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	Control infection risks in accordance with departmental protocols, always washing hand 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 importance of introducing yourself and your role as a student HCSP as part of the process of introduction and consent. • The principles of effective communication, including written and electronic, verbal and non-verbal. • The importance of ensuring the patient is aware of the role of the member of the HCS workforce. • 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.
1	Work professionally in the workplace at all times.	• *Good Scientific Practice*.

10.2 Introduction to Neurosensory Sciences

MODULE	Introduction to Neurosensory Sciences	Component	Division-Theme Year 1
AIM	The aim of this module is to introduce to the workplace and enable the student to apply the knowledge and skills they have gained in the modules 'Applied Physics and Measurement'; 'Applied Anatomy, Physiology and Pathophysiology'; and 'Clinical Measurement and Treatment'. Students will be expected to assist in performing some routine skills and develop and build their professional practice.		
SCOPE	On completion of this module the student will be able to assist in a range of routine investigations and use effective communication skills with patients, colleagues and other members of the department. They will also be expected to adhere to health and safety procedures and work safely in the workplace, adhering to the NHS trust procedures and governance, including the Data Protection Act.		

LEARNING OUTCOMES

On successful completion of this module the student, under direct supervision, will:

1. Observe and, where practically possible, assist with routine adult diagnostic investigations in Audiology, adhering to departmental and trust procedures.
2. Observe and, where practically possible, assist with routine repairs in an adult hearing aid repair clinic.
3. Observe and, where practically possible, assist with preparing the environment, set-up and calibration of equipment ready for routine EEG recordings.
4. Observe and, where practically possible, assist with visual acuity testing.
5. Observe and, where practically possible, assist with either OCT or fundus photography.
6. Observe and, where practically possible, assist with preparation and set up for routine adult visual electrophysiological investigations (VEP, ERG, EOG).
7. Adhere to standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

Audiology

- Observe the assessment of children ≥5 years of age, including otoscopy, not-masked and masked pure tone audiometry, and discuss how your professional practice and communication skills should be adapted when working with children and their families.
- Observe a paediatric hearing assessment and explain the test requirements to your training officer.

Ophthalmic and Vision Science

- Observe visual field testing in a range of patients and discuss how this investigation is used in the diagnosis and monitoring of patients with diseases of the visual system.

Audiology, Neurophysiology, Ophthalmic and Vision Science

- Observe the range of procedures undertaken in each department and identify examples of good practice with respect to professionalism and patient-centred care.
- Attend a multidisciplinary meeting and reflect on the way the MDT contributes to the care of patients referred to one of the departments in which you are placed.
- Observe the work of the HCS workforce and how it contributes to the patient pathways relevant to Audiology, Neurophysiology, and Ophthalmic and Vision Science, and discuss this 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	Control infection risks in accordance with departmental protocols.	• 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 NHS trust requirements.
1, 2, 3, 4, 5	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, 2, 3, 4, 5	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 summarising in communication.
1, 2, 3, 4, 5	Review a suitably completed appointment request, collect the patient from the waiting area, greet the patient, and check the patient ID and demographics details.	• Referral routes for neurosensory diagnostic investigations. • Requirements for correct completion of request forms and how to validate. • The importance of checking and confirming the patient identity and the implications of not doing so.
1, 2, 3, 4, 5	Assist in preparing the environment, setting up and calibrating equipment ready for use for each type of investigation.	• Range of equipment used, relative merits and principles of measurement. • Requirements for the investigation environment to ensure privacy, dignity and comfort of the patient. • Recognition of the errors or potential risks of using defective equipment in clinical practice and the implications of use. • Identification of common faults and remedial action.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• Current safety standards, including safety testing and routine maintenance. • Preparation and calibration of equipment. • Manufacturer and local protocols for equipment used.
1, 2, 3, 4, 5	Treat the patient in a way that respects their dignity, rights, privacy and confidentiality.	• The rights of the patient with regard to consent for treatment and confidentiality of consultation and medical records. • Key factors influencing dignity, rights, privacy and confidentiality, including age, gender, culture and beliefs. • Correct position of the patient, ensuring comfort, co-operation and optimal investigation results. • The impact of incorrect positioning or non-co-operation on investigation results.
Adult Diagnostic Assessment		
1	As appropriate, assist with the room preparation for adult and paediatric patient appointments.	• Requirements for the room for adult and paediatric patients.
1	Assist with the calibration of an audiometer.	• Standard operating procedures (SOPs). • How to calibrate an audiometer.
1	Assist with the calibration of a tympanometer.	• SOPs. • How to calibrate a tympanometer. • Common disorders of the middle ear.
1	Assist with transducer placement for not-masked pure tone audiometry (PTA) on an adult patient.	• SOPs. • Positioning of a transducer for not-masked PTA.
1	Practice PTA on an adult volunteer.	• SOPs. • How to perform a PTA • Communication strategies.
Adult Hearing Aid Repair Clinic		

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
2	In an adult hearing aid repair clinic, under direct supervision, assist with repairs, for example like-for-like replacement of battery, life tubes and domes.	• SOPs. • Communication strategies. • How to replace a battery. • How to replace tubes and domes.
2	Fit life tube, domes and re-tube an ear mould, adjusting size to fit ear using spare unassigned ear moulds, plastic ears or volunteers.	• SOPs. • Communication strategies. • How to measure and fit life tubes, domes and re-tube and ear mould and adjust to fit.
2	Under direct supervision perform otoscopy on volunteers.	• SOPs. • Indications and contraindications for otoscopy. • How to perform otoscopy.
2	Under direct supervision take an aural impression from a plastic ear.	• SOP. • Indications and contraindications for aural impressions. • How to take an aural impression.
2	Perform listening checks of hearing aids as part of routine hearing maintenance and checks.	• SOP. • How to do listening checks. • How to identify a faulty hearing aid.
Neurophysiology		
3	Assist in preparing the room for routine EEG recordings.	• SOP. • Room set-up for routine EEG recordings.
3	Assist in setting up and calibrating equipment for routine EEG recordings.	• SOP. • How to set up and calibrate the equipment used for EEG recording.
Ophthalmic and Vision Science		
4	Observe and assist where possible, on a volunteer adult subject: • Snellen or logMAR visual acuity	• Relevant protocols and SOPs for the investigations to be performed. • Anatomy and physiology of the eye and visual pathway. • Range of clinical conditions that can cause reduced visual acuity or

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	for distance and near with and without optical correction; • Ishihara colour vision test.	colour vision and the relevance of the tests listed below to these conditions: ○ visual acuity (e.g. cataract, maculopathy, optic nerve disease); ○ colour vision (e.g. optic nerve disease, congenital colour vision defects).
4	Write acuity measures using correct notation. Compare with UK car DVLA requirements for class 1 driving licence.	• Correct documentation and the importance of accuracy, legibility and completeness. • Statutory provisions for patients with vision impairment.
5	Observe and assist, under direct supervision, either OCT or fundus photography.	• Range of imaging modalities used to investigate, diagnose and monitor ophthalmic diseases. • How to ensure consistent and reproducible image measurements are obtained.
5	Document the results (photograph or the OCT printout) from either OCT or fundus photography.	• Correct annotation of recordings and other patient documentation and the importance of accuracy, legibility and completeness. • Information needs of the patient following investigation.
6	Reflect on your practice during this period of work-based learning 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 continuous personal development can improve personal performance.

SECTION 11: WORK-BASED SYLLABUS: AUDIOLOGY

*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	Physiological Sciences
THEME	Neurosensory Sciences
SPECIALISM	**Audiology**

MODULE	Adult Diagnostic Assessment	Component	Specialist Years 2 and 3
AIM	The aim of this module is to ensure that the student develops their skills with respect to patient-centred care and performs a range of procedures as part of the diagnostic assessment of adults. During this work-based module students will apply their learning from the modules and professional practice.		
SCOPE	On completion of this module the student will be able to competently perform a range of procedures, including not-masked and masked PTA on adult patients (including Air Conduction (AC) and Bone Conduction (BC), tympanometry, full acoustic reflex threshold and transient evoked oto-acoustic emissions. 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 Continuing Personal and Professional Development.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform and interpret not-masked pure tone audiometry.
2. Perform and interpret masked pure tone audiometry.
3. Perform and interpret tympanometry.
4. Perform and interpret full acoustic reflex threshold.
5. Set up and perform transient evoked oto-acoustic emissions.
6. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Assist at paediatric hearing assessments, including a range of tests and procedures, and explain the test requirements to your training officer.
- Attend a range of clinics/settings where patients with hearing difficulties attend, summarise the different patient referral patterns and discuss with your training officer some of the available healthcare pathways.
- Observe the range of tests within an audiology service and discuss with your training officer:
  - the needs of a range of patients and healthcare pathways that use an audiology centre;
  - the role of the service in the diagnosis and management, including rehabilitation of patients, and audiology services within the public and independent sector.
- Based on your placement, discuss with your training officer the range of different healthcare professionals who work within Audiology and how the audiology placement centre services relate to other local NHS services.
- Attend a meeting at which the outcome of a clinical audit, research, innovation, or service development is presented and discuss with your training officer how evidence-based practice is implemented with respect to Audiology.
- Attend a multidisciplinary meeting and reflect on the way the MDT contributes to the care of patients with hearing disorders.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning at least one of the routine investigations and one treatment plan.
- Assist a senior audiologist (as required) in a range of audiology investigations, including assisting in equipment set-up and calibration, and discuss the role differences between tester/assistant. The range of audiology investigations may include (see footnote[43]):
  - diagnostic and/or threshold auditory brainstem responses;
  - methods of monitoring eye movement during vestibular testing, including when and how electronystagmography and video nystagmography is used;
  - bi-thermal caloric measures;
  - vestibular rehabilitation;
  - oculomotor testing;
  - static and dynamic position testing;
  - caloric testing;

[43] *In some Audiology placement centres it may not always be possible to complete all the above topics either due to time constraints, staff or equipment availability; the aim should be to extend the students' understanding and knowledge of best practice techniques within the audiological clinical environment, not necessarily their competences.*

    - basic ‘bedside’ testing and ’office’ testing;
    - common causes of balance disorders;
    - assessment and management of BPPV.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning the practice of Audiology.

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	Minimise risks and hazards, including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks, and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1, 2, 3, 4, 5	Ensure that all the required equipment is working correctly and safely, including any daily calibration requirements.	• Equipment maintenance and process for reporting faults.
1, 2, 3, 4, 5	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 summarising in communication.
1, 2, 3, 4, 5	As appropriate, retrieve the patient's records, referral, file, or medical notes, obtain and review a suitably completed request form, identify and greet the patient, and check patient ID.	• Referral routes for audiology investigations. • Requirements for correct completion of request forms and how to validate them. • The importance of checking and confirming the patient identity and the implications of not doing so.
1, 2, 4, 5, 6	As appropriate, prepare the	• Range of equipment used, relative merits and principles of

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	environment, set up and calibrate equipment ready for use for each type of investigation and select equipment settings appropriate to the audiological test requirements.	measurement. • Requirements for the investigation environment to ensure privacy, dignity and comfort of the patient. • Recognition of the errors or potential risks of using defective equipment in clinical practice and the implications of use. • Identification of common faults and remedial action. • Current safety standards, including safety testing and routine maintenance. • Preparation and calibration of equipment. • Manufacturer and local protocols for equipment used. • How errors occur and how the correction factors need to be applied to give meaning results. • Quality standards.
1, 2, 4, 5, 6	Evaluate the technical quality of recordings/measurements, identify suboptimal recordings/measurements and re-record/measure where necessary, knowing when to refer to senior colleagues.	• How to identify recordings/measurements that are substandard. • When and how to refer to senior colleagues.
1, 2, 4, 5	Treat the patient in a way that respects their dignity, rights, privacy and confidentiality.	• The rights of the patient with regard to consent for treatment, and confidentiality of consultation and medical records. • Key factors influencing dignity, rights, privacy and confidentiality, including age, gender, culture and beliefs. • Correct position of the patient, ensuring comfort, co-operation and optimal investigation results. • The impact of incorrect positioning or non-co=operation on investigation results.
1, 2, 3, 4, 5	Explain the procedure to the patient	• The importance of introducing yourself and your role as a student

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	and gain informed consent.	healthcare science practitioner as part of the process of introduction and consent. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Perform not-masked PTA on an adult patient (including AC and BC) modifying technique according to patient performance or ability.	• SOP. • Selection of starting point for the test based on the patient history. • Current published recommended procedure for threshold testing. Appropriate patient instructions and understanding check. • Correct placement of transducers, including supra-aural headphones, inserts and bone conductors. • Reasons why variation in technique may be necessary.
1	Correctly plot the results of not-masked PTA identifying any potential errors or factors that might affect the results	• SOP. • Patient responses, errors, acceptable technique modifications, why and when appropriate. • Determination of threshold.
1	Assimilate and interpret the not-masked PTA test results obtained.	• Clinical and audiological conditions. • Limitations of test results.
2	Utilise the results of the not-masked pure tone audiogram to select the initial masking level and undertake masked PTA (including AC and BC), modifying their technique according to patient performance or ability.	• SOP. • Selection of starting point for the test based on the patient history. • Current published recommended procedure for threshold testing. Appropriate patient instructions and understanding check. • Correct placement of transducers, including supra-aural headphones, inserts and bone conductors.
2	Correctly plot the results of masked	• Standards for recording results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	PTA, identifying any potential errors or factors that might affect the results.	• Patient responses, errors, acceptable technique modifications, why and when appropriate. • Determination of threshold.
2	Assimilate and interpret the masked PTA test results obtained in conjunction with other audiological results obtained.	• Clinical and audiological conditions. • Use and implications of test results.
1, 2	Decide and agree a management plan with the patient.	• Factors affecting management plan.
3	Perform tympanometry, recording the middle ear pressure, middle ear compliance and ear canal volume.	• SOP/current published recommended procedure. • Calibration checks. • Indications and contraindications. • Causes of patient discomfort. • Use of the patient history and any audiological test data available to select the initial starting point for tympanometry.
3	Correctly report the results of tympanometry, identifying any potential errors or factors that might affect the results, and interpret them in conjunction with other audiological results obtained.	• Standards for recording results. • Patient responses, errors, acceptable technique modifications, why and when appropriate. • Clinical and audiological conditions. • Use and implications of test results. • Determination and reliability of results. • Interdependency of the different test results.
4	Perform and interpret full acoustic reflex threshold on an adult patient, identifying any potential errors or factors that might affect the results.	• SOP. • Causes of patient discomfort. • Indications and contraindications. • Reasons why variation in technique may be necessary. • Clinical and audiological conditions. • Use and implications of test results. • Determination and reliability of results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• Interdependency of the different test results. • Patient responses, errors, acceptable technique modifications, why and when appropriate. • Factors affecting management plan.
4	Correctly plot/report the results of acoustic reflex thresholds, identifying any potential errors or factors that might affect the results, and interpret them in conjunction with other audiological results obtained.	• Standards for recording results. • Patient responses, errors, acceptable technique modifications, why and when appropriate. • Clinical and audiological conditions. • Use and implications of test results. • Determination and reliability of results. • Interdependency of the different test results.
5	Perform and interpret transient evoked oto-acoustic emissions on an adult patient identifying any potential errors or factors that might affect the results.	• SOP. • Calibration checks. • Causes of patient discomfort. • Indications and contraindications. • Reasons why variation in technique may be necessary. • Clinical and audiological conditions. • Use and implications of test results. • Determination and reliability of results. • Interdependency of the different test results. • Patient responses, errors, acceptable technique modifications, why and when appropriate. • Factors affecting management plan.
5	Correctly report the results of transient evoked oto-acoustic emissions, identifying any potential errors or factors that might affect the results, and interpret them in conjunction with other audiological	• Standards for recording results. • Patient responses, errors, acceptable technique modifications, why and when appropriate. • Clinical and audiological conditions. • Use and implications of test results. • Determination and reliability of results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	results obtained.	• Interdependency of the different test results.
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: • 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: o medical ethics o confidentiality o information governance o informed consent o equality and diversity o child protection o elder abuse o use of chaperones o probity o fitness to practise o personal health and wellbeing.
6	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

MODULE	Adult Hearing Aid Clinic	Component	Specialist Years 2 and 3
AIM	The aim of this module is to ensure that the student develops their skills with respect to patient-centred care and is able to perform a range of procedures in an adult hearing aid clinic. During this work-based module students will apply their learning from the modules and professional practice.		
SCOPE	On completion of this module the student will be able to work competently in an adult hearing aid clinic. They will be able to obtain a patient history, undertake a range of procedures/measurements, including hearing assessment, and fit a hearing aid to a new patient. They will also be competent to re-assess patients who already wear a hearing aid and work with the patient to develop rehabilitation plans. 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. Obtain a comprehensive patient history from a range of patients referred to the clinic.
2. Perform real ear measurements (REM) according to SOPs and current published recommended procedure in a range of adult patients.
3. Use a hearing aid test box according to SOPs.
4. Perform an adult hearing assessment according to SOPs and current published recommended procedure in a range of adult patients.
5. Perform a hearing aid fitting with an adult patient who has not previously worn a device, including hearing aid selection, programming, explanation of its functionality and initial adaptation period.
6. Perform a re-assessment on a patient who already wears a hearing aid, including hearing aid selection, programming, explanation of its functionality and initial adaptation period.
7. Based on the patient reported outcome measures, produce as appropriate, a hearing loss information/advice plan. This will be as part of a hearing assessment, or hearing aid selection, programming, fitting, or the long-term rehabilitative healthcare, of a patient who is experiencing a hearing impairment, according to current guidelines.
8. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- With permission, discuss with a patient the effect of hearing loss and reflect on how the audiology department can contribute to improving the quality of life of the patient.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning at least one routine investigation and one treatment plan.
- Based on your placement, discuss the range of patients and healthcare pathways that use an audiology centre, explaining the role of Audiology in the care of patients.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning the practice of Audiology.

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	Put the patient at ease and build rapport at the beginning of the session, and use 'problem-oriented medical questioning' to obtain a patient history.	• Communication attributes. • Key social and interpersonal factors.
1	Use a variety of questioning techniques in a logical sequence with active listening, clarify any misunderstandings in the patient history and assimilate and ensure understanding, and give appropriate feedback to patient.	• Questioning techniques, including direct/indirect, open/closed, supplementary. • Recognise the importance of a concise and understandable summary of the patient history to reduce misunderstandings.
1	Take contemporaneous notes and then write up history notes in a legible and readable manner, sign and date or complete appropriate electronic records.	• Legal requirements for note taking.
2, 3, 4, 5, 6, 7	Minimise risks and hazards, including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks, and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
2, 3, 4, 5, 6, 7	Ensure that all the required equipment is working correctly and	• Equipment maintenance and process for reporting faults.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	safely, including any daily calibration requirements.	
1, 2, 3, 4, 5, 6, 7	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 summarising in communication.
2, 3, 4, 5, 6, 7	As appropriate, retrieve the patient's records, referral, file, or medical notes, obtain and review a suitably completed request form, identify and greet the patient, and check patient ID.	• Referral routes for audiology investigations. • Requirements for correct completion of request forms and how to validate them. • The importance of checking and confirming the patient identity and the implications of not doing so.
1, 2, 3, 4, 5, 6, 7	Prepare the environment, set up and calibrate equipment ready for use for each type of investigation and select equipment settings appropriate to the audiological test requirements.	• Range of equipment used, relative merits and principles of measurement. • Requirements for the investigation environment to ensure privacy, dignity and comfort of the patient. • Recognition of the errors or potential risks of using defective equipment in clinical practice and the implications of use. • Identification of common faults and remedial action. • Current safety standards, including safety testing and routine maintenance. • Preparation and calibration of equipment. • Manufacturer and local protocols for equipment used. • How errors occur and how the correction factors need to be applied to give meaningful results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• Quality standards.
2, 3, 4, 5, 6, 7	Evaluate the technical quality of recordings/measurements, identify suboptimal recordings/measurements and re-record/measure where necessary, knowing when to refer to senior colleagues.	• How to identify recordings/measurements that are substandard. • When and how to refer to senior colleagues.
2, 3, 4, 5, 6, 7	Treat the patient in a way that respects their dignity, rights, privacy and confidentiality.	• The rights of the patient with regard to consent for treatment, and confidentiality of consultation and medical records. • Key factors influencing dignity, rights, privacy and confidentiality, including age, gender, culture and beliefs. • Correct position of the patient, ensuring comfort, co-operation and optimal investigation results. • The impact of incorrect positioning or non-co-operation on investigation results.
2, 3, 4, 5, 6, 7	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role as a student HCSP as part of the process of introduction and consent. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
2	Select the appropriate REM parameters, calibrate and perform the initial non-patient test measures followed by patient test measures,	• Calibration procedures. • Different REM measures. • Troubleshooting results. • How to interpret the results.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	and interpret the results.	• Relationship to patient management.
2	Review, modify and adjust the REM measures, taking account of patient's needs, and assessing and identifying any potential errors or factors that might affect the REM recordings.	• SOP/current published recommended procedure. • Clinical and audiological conditions. • Use and implications of test results. • Determination and reliability of results. • Interdependency of the different test results. • Factors affecting management plan.
3	Perform hearing aid performance measures and interpret the results.	• SOPs.
3	Compare and contrast the hearing aid test box results to the manufacturer's published specifications for the same digital hearing aid.	• Correct and incorrect functions of the hearing aid and act on this. • Potential errors or factors that might affect the hearing aid test box measures. • Contrast results to manufacturer's hearing aid specifications. • Different technical standards.
4	Perform an adult hearing assessment, identify potential problems, performing subjective listening and/or objective hearing aid measures to establish faults, initiate repair and ensure that patient expectation has been met.	• Appropriate ISO standards. • Different hearing aid specifications. • Common hearing aid faults. • Range of repair and maintenance procedures. • Problem identification and solution.
5	Perform a hearing aid fitting with an adult patient who has not previously worn one, including hearing aid selection, programming, explanation of its functionality and initial adaptation period.	• Communication style. • Range of devices available. • Different hearing aid specifications. • Programming strategies. • Different management requirements.
5	Use the obtained patient history and	• Different 'test' protocols and factors affecting them.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	any subjective reported changes or objective measured changes to agree a suitable patient assessment and management strategy.	• Medical and related audiological conditions, effects of tinnitus, vestibular disorders and implications on assessment. • Selection of starting point for the test based on the patient history. • Current published recommended procedure for threshold testing.
5	Assimilate the patient history, audiological test results and the patient's expressed need into a possible medical or audiological healthcare plan.	• Clinical and audiological conditions. • Use and implications of test results. • Determination and reliability of results. • Interdependency of the different test results. • Factors affecting management plan.
6	Undertake appropriate diagnostic adult hearing testing to support the patient management strategy, and modify according to patient need.	• How to recognise the presence of tinnitus/hyperacusis, and its effect on the test protocol and patient lifestyle. • How to assess the patient's approach to their hearing disability and the ways it may affect their management. • Audiological/medical conditions affecting decision with respect to diagnostic test. • Assessment of speech understanding. • Contraindications.
6	Select and programme the hearing aid system to a prescribed amplification rational in accordance with current published recommended procedures.	• Current published recommended procedures/SOPs. • Range of software packages, algorithms. • Technical parameters, use and implications.
6	Use the relevant information from the diagnostic adult hearing testing to discuss and agree a patient management strategy and initiate the plan.	• Appropriate use of personal amplification. • Assistive listening devices. • Coping strategies and communication strategies. • Non-amplification advice, benefit of monaural/binaural provision.
6	Explain the functions and controls of the device to the patient and/or	• Acclimatisation techniques and expectations of the new amplified acoustical environment the patient can expect, in particular focusing on

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	'significant other', ensuring the patient understands and can manipulate the device.	sounds that potentially may be unexpected or sudden.
6	Discuss acclimatisation techniques, future management options, follow-up or long-term services, and use a range of outcomes measures to evaluate intervention and benefit.	• When to involve or refer to other agencies or healthcare providers as part of the care plan. • Acclimatisation techniques and expectations of the changed amplified acoustical environment.
7	Undertake follow-up as part of the long-term rehabilitative healthcare plan using the past patient history and any reported subjective changes since the last visit to decide whether there is a need to change the patient rehabilitation management strategy.	• Appropriate use of personal amplification. • Assistive listening devices. • Coping strategies. • Communication strategies. • Non-amplification advice. • Benefit of monaural/binaural provision. • When and how to select, program and explain to the patient the hearing aid system to prescribe amplification rational in accordance with current published recommended procedures or guidelines. • Range of software packages, algorithms. • Technical parameters, use and implications. • Different outcome measure techniques. • When to involve or refer to other agencies or healthcare providers as part of the care plan. • Acclimatisation techniques and expectations of the changed amplified acoustical environment. • Social impact for a patient with a hearing loss. • Differences between formal/informal auditory training and communication handicap and/or disability. • Socioeconomic and psychological factors that can influence everyday

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		communication. • Different hearing strategies or training models that may be used with hearing aids or similar devices.
7	Discuss and agree with the patient the proposed change in the personal amplification healthcare plan.	• Appropriate adjustments to a hearing aid system based on a rationale in accordance with current published recommended procedures or guidelines.
7	Measure and analyse patient reported outcome measures.	• How to measure patient reported outcomes. • How to analyse patient reported outcomes.
7	Produce a hearing loss information/advice plan as part of a hearing assessment for a patient who is experiencing hearing impairment.	• How, when and where aural rehabilitation can take place in an everyday setting. • Reasons for the different communication strategies and conversational styles that are used in everyday listening situations. • Factors that can influence the reception of listening and how changes to the environment and good conversational skills can help. • Range of outcomes measures that can be used to evaluate the rehabilitation advice or intervention and the possible benefit that might be derived by the patient. • Additional hearing advice or communication training options available locally for patient follow-up or long-term support. • How hearing aids or similar devices, hearing advice or specialist rehabilitative advice could be used in the patient's everyday life
8	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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
8	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 ○ personal health and wellbeing.
8	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

MODULE	Adult Hearing Aid Repair Clinic	Component	Specialist Years 2 and 3
AIM	The aim of this module is to ensure that the student develops their skills with respect to patient-centred care and is able to perform a range of procedures in an adult hearing aid repair clinic. During this work-based module students will apply their learning from the modules and professional practice.		
SCOPE	On completion of this module the student will be able to work competently in an adult hearing aid repair clinic. They will be able to perform otoscopy, take an aural impression and perform routine hearing aid maintenance checks. 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 otoscopy in a range of adult patients referred to the hearing aid repair clinic.
2. Take an aural impression under supervision from a range of adult patients referred to the hearing aid repair clinic.
3. Perform routine hearing aid maintenance and checks.
4. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- With permission, discuss how wearing a hearing aid has affected the quality of life with a range of patients from different age ranges, and reflect on your learning from this experience and how this will impact on your future work as a HCSP.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning at least one routine investigation and one treatment plan.

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	Minimise risks and hazards, including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1, 2, 3	Ensure that all the required equipment is working correctly and safely, including any daily calibration requirements.	• Equipment maintenance and process for reporting faults.
1, 2, 3	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 summarising in communication.
1, 2, 3	As appropriate, retrieve the patient's records referral, file, or medical notes, obtain and review a suitably completed request form, identify themselves to the patient and check patient ID.	• Referral routes for audiology investigations. • Requirements for correct completion of request forms and how to validate. • The importance of checking and confirming the patient identity and the implications of not doing so.
1, 2	Treat the patient in a way that	• The rights of the patient with regard to consent for treatment, and

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	respects their dignity, rights, privacy and confidentiality.	confidentiality of consultation and medical records. • Key factors influencing dignity, rights, privacy and confidentiality, including age, gender, culture and beliefs. • Correct position of the patient, ensuring comfort, co-operation and optimal investigation results. • The impact of incorrect positioning or non-co-operation on investigation results.
1, 2	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role as a student HCSP as part of the process of introduction and consent. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Examine the external ear and surrounding area, and perform otoscopy in a range of adult patients.	• SOP/current published recommended procedure. • Causes of patient discomfort. • Indications for and contraindications to otoscopy. • Identify normal and abnormal external ear examinations.
2	Take an impression, modifying technique as appropriate.	• Indications for and contraindications to taking an aural impression. • Potential errors or factors that might affect the finished impression. • SOP/current published recommended procedure. • Safety aspects of aural impression taking. • Different techniques. • Reasons why variation in technique may be necessary. • Quality standards. • Manufacturing process.
3	Undertake hearing aid repairs,	• SOPs.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	including like-for-like battery replacement, life tubes and domes.	• Communication strategies. • How to replace a battery. • How to replace life tubes and domes.
3	Fit life tubes and domes, and re-tube an ear mould, adjusting size to fit the ear.	• SOPs. • Communication strategies. • How to measure and fit life tubes and domes, and re-tube an ear mould and adjust to fit.
3	Select appropriate ear mould type and additional modifications.	• SOPs. • Acoustic properties of various ear mould types and modifications • Contraindications to the use of various ear mould types and modifications. • Manufacturer's specifications.
3	Contrast hearing aid parameters to published manufacturers' specifications and modify a range of digital parameters to influence acoustic output.	• Different 'international recording standards' and methods for illustrating hearing aid performance
3	Perform routine hearing aid maintenance and checks.	• SOP. • How to do listening checks. • How to identify a faulty hearing aid.
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	• 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.
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 12: WORK-BASED SYLLABUS: NEUROPHYSIOLOGY

*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	Physiological Sciences
THEME	Neurosensory Sciences
SPECIALISM	**Neurophysiology**

MODULE	Electroencephalography and Evoked Potentials	Component	Specialist Years 2 and 3
AIM	The aim of this module is to ensure that the student develops their skills with respect to patient-centred care, calibrating EEG recording equipment and performing EEG recordings. In the final stages of training the student will be expected to assist senior staff performing VEPs. During this period of work-based training students will apply their learning from the academic modules and professional practice.		
SCOPE	On completion of this module the student will be able to perform EEG recordings competently in adult patients and assist with more complex investigations. 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 CPPD.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Perform the internal calibration procedure on neurophysiological recording equipment.
2. Perform the external calibration procedure on neurophysiological recording equipment.
3. Plan, prepare and record a resting adult EEG.
4. Implement and monitor hyperventilation and photic stimulation.
5. Factually report an adult EEG, recognising biological and non-biological artefact.
6. Assist with the planning, preparation and recording of an adult VEP.
7. Observe and assist where practically possible with somatosensory evoked responses and brainstem auditory evoked responses.
8. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Observe EEG recordings in a range of patients and recognise the type of EEG abnormality and the clinical significance from a range of the following disorders (one of these may be a non-epileptic seizure):
  - generalised epilepsies
  - partial epilepsies
  - epilepsy syndromes, e.g. West syndrome, typical absence, juvenile myoclonic epilepsy, benign epilepsy of centro-temporal origin, etc.
  - cerebral inflammatory process, e.g. encephalitis, meningitis, etc.
  - degenerative disorders, e.g. Alzheimer's, CJD, etc.
  - cerebrovascular disorders
  - metabolic disorders
  - others, e.g. non-epileptic seizures, etc.
- Observe the recording of VEPs and discuss the role of this investigation in the care pathway of patients referred to the department.
- From you practice collect at least 10 EEG case studies, document patient history, medication, results of other procedures, provisional diagnosis and pathophysiology of each of the case studies' provisional diagnosis and write a factual report on the EEG for each case study.
- Present one of the case studies at a departmental meeting and reflect on the presentation, identifying aspects that went well and those where you can improve.
- With permission, discuss the effect epilepsy has on a patient and reflect on how the neurophysiology department can contribute to improving the quality of life of the patient.
- Attend a multidisciplinary meeting and reflect on the way the MDT contributes to the care of patients referred to neurophysiology departments.
- Attend a meeting at which the outcome of a clinical audit, research, innovation, or service development is presented and discuss with your training officer how evidence-based practice is implemented with respect to Neurophysiology.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning EEG.

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	Undertake internal calibration procedures on neurophysiological recording equipment, making a permanent record of the procedure, identifying any faults, and reporting and rectifying (if possible) in accordance with departmental procedure.	• SOP. • Electrical safety of the machine: safety rating: last safety check. • Condition of cables and connectors. • Adequate storage medium for the test to be carried out. • Correct date and time. • Number of enabled channels and sampling rate. • Default settings (filters, sensitivity, time base and montage/montages). • Function of the high- and low-frequency filter and default sensitivity setting, and use of a square wave signal. • Time base, time marker, range of different time bases, cursors. • Function of stimulator and correct use of the stimulus parameters (stimulation rate and where appropriate stimulus duration). • Fault recognition.
2	Undertake external calibration procedures on neurophysiological recording equipment, testing the machine over a range of frequencies using a number of different bandwidths.	• SOP. • How to select and connect correct external devices to measure frequency response. • Selection of correct input signal voltage, frequency/frequencies and type of wave (square/sine) on a signal generator for the measurement of frequency response curves. • Selection of correct display parameters for the measurement of frequency response curves. • Range of test frequencies and number of different bandwidths (both low- and high-frequency filters), including 50 Hz notch filter.
2	Produce a formal written assessment, including an appropriate set of graphs showing the response from a number of filter bandwidths, including the	• Calculation of the machine's turnover frequency for appropriate filter settings and show on the graph.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	50 Hz notch filter.	
2	Measure common mode rejection ratio (CMRR) using a signal generator for a number of recorder channels and produce a written assessment showing the calculation of the CMRR in decibels (dB).	• Selection of correct external devices.
2	Measure internal noise of a number of the recorder's channels and produce a written assessment.	• Selection of correct external devices/transducters. • Selection of the correct input signal voltage, frequency/frequencies and type of wave (square/sine).
3, 4	Evaluate all available data pertinent to the investigation to plan.	• SOP. • Action to be taken when available data is insufficient to produce a valid plan. • Selection of appropriate electrodes and transducers. • Necessary quantity and type of consumables available in accordance with the requirements of the investigation.
3, 4, 6	Minimise risks and hazards, including the control of infection in accordance with health and safety policies and solve problems that may arise, referring to senior colleagues as appropriate.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines. • Identification and solutions to problems that may arise. • When and how to seek help to resolve problems.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
3, 4, 6	Ensure that all the required equipment is working correctly and safely.	• Equipment maintenance and reporting systems.
3, 4, 6	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 summarising in communication.
3, 4, 6	Retrieve the patient's records, referral, file, or medical notes, obtain and review a suitably completed request form, identify yourself, greet the patient and check patient ID.	• Referral routes for neurophysiology diagnostic investigations. • Requirements for correct completion of request forms and how to validate. • The importance of checking and confirming the patient identity and the implications of not doing so.
3, 4	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role as a student HCSP as part of the process of introduction and consent. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent.
3	Prepare the environment, set up and calibrate equipment ready for use for each type of investigation, and select equipment settings appropriate to the EEG test requirements.	• Range of equipment used, relative merits and principles of measurement. • Requirements for the investigation environment to ensure privacy, dignity and comfort of the patient. • Recognition of the errors or potential risks of using defective equipment in clinical practice and the implications of use. • Identification of common faults and remedial action.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• Current safety standards, including safety testing and routine maintenance. • Preparation and calibration of equipment. • Manufacturer and local protocols for equipment used. • How errors occur and how the correction factors need to be applied to give meaning results.
3	Evaluate the technical quality of recordings/measurements, identify suboptimal recordings/measurements and re-record/measure where necessary, knowing when to refer to senior colleagues.	• How to identify recordings/measurements that are substandard. • When and how to refer to senior colleagues.
3	Treat the patient in a way that respects their dignity, rights, privacy and confidentiality.	• The rights of the patient with regard to consent for treatment and confidentiality of consultation and medical records. • Key factors influencing dignity, rights, privacy and confidentiality, including age, gender, culture and beliefs. • Correct position of the patient, ensuring comfort, co-operation and optimal investigation results. • The impact of incorrect positioning or non-co-operation on investigation results.
3	Mark electrode sites accurately in accordance with the recommended placement system, ensuring (as far as possible) symmetry in electrode distances – accuracy should be within +/–0.5 cm.	• Importance of correctly and securely attaching electrodes and transducers to within +/– 0.5 cm. • Importance of securely positioning all leads and checking connections to the head box are correct. • How to confirm contact impedances as appropriate to the electrode type and to the patient.
3	Help the patient to reach a position that is comfortable and which optimises the quality of the recording.	• Importance of patient position in EEG recording. • Local procedures for patient positioning.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
3	Explain the procedure to the patient and record an EEG, identifying, eliminating, or minimising artefacts, recording polygraphic variables indicated by the patient's clinical condition, ensuring filter (and other) settings are appropriate, and annotate the EEG recording accurately and legibly.	• SOP. • Electrode placement. • The importance of recording a calibration pulse at the start of the recording and check the sensitivity and time base of the machine. • Use of the reference montage at the start of the recording to view the EEG. • Use of a range of montages (including bipolar and common average references) during the recording. • Use of appropriate control setting during the recording and modify to optimise the recording if required. • Artefacts. • Methods of eliminating or minimising artefacts. • Modification of electrode positions, application of additional electrodes and transducers, and use of non-standard montages, according to the patient characteristics, clinical problem and findings during the recording**.** • How to record polygraphic variables indicated by the clinical condition of the patient. • Importance of ensuring filter (and other) settings are appropriate. • Importance of recording periods of eye opening and closure. • When to modify or extend the current investigation and refer to a senior member of staff for advice when required.
4	Review patient information, explain the procedure to the patient, position the patient, and implement and monitor hyperventilation and photic stimulation annotate details relevant to the procedure (time, effort, etc.).	• SOP. • Indications for and contraindications to hyperventilation and when activation should not proceed, and when to refer to a senior member of staff. • Information needs of the patient to ensure they have a clear and accurate understanding of the procedure, and encourage them to clarify any areas of concern.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• Positioning of the patient for hyperventilation. • Correct and safe activation procedures and the importance of encouraging the patient to co-operate. • How to annotate details relevant to the procedure (time, effort, etc.).
4	Monitor the activation procedure continuously and record changes in the condition of the patient accurately.	• How to continuously monitor the activation procedure and record changes in the condition of the patient accurately.
4	Accurately identify indications that the activation procedure should be discontinued and respond to promptly.	• Accurate identification of indications that the activation procedure should be discontinued.
4	Complete the EEG and clean equipment and environment in accordance with local policy and leave it in a condition for reuse.	• How to remove electrodes and clean the site with minimum discomfort. Process for informing the patient of the procedure for notification of results of the investigation. • Process to ensure that any required transporting/portering service and escorts are made available to coincide with the completion of the investigation. • How to clean equipment and environment (and where appropriate sterilise it) in accordance with local policy and leave it in a condition for reuse.
5	Produce a factual EEG report on typical adult patients documenting and measuring (where appropriate) the frequency, amplitude, amount and distribution of the four EEG frequency bands, other activity present in the ECG and the effect of hyperventilation and photic stimulation.	• Importance of documenting handedness, last meal and medication, ECG. • How to review the clinical history obtained from the patient. • Analysis of the background EEG. • How to document and measure (where appropriate) the frequency, amplitude, amount and distribution of the four EEG frequency bands (delta, theta, alpha and beta). • The importance of documenting other activity present in the EEG as far as type of waveform, amplitude, distribution and duration of

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING

		discharge.
		• Physiological and EEG changes caused by hyperventilation.
		• The effects of photic stimulation, associated abnormal variants and EEG changes.
		• Importance of documenting any clinical events and the EEG features accompanying them.
		• Common conditions of patients referred for EEG, including:
		  ○ generalised epilepsies
		  ○ partial epilepsies
		  ○ epilepsy syndromes, e.g. West syndrome, typical absence, juvenile myoclonic epilepsy, benign epilepsy of centro-temporal origin, etc.
		  ○ cerebral inflammatory process, e.g. encephalitis, meningitis, etc.
		  ○ degenerative disorders, e.g. Alzheimer's, CJD, etc.
		  ○ cerebrovascular disorders
		  ○ metabolic disorders
		  ○ others, e.g. non-epileptic seizures, etc.

5	Produce a written report recognising biological and non-biological artefact and use a personal collection of a number of different types of biological and non-biological artefact to differentiate between them and critically evaluate your findings.	• Types of biological and non-biological artefacts over a period of time. • Identification and elimination of artefact. • Monitoring of biological artefact and what type of transducers or electrodes can be used. • Recognise how and where these transducers or electrodes are applied.
6	Assist with the planning and preparation for recording VEPs, including the assessment of visual acuity, ensuring the patient is comfortable and positioned to	• SOP. • Assessing visual acuity and using any required correction. • How to mark the electrode sites accurately, in accordance with a recommended placement system and the planned investigation. • How to correctly and securely site the electrodes, and correctly

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	optimise the recording quality.	position the leads. • How to ensure that the contact impedances are appropriate for the electrode type. • Patient positioning to optimise the quality of the recording. • Correct and accurate positioning of the stimulators, in accordance with recommended procedures and adjustment in accordance with the type of investigation.
6	Assist in recording adult evoked potentials (VEP, SEP, BSEP), giving the patient clear instructions, ensuring sufficient samples are averaged and annotating the recording.	• Selection of recording programs in accordance with standard protocol, including appropriate machine settings (filters, stimulus parameters, etc.) for the investigation. • Machine modifications to optimise the display and highlight salient features. • Importance of ensuring that the eye not being tested is masked/patched adequately to ensure it receives no stimulus. • How to monitor the technical quality of raw data and identify any artefacts and eliminate or minimise them. • Patient instructions for the procedure monitoring and compliance/attention. • Importance of ensuring sufficient samples are averaged to yield a waveform that is stable and contains minimal noise. • How to check evoked potentials for reproducibility. • How to annotate the recording legibly to show control settings, stimulus settings, clinical states and events.
6	Measure features of the evoked potential, comparing the salient features of the waveforms with local normative data.	• How to measure features of the evoked potential. • Salient features of the evoked potential waveforms and comparison with local normative data.
7	Reflect on your practice and generate a reflective diary that demonstrates	• Personal values, principles and assumptions, emotions and prejudices, understanding how these may influence personal

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	how you take responsibility for your learning and utilise the skills required of an independent learner, and your commitment to your CPD.	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	Take responsibility for keeping your professional, technical and scientific knowledge and skills up to date.	• Identify and evaluate the potential role for new and innovative technologies and scientific advances.
7	Meet commitments and goals in your professional practice using a range of organisational and planning tools.	• Different methods of planning, prioritising and organising, and how they can enhance personal effectiveness.
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 ○ personal health and wellbeing.
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 13: WORK-BASED SYLLABUS: OPHTHALMIC AND VISION 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	Physiological Sciences
THEME	Neurosensory Sciences
SPECIALISM	**Ophthalmic and Vision Science**

MODULE 1	Assessment of the Ophthalmic Patient	Component	Specialist Years 2 and 3
AIM	The aim of this module is to introduce the student to techniques used to assess ophthalmic patients that they will apply to a range of ophthalmic patients, developing their skills with respect to patient-centred, compassionate care and applying their learning from the academic and professional practice modules.		
SCOPE	On completion of this module the student will be able to take a clinical history from a range of ophthalmic patients prior to examination and treatment, instil eye medication, clinically examine the eye and obtain measurements of intraocular pressure. 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. Gather an ophthalmic patient history to assist with diagnosis and treatment planning.
2. Instill eye medication for the purpose of investigation or treatment This is likely to be under a local PGD group directive and/or check patient compliance with their ocular medication regimen.[1]
3. Clinically examine the eye (anterior segment of the eye and ocular adnexae, and assessment of pupil responses) with a torch, loupe, or slit lamp.
4. Measure intraocular pressure and pachymetry.[2]
5. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

[1]*Individuals performing such instillation must have relevant authority or may work under supervision. They should ensure that a current drug history has been obtained from the patient prior to administration.*
[2]*It may include other more specialised procedures such as measurement of ocular blood flow and tonography.*

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Attend a range of clinics where patients with diseases of the eye(s) are reviewed and observe the practice of patient history taking, identifying the strengths and areas for improvement, and discuss these with your training officer.
- Undertake eye drop administration training and certification to local protocol. Under supervision, observe and assist with administration of eye drops for **at least two** patients, to include patients of different age range and vision impairment, and discuss the risks, benefits and requirements for prescription/administration.
- With permission, discuss the effect of low vision on a patient and reflect on how the services offered by the ophthalmic and vision department can contribute to improving the quality of life of the patient.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning the practice of Ophthalmic and Vision Science.

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	Establish a professional relationship with the patient, identifying and addressing any special needs, analysing patient needs and maintaining patient confidentially.	• Principles of patient-centred care and how they are implemented in clinical practice. • Patient confidentiality and how to maintain confidentiality in clinical practice. • Forms of communication (verbal, non-verbal, written, electronic, etc.) and demonstrate effective communication with patients, relatives, carers and other members of the clinical team. • Patient special needs, e.g. sensory impairment, physical disability, learning disability, cognitive dysfunction, etc. • How to assess patient special needs and provisions that should be made in clinical practice.
1, 2, 3, 4	Minimise risks and hazards including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks, and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1, 2, 3, 4	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 summarising in communication.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1, 2, 3, 4	Review a suitably completed request form, retrieve the patient's records, file, or medical notes, greet the patient, identify yourself and check patient ID.	• Referral routes for ophthalmic and vision science diagnostic investigations. • Requirements for correct completion of request forms and how to validate. • The importance of checking and confirming the patient identity and the implications of not doing so.
1, 2, 3, 4	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Obtain and record: • patient's presenting symptoms; • patient's past ocular diseases and conditions, including history of surgery, and details of birth history where appropriate; • relevant family history of diseases; • social history, including occupation and details of exposure to industrial or occupational hazards; • story of patient's current and past general health and trauma, including any surgical	• Personal role, responsibilities and level of competence for the procedure. • Requirements for confidentiality of information. • Requirements for accurate and legible recording of information. • The purpose and relevant protocols for obtaining and documenting patient history. • The anxieties or concerns that patients, parents, or carers may experience and how to alleviate them. • How to communicate effectively with patients, parents, or carers, including patients with a range of cultural and special needs. • The relevance of patient history to ocular and systemic disease. • The symptoms of common diseases affecting the visual system and the relationship between ocular/visual and non-ocular symptoms and diseases of the visual system and systemic disease. • Ocular/visual manifestations of systemic disease.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	procedures; • history of current medications for ocular conditions and general medical conditions; • history of any allergies or other adverse reactions to treatments.	
1	Identify aspects or areas of particular concern and inform relevant professional if appropriate.	
2	Perform pre-instillation procedures.	• SOP. • Personal authority for instillation of eye medication. • Medications used to investigate, diagnose and treat ocular disease, indications for use and modes of action. • The purpose and prescription of eye medication for the individual. • Contraindications to instillation of eye medications. • Possible effects of eye medication, including duration and consequences. • Adverse reactions that may occur and appropriate remedial action. • Consequences of incorrect type, dosage, or frequency of instillation. • The relevant personnel to contact for further advice. • The range of methods and techniques for instillation of eye medication and their correct application for intended purpose. • How to advise patients and/or carers on correct instillation of eye medications and any side effects and adverse effects of medication. • Requirements for labelling and storage of eye medication. • Infection control procedures and their application. • Requirements for accurate and legible recording of information.
2	Explain to the patient the purpose, effects and duration of the medication.	
2	Instill the correct medication in the correct strength, with the correct method and at prescribed frequency to the correct eye, terminating instillations immediately where adverse or unexpected reactions occur.	
2	Record instillation in accordance with relevant protocol or procedure, including signature, time and date of administration.	
2	Advise and educate patient and/or carers on instillation of eye medication if appropriate.	
3	Perform pre-examination procedures and instil topical	• Personal role, responsibilities and level of competence for performing examination.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	medications as required for purposes of examination.	• Requirements and protocols for maintenance and calibration of equipment. • Relevant protocols for procedure and their correct interpretation. • Possible precautions and contraindications to the procedure and the relevant personnel to contact for further advice. • Information needs of patients prior to, during and after examination, and limits of professional role in providing information. • Topical medications used for examination, indications, authorisation and correct method for instillation, and effects. • The purpose and relevant protocols for performing and documenting ocular examination. • Normal and abnormal ocular movement and range of ocular movement. • How to examine the eye and ocular adnexae with loupe and torch. • The component parts of the slit lamp and slit lamp examination techniques. • The normal appearance of anterior segment of eye and ocular adnexae. • Clinical findings of common conditions affecting the ocular adnexae and anterior segment of the eye. • Normal and abnormal pupil responses, including how to recognise an afferent pupil defect, and their relation to diseases of the eye and visual pathway. • Requirements for accurate and legible recording of information. • Infection control procedures and their correct application.
3	Position and align the patient correctly for examination, avoiding patient discomfort.	
3	Examine ocular adnexae and anterior segment of eye with loupe and/or torch or slit lamp to confirm normal appearance or for evidence of disease or disorder.	
3	Examine posterior segment of the eye with direct or indirect ophthalmoscopy and condensing lenses.	
3	Determine or otherwise full range of ocular movement and note any abnormalities of eye movement.	
3	Evaluate pupil shape and responses to light, including whether there is a presence of afferent pupil defect.	
3	Evaluate tear production and patency of nasolacrimal passage.	
3	Record all findings accurately in case notes according to relevant protocols.	
4	Complete pre-test procedures and where topical medications are instilled, confirm correct dosage, strength and frequency of use	• SOP. • Personal role, responsibilities and level of competence for performing investigations. • Requirements and protocols for maintenance and calibration of

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	against relevant protocol.	equipment. • Relevant international and national recommendations for performance of investigation, in addition to local protocols. • Precautions and contraindications to the procedure and the relevant personnel to contact for further advice. • The range of topical medications used and their purpose, correct method of instillation and effects. • Information needs of patients to ensure compliance with the procedure. • Principles of aqueous production and outflow, and ocular blood flow, equipment used to measure these functions and clinical conditions that may affect their measurement. • Purposes and clinical indications for obtaining functional measurements. • Principles of measurement of intraocular pressure, aqueous outflow and ocular blood flow. • Different methods and equipment used for measuring intraocular pressure, aqueous outflow and ocular blood flow, and their clinical indications. • Use of slit lamp for purposes of Goldmann tonometry. • Interaction and interdependencies between different investigations. • Limitations of the procedure, including sources of operator error and how to minimise them, ocular conditions that can affect accuracy of measurements and patient compliance. • How to recognise abnormal measurements and their significance to diagnosis or treatment, and to take appropriate action. • Requirements for accurate and legible recording of information. • Infection control procedures.
4	Provide clear and concise instructions to the patient and reassure the patient throughout to ensure compliance with the required procedure.	
4	Obtain sufficient accurate measurements to ensure comparability and adequate response to clinical question, recognising when additional tests or expertise may be needed and acting appropriately.	
4	Document results accurately and any difficulties encountered in obtaining measurements.	
5	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.
5	Take responsibility for keeping your professional, technical and scientific knowledge and skills up to date.	• Identify and evaluate the potential role for new and innovative technologies and scientific advances.
5	Meet commitments and goals in your professional practice using a range of organisational and planning tools.	• Different methods of planning, prioritising and organizing, and how they can enhance personal effectiveness.
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 ○ personal health and wellbeing.
5	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

MODULE 2	Assessment of the Visual Field	Component	Specialist Years 2 and 3
AIM	The aim of this module is to ensure that the student develops skills to test the visual field and measure the dimensions of the eye. They will be expected to develop their skills with respect to patient-centred, compassionate care, applying their learning from the academic and professional practice modules.		
SCOPE	On completion of this module the student will be able to perform investigations to test the visual field competently and safely, and perform a range of investigations to measure the dimensions of the eye. 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 investigations to test the visual field, including automated and non-automated static and kinetic perimetry, and tests for central field.
2. Perform a range of investigations to measure the dimensions of the eye, including corneal thickness and curvature, anterior chamber depth, axial length and pupil diameter, used for the clinical management of patients undergoing cataract or corneal refractive surgery and the management of glaucoma.
3. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Observe the range of visual field tests and discuss the indications and limitations of physiological measurement systems in the evaluation of the vision system.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning the practice of Ophthalmic and Vision Science.

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	Establish a professional relationship with the patient, identifying and addressing any special needs, analysing patient needs and maintaining patient confidentially.	• Principles of patient-centred care and how they are implemented in clinical practice. • Patient confidentiality and how to maintain confidentiality in clinical practice. • Forms of communication (verbal, non-verbal, written, electronic, etc.) and demonstrate effective communication with patients, relatives, carers and other members of the clinical team. • Patient special needs, e.g. sensory impairment, physical disability, learning disability, cognitive dysfunction, etc. • How to assess patient special needs and provisions that should be made in clinical practice.
1, 2	Minimise risks and hazards, including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1, 2	Ensure that all the required equipment is working correctly and safely.	• Equipment maintenance and reporting systems.
1, 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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• The importance of some key ideas, for example signposting, listening, language, non-verbal behaviour, ideas, beliefs, concerns, expectations and summarising in communication.
1, 2	Review a suitably completed request form, retrieve the patient's records, file, or medical notes, greet the patient, identify yourself, and check patient ID.	• Referral routes for ophthalmic and vision science diagnostic investigations. • Requirements for correct completion of request forms and how to validate them. • The importance of checking and confirming the patient identity and the implications of not doing so.
1, 2	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Complete all pre-test procedures for visual field assessment, including the accurate recording of corrected visual acuity.	• SOP. • Personal role, responsibilities and level of competence for performing investigations. • Requirements and protocols for maintenance and calibration of equipment. • Relevant international and national recommendations for performance of investigation, in addition to local protocols. • How to maintain and calibrate equipment. • Correct use of equipment. • Principles of perimetry. • Different methods and equipment used for these measurements. • Precautions and contraindications to procedure, and relevant personnel
1	Provide clear and concise instructions to the patient and reassure the patient throughout to obtain compliance, monitoring patient behaviour to obtain required fixation and concentration throughout testing.	
1	Evaluate reliability of patient	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	responses and alter testing strategies as indicated.	to contact for further advice. • Anatomy and physiology of the eye and visual pathway relevant to visual field examination. • Range of clinical conditions that can give rise to defects in the visual field and relevance of the test to these conditions. • How to choose appropriate test strategy according to the patient's age, co-operation, ability and clinical condition. • How to instruct and reassure the patient to maximise effectiveness and compliance. • Methods of judging reliability of patient response. • Sources of error and artefact and how to overcome them, including operator error, ocular conditions and patient compliance. • How to recognise abnormal measurements and their significance to diagnosis or treatment, and to take appropriate action. • How to annotate data and record patient compliance. • Requirements for accurate and legible recording of information. • Infection control procedures.
1	Analyse results and carry out additional tests as appropriate.	
1	Document results in the patient record, record patient responses accurately and any difficulties with compliance.	
2	Perform pre-test procedures to obtain measurements of the eye.	• SOPs. • Personal role, responsibilities and level of competence for performing investigations. • Requirements and protocols for maintenance and calibration of equipment. • Relevant international and national recommendations for performance of investigation, in addition to local protocols. • Information needs of patients to ensure compliance with procedures. • Precautions and contraindications to the procedure, and the relevant personnel to contact for further advice. • Anatomy, physiology, pathology and optics of the eye relevant to the procedure.
2	Provide clear and concise instructions to the patient and reassure the patient throughout to ensure compliance with the required procedure.	
2	Select appropriate test parameters according to the patient's age, co-operation, ability and eye condition.	
2	Monitor patient behaviour throughout to obtain required	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	fixation and concentration throughout testing.	• Purposes and clinical indications for obtaining structural measurements. • The range of topical medications used for the procedure, their purpose, correct method of instillation and effects. • Principles of techniques used for measurement of ocular dimensions. • Methods and equipment used for measuring ocular dimensions. • Interrelationships between these measurements and between these and the clinical condition. • Limitations of the procedure, including sources of operator error and how to minimise them, ocular conditions that can affect accuracy of measurements, and patient compliance • Changes in corneal curvature and refraction that can be induced by contact lens wear. • How to obtain measurements of axial length in phakic, pseudophakic and aphakic eyes, and other eye conditions and diseases. • How to choose formulae and make calculations using measurements obtained. • How to recognise abnormal measurements and their significance to diagnosis or treatment, and to take appropriate action. • How to check and monitor accuracy and reproducibility of results. • Requirements for accurate and legible recording of results. • Infection control procedures.
2	Obtain sufficient accurate measurements to ensure reliability of results and document results and any difficulties encountered in obtaining measurements accurately.	
2	Evaluate results and seek further information and advice as appropriate.	
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

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		performance.
3	Take responsibility for keeping your professional, technical and scientific knowledge and skills up to date.	• Identify and evaluate the potential role for new and innovative technologies and scientific advances.
3	Meet commitments and goals in your professional practice using a range of organisational and planning tools.	• Different methods of planning, prioritising and organising and how they can enhance personal effectiveness.
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 ○ personal health and wellbeing.
3	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

MODULE 3	Structural Measurements of the Eye	Component	Specialist Years 2 and 3
AIM	This module will introduce the student to how to measure the dimensions of the eye and they will also be expected to develop their skills with respect to patient-centred, compassionate care, applying their learning from the academic and professional practice modules.		
SCOPE	On completion of this module the student will be able to measure the dimensions of the eye competently, including corneal thickness and curvature, anterior chamber depth, axial length and pupil diameter. These measurements may be used for the clinical management of patients undergoing cataract or corneal refractive surgery and the management of glaucoma. Students 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. Measure the dimensions of the eye, including corneal thickness and curvature, anterior chamber depth, axial length and pupil diameter. These measurements may be used for the clinical management of patients undergoing cataract or corneal refractive surgery and the management of glaucoma.
2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Observe some specialist diagnostic procedures, including photography, angiography and OCT, and discuss the use of these procedures, considering the patient perspective, with your training supervisor.
- Identify a patient referred for ophthalmic imaging and, with permission, follow the progress of the patient from the initial consultation, through investigations, follow-up appointment and/or surgery and discharge, and reflect on your learning from this process.
- Attend a meeting at which the outcome of a clinical audit, research, innovation, or service development is presented and discuss with your training officer how evidence-based practice is implemented with respect to audiology.
- Critically apply the scientific principles covered in the academic modules to this work-based module and specifically appraise the evidence base underpinning the practice of Ophthalmic and Vision Science.

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	Establish a professional relationship with the patient, identifying and addressing any special needs, analysing patient needs and maintaining patient confidentially.	• Principles of patient-centred care and how they are implemented in clinical practice. • Patient confidentiality and how to maintain confidentiality in clinical practice. • Forms of communication (verbal, non-verbal, written, electronic, etc.) and demonstrate effective communication with patients, relatives, carers and other members of the clinical team. • Patient special needs, e.g. sensory impairment, physical disability, learning disability, cognitive dysfunction, etc. • How to assess patient special needs and provisions that should be made in clinical practice.
1	Minimise risks and hazards, including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks, and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1	Ensure that all the required equipment is working correctly and safely.	• Equipment maintenance and reporting systems.
1	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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• The importance of some key ideas, for example signposting, listening, language, non-verbal behaviour, ideas, beliefs, concerns, expectations and summarising in communication.
1	Review a suitably completed request form, retrieve the patient's records, file, or medical notes, greet the patient, identify yourself and check patient ID.	• Referral routes for ophthalmic and vision science diagnostic investigations. • Requirements for correct completion of request forms and how to validate them. • The importance of checking and confirming the patient identity and the implications of not doing so.
	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Complete pre-test procedures to measure the dimensions of the eye, including the topical instillation of medication as appropriate.	• SOP. • Personal role, responsibilities and level of competence for performing investigations. • Requirements and protocols for maintenance and calibration of equipment. • Relevant international and national recommendations for performance of investigation, in addition to local protocols. • Information needs of patients to ensure compliance with procedures. • Precautions and contraindications to the procedure and the relevant personnel to contact for further advice. • Anatomy, physiology, pathology and optics of the eye relevant to procedure.
1	Provide clear and concise instructions to the patient and reassure the patient throughout to ensure compliance with the required procedure.	
1	Select appropriate test parameters according to the patient's age, co-	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	operation, ability and eye condition, and conduct measurements in correct sequence and in line with relevant protocols.	• Purposes and clinical indications for obtaining structural measurements. • The range of topical medications used for the procedure, their purpose, correct method of instillation and effects. • Principles of techniques used for measurement of ocular dimensions. • Methods and equipment used for measuring ocular dimensions. • Interrelationships between these measurements, and between these and the clinical condition. • Limitations of the procedure, including sources of operator error and how to minimise them, ocular conditions that can affect accuracy of measurements, and patient compliance. • Changes in corneal curvature and refraction that can be induced by contact lens wear. • How to obtain measurements of corneal thickness (pachymetry). • How to obtain measurements of axial length in phakic, pseudophakic and aphakic eyes, and other eye conditions and diseases. • How to choose formulae and make calculations using measurements obtained. • How to recognise abnormal measurements and their significance to diagnosis or treatment, and to take appropriate action. • How to check and monitor accuracy and reproducibility of results. • Requirements for accurate and legible recording of results. • Infection control procedures.
1	Monitor patient behaviour throughout to obtain required fixation and concentration throughout testing and obtain sufficient accurate measurements to ensure reliability of results.	
1	Document results and any difficulties encountered accurately, selecting and using appropriate formulae to calculate results where applicable.	
1	Evaluate results and seek further information and advice as appropriate.	
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	• 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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	commitment to your CPD.	• How continuous personal development can improve personal performance.
2	Take responsibility for keeping your professional, technical and scientific knowledge and skills up to date.	• Identify and evaluate the potential role for new and innovative technologies and scientific advances.
2	Meet commitments and goals in your professional practice using a range of organisational and planning tools.	• Different methods of planning, prioritising and organizing, and how they can enhance personal effectiveness.
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: o medical ethics o confidentiality o information governance o informed consent o equality and diversity o child protection o elder abuse o use of chaperones o probity o fitness to practise o personal health and wellbeing.
2	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

MODULE 4	Imaging the Eye Using Light or Lasers	Component	Specialist Years 2 and 3
AIM	The aim of this module is to ensure that the student is able to use light or lasers to obtain images of the eye and supporting structures while developing their skills with respect to patient-centred, compassionate care, applying their learning from the academic and professional practice modules.		
SCOPE	On completion of this module the student will be able to obtain images of the eye and supporting structures competently, using light or lasers, including fundus photography with film and digital imaging systems, and may include confocal scanning laser ophthalmoscopy (SLO), OCT and scanning laser polarimetry (SLP, GDx). 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. Obtain images of the eye and supporting structures using light or lasers.
2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Observe a range of routine ophthalmic imaging investigations and discuss the use of ophthalmic imaging in the diagnosis and monitoring of diseases of the eye with your training supervisor.
- Attend a multidisciplinary meeting and reflect on the role of the ophthalmic science practitioner in the context of the wider ophthalmic team and their contribution to patient care.

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	Establish a professional relationship with the patient, identifying and addressing any special needs, analysing patient needs and maintaining patient confidentially.	• Principles of patient-centred care and how they are implemented in clinical practice. • Patient confidentiality and how to maintain confidentiality in clinical practice. • Forms of communication (verbal, non-verbal, written, electronic, etc.) and demonstrate effective communication with patients, relatives, carers and other members of the clinical team. • Patient special needs, e.g. sensory impairment, physical disability, learning disability, cognitive dysfunction, etc. • How to assess patient special needs and provisions that should be made in clinical practice.
1	Minimise risks and hazards, including the control of infection, in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks, and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1	Ensure that all the required equipment is working correctly and safely.	• Equipment maintenance and reporting systems.
1	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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• The importance of some key ideas, for example signposting, listening, language, non-verbal behaviour, ideas, beliefs, concerns, expectations and summarising in communication.
1	Review a suitably completed request form, retrieve the patient's records, file, or medical notes, greet the patient, identify yourself and check patient ID.	• Referral routes for ophthalmic and vision science diagnostic investigations. • Requirements for correct completion of request forms and how to validate them. • The importance of checking and confirming the patient identity and the implications of not doing so.
1	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Complete the pre-test procedures to obtain images of the eye and supporting structures.	• SOPs. • Personal role, responsibilities, authority and level of competence for performing investigations. • Relevant international and national recommendations for performance of investigation, in addition to local protocols. • Requirements for authorisation of request and patient consent. • Precautions and contraindications to procedure and the relevant personnel to contact for further advice. • Information needs of patients prior to, during and after investigations. • Topical medications used for the procedure, indications, authorisation and the correct method for instillation, and effects. • Contraindications and risks of investigations and relevant actions.
1	Select the imaging modality appropriate to the clinical question and review and change as necessary during the course of the investigations.	
1	Determine the patient's refractive error with autorefraction, keratometry and focimetry as required.	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Obtain images of suitable clarity and type and in sufficient quantity to respond to the clinical question, determining additional tests or expertise needed and action appropriately.	• Relevant principles of physics and instrumentation for imaging modalities. • Reasons for selection of the imaging modality according to clinical condition. • Reasons for adjusting equipment for the patient's refractive error and the consequences if this is not done. • How to identify and minimise artefacts and poor quality images due to ocular conditions, operator error and patient compliance. • The relationship between normal and abnormal features with anatomy, physiology and pathology of the eye and supporting structures, and the significance to diagnosis or treatment. • How to annotate, identify, archive and retrieve images and film appropriately. • The relevant image acquisition and management system and its correct use. • Infection control procedures.
1	Evaluate, interpret and annotate images as required to obtain the appropriate result.	
1	Acquire stereo images where appropriate, in the correct sequence for the display method chosen, and from the image sequence identify and tag stereo pairs for review.	
1	Annotate records as necessary.	
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	Take responsibility for keeping your professional, technical and scientific knowledge and skills up to date.	• Identify and evaluate the potential role for new and innovative technologies and scientific advances.
2	Meet commitments and goals in	• Different methods of planning, prioritising and organising and how they

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	your professional practice using a range of organisational and planning tools.	can enhance personal effectiveness.
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: o medical ethics o confidentiality o information governance o informed consent o equality and diversity o child protection o elder abuse o use of chaperones o probity o fitness to practise o personal health and wellbeing.
2	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

OPTIONAL MODULES

STUDENT SELECTS ONE MODULE

MODULE 5	Angiographic Imaging of the Eye Using Contrast Media	Component	Specialist Years 2 and 3
AIM	The aim of this module is to ensure that the student applies and extends their knowledge, understanding and skills to obtain angiographic images of the eye using contrast media. They will also be expected to develop their skills with respect to patient-centred, compassionate care, applying their learning from the academic and professional practice modules.		
SCOPE	This optional module relates to angiography of the eye by administration or oral or intravenous fluorescein and intravenous ICG contrast medium. This includes imaging the fundus with a fundus camera and confocal scanning laser ophthalmoscope, and may include imaging with a slit lamp camera. This activity will assist with diagnosis, management, treatment and monitoring. Students 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. Obtain angiographic images of the eye using contrast media.
2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Observe fluorescein and indocyanine angiography using a fundus camera and confocal scanning laser ophthalmoscope, leading eventually to hands-on experience of the same, starting with non-critical (late-phase) imaging.
- Critically apply the scientific principles covered in the academic modules that underpin this work-based module.
- Prepare a portfolio of fluorescein and indocyanine angiograms (anonymised) from a series of patients with a range of pathologies affecting the posterior segment and, depending on available resources, the anterior segment of the eye; the pathological conditions must include, as a minimum, ARMD, diabetic retinopathy, other retinal vascular diseases.
- Reflect on the role of angiography compared with other imaging modalities in the diagnosis, treatment and monitoring of relevant ocular diseases.

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	Establish a professional relationship with the patient, identifying and addressing any special needs, analysing patient needs and maintaining patient confidentially.	• Principles of patient-centred care and how they are implemented in clinical practice. • Patient confidentiality and how to maintain confidentiality in clinical practice. • Forms of communication (verbal, non-verbal, written, electronic, etc.) and demonstrate effective communication with patients, relatives, carers and other members of the clinical team. • Patient special needs, e.g. sensory impairment, physical disability, learning disability, cognitive dysfunction, etc. • How to assess patient special needs and provisions that should be made in clinical practice.
1	Minimise risks and hazards, including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks, and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1	Ensure that all the required equipment is working correctly and safely.	• Equipment maintenance and reporting systems.
1	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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• The importance of some key ideas, for example signposting, listening, language, non-verbal behaviour, ideas, beliefs, concerns, expectations and summarising in communication.
1	Review a suitably completed request form, retrieve the patient's records, file, or medical notes, greet the patient, identify yourself and check patient ID.	• Referral routes for ophthalmic and vision science diagnostic investigations. • Requirements for correct completion of request forms and how to validate them. • The importance of checking and confirming the patient identity and the implications of not doing so.
1	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Complete pre-test procedures to obtain angiographic images of the eye using contrast media.	• SOPs. • Personal role, responsibilities and level of competence for performing investigations. • Requirements and protocols for maintenance and calibration of equipment. • Relevant international and national recommendations for performance of investigation, in addition to local protocols. • Requirements for authorisation of request and patient consent. • Precautions and contraindications to the procedure and the relevant personnel to contact for further advice. • Information needs of patients prior to, during and after investigations. • Relevant safety issues, including safety implications associated with
1	Adjust equipment or use supplementary lenses to correct for the patient's refractive error to enable consistent and reproducible image measurements.	
1	Determine the patient's refractive error with autorefraction, keratometry and focimetry as	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	required, obtaining images of suitable clarity and type and in sufficient quantity to respond to the clinical question.	the use of contrast medium. • How to maintain and calibrate equipment according to protocols • Topical medications used for procedure, indications, authorisation and correct method for instillation, and effects. • Contraindications and risks of investigations and relevant actions. • How to recognise complications of intravenous contrast medium and how to take appropriate action. • Relevant principles of physics and instrumentation for imaging modalities. • Reason(s) for selection of the imaging modality according to clinical condition. • How to identify and minimise artefacts and poor quality images due to ocular conditions, operator error and patient compliance. • The relationship between normal and abnormal features with the anatomy, physiology and pathology of the eye and supporting structures, and the significance to diagnosis or treatment. • How to record and store images appropriately. • Requirements for accurate recording of information. • Relevant image acquisition and management system and its correct use. • Infection control procedures.
1	Acquire stereo images where appropriate, in the correct sequence for the display method chosen, and from the image sequence identify and tag stereo pairs for review.	
1	Determine additional tests or expertise needed and take appropriate action, responding appropriately to any adverse reactions to contrast medium and deterioration in the patient's condition.	
1	Evaluate, interpret and annotate images as required, recording and storing images in accordance with relevant protocols and procedures.	
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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
2	Take responsibility for keeping your professional, technical and scientific knowledge and skills up to date.	• Identify and evaluate the potential role for new and innovative technologies and scientific advances.
2	Meet commitments and goals in your professional practice using a range of organisational and planning tools.	• Different methods of planning, prioritising and organising, and how they can enhance personal effectiveness.
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: o medical ethics o confidentiality o information governance o informed consent o equality and diversity o child protection o elder abuse o use of chaperones o probity o fitness to practise o personal health and wellbeing.
2	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

MODULE 6	Assessment of the Electrophysiological Function of the Visual System	Component	Specialist Years 2 and 3
AIM	The aim of this module is to introduce the student to a range of electrophysiological investigations of the visual system while developing their skills with respect to patient-centred, compassionate care, applying their learning from the academic and professional practice modules.		
SCOPE	On completion of this module the student will be able to perform a range of electrophysiological investigations of the visual system. This will include EOGs, ERGs and VEPs, and may include other more specialised tests. 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. Assess electrophysiological function of the visual system.
2. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Observe adult and paediatric patients in an electrophysiology clinics.
- Observe tests being performed in theatre and/or ICU (if done locally).
- Experience the tests being performed on self (not necessarily with pupillary dilation and topical anaesthesia).
- Gain experience of using the equipment to perform standard tests (VEP, PERG, ERG, EOG), including basic analysis of results.
- Gain experience of performing test on colleagues/volunteers, and experimenting to observe the effects of varying stimulus and recording parameters.
- Critically apply the scientific principles covered in the academic modules that underpin this work-based module.
- Prepare a portfolio containing electrodiagnostic tests (anonymised) from a series of patients with a range of pathologies.

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	Establish a professional relationship with the patient, identifying and addressing any special needs, analysing patient needs and maintaining patient confidentially.	• Principles of patient-centred care and how they are implemented in clinical practice. • Patient confidentiality and how to maintain confidentiality in clinical practice. • Forms of communication (verbal, non-verbal, written, electronic, etc.) and demonstrate effective communication with patients, relatives, carers and other members of the clinical team. • Patient special needs, e.g. sensory impairment, physical disability, learning disability, cognitive dysfunction, etc. • How to assess patient special needs and provisions that should be made in clinical practice.
1	Minimise risks and hazards, including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks, and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1	Ensure that all the required equipment is working correctly and safely.	• Equipment maintenance and reporting systems.
1	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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• The importance of some key ideas, for example signposting, listening, language, non-verbal behaviour, ideas, beliefs, concerns, expectations and summarising in communication.
1	Review a suitably completed request form, retrieve the patient's records, file, or medical notes, greet the patient, identify yourself and check patient ID.	• Referral routes for ophthalmic and vision science diagnostic investigations. • Requirements for correct completion of request forms and how to validate them. • The importance of checking and confirming the patient identity and the implications of not doing so.
1	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role. • The importance of explaining the procedure for each investigation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Clinical indications for and contraindications to each investigation. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Perform pre-test procedures prior to undertaking electrophysiological investigations of the visual system, including setting up trial frame correction relevant to optical prescription.	• SOPs. • Personal role, responsibilities and level of competence for performing investigations. • Requirements and protocols for maintenance and calibration of equipment. • Relevant international and national recommendations for performance of investigation, in addition to local protocols. • Precautions and contraindications to the procedure and the relevant personnel to contact for further advice. • Likely electrophysiological consequences of the clinical condition being investigated. • How to set up a trial frame and principles of refraction.
1	Prepare, position and apply electrodes appropriate for the test being performed, and adjust equipment parameters according to the test being performed.	
1	Continuously monitor results and	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	patient awareness for validity, accuracy and clinical usefulness, and check results for reproducibility.	• How to take relevant clinical history and the range of data that will assist assessment. • How to instruct and reassure the patient to maximise effectiveness and compliance. • Equipment and electrodes being used and their characteristics. • How to adjust equipment parameters and the reasons for such adjustments. • How to prepare the patient, select and correctly position and apply and remove electrodes. • Types and purpose of stimulators and their correct use. • Structure and function of the visual system. • Possible interdependencies and interaction between different investigations. • How to check reproducibility of results. • Stimulus modalities and characteristics. • How to annotate recordings. • How to recognise normal and abnormal findings and relevant artefacts in different patient groups and take corrective action when artefacts are recognised. • Requirements for accurate and legible recording of information. • Infection control procedures. • Effect of mydriatics on electrophysiological results. • Special requirements for intra-operative measurements.
1	Evaluate presence of noise or artefact in the signal, determine the cause and take relevant corrective action, and annotate accordingly.	
1	Annotate recordings legibly to show control settings, stimulus settings, clinical states and other relevant data.	
1	At end of the investigation remove electrodes, clean skin, clean and sterilise electrodes according to protocols, and remind the patient of any possible after-effects of medication or investigation.	
1	Prepare data in a suitable form for clinical reporting and provide factual assessment of results, recognising when additional tests or expertise may be needed, and act appropriately.	
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	• 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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	commitment to your CPD.	• How continuous personal development can improve personal performance.
2	Take responsibility for keeping your professional, technical and scientific knowledge and skills up to date.	• Identify and evaluate the potential role for new and innovative technologies and scientific advances.
2	Meet commitments and goals in your professional practice using a range of organisational and planning tools.	• Different methods of planning, prioritising and organising and how they can enhance personal effectiveness.
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: o medical ethics o confidentiality o information governance o informed consent o equality and diversity o child protection o elder abuse o use of chaperones o probity o fitness to practise o personal health and wellbeing.
2	Work constructively and effectively as a member of a MDT.	• The underpinning principles of effective teamwork and working within and across professional boundaries.

MODULE 7	Low Vision	Component	Specialist Years 2 and 3
AIM	The aim of this module is to enable the student to extend their skills in the assessment and rehabilitation of patients with low vision. They will also be expected to develop their skills with respect to patient-centred, compassionate care, applying their learning from the academic and professional practice modules.		
SCOPE	This module introduces the student to the methods for assessment of patients with low vision, and the provision and training of patients in the use of optical, electronic and other low vision aids. The student will understand the importance of a patient-centred approach to identifying the goals of vision rehabilitation, and in training and supporting the patient in achieving these goals. The student will also gain understanding of their role in the context of the wider vision rehabilitation team, knowing when to seek advice, assistance and support for the patient as needed. 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 continuous professional development.		

LEARNING OUTCOMES

On successful completion of this module the student will:

1. Assess vision of patients with low vision and the holistic needs of the patient in the context of their vision impairment.
2. Provide and train patients in the use of optical and electronic low vision aids and the use of vision enhancement techniques.
3. Recognise the impact of the working/home environment on the use of vision and suggest environmental modifications, including the use of contrast, lighting and ergonomic changes.
4. Adhere to appropriate standards of professional practice as defined in *Good Scientific Practice*.

CLINICAL EXPERIENTIAL LEARNING

The clinical experiential learning for this module is:

- Critically apply the scientific principles covered in the academic modules for this work-based module.
- Know the criteria for certification as sight impaired (partially sighted) or severely sight impaired (blind), understand the difference between certification and registration, and the outcomes of certification and registration for the patient.
- Appreciate how the RVI (Referral for Visual Impairment) and LVL (Low Vision Leaflet) can be used to facilitate direct referrals to the local sensory impairment team (all with the client's/patient's permission).
- Appreciate the consequences of vision loss to the patient's health, emotional wellbeing and social interaction, and discuss and seek advice from members of the rehabilitation team or other professionals or services as appropriate.
- Observe and reflect on the work of a rehabilitation officer in the provision of training in mobility and daily living skills.
- Obtain information about the wider vision rehabilitation team, social services, voluntary and other agencies that provide support to patients with vision impairment.

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	Establish a professional relationship with the patient, identifying and addressing any special needs, analysing patient needs and maintaining patient confidentially.	• Principles of patient-centred care and how they are implemented in clinical practice. • Patient confidentiality and how to maintain confidentiality in clinical practice. • Forms of communication (verbal, non-verbal, written, electronic, etc.) and demonstrate effective communication with patients, relatives, carers and other members of the clinical team. • Patient special needs, e.g. sensory impairment, physical disability, learning disability, cognitive dysfunction, etc. • How to assess patient special needs and provisions that should be made in clinical practice.
1	Minimise risks and hazards, including the control of infection in accordance with health and safety policies.	• 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. • The relevant health and safety regulations specific to the investigations, the potential hazards and risks and the actions to be taken to minimise these. • Use of safe manual handling practices, COSHH and risk management guidelines.
1	Ensure that all the required equipment is working correctly and safely.	• Equipment maintenance and reporting systems.
1	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.

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		• The importance of some key ideas, for example signposting, listening, language, non-verbal behaviour, ideas, beliefs, concerns, expectations and summarising in communication.
1	Review a suitably completed request form, retrieve the patient's records, file, or medical notes, greet the patient, identify yourself and check patient ID.	• Referral routes for vision rehabilitation. • Requirements for correct completion of request forms and how to validate them. • The importance of checking and confirming the patient identity and the implications of not doing so.
1	Explain the procedure to the patient and gain informed consent.	• The importance of introducing yourself and your role. • The importance of explaining the procedure for vision rehabilitation to the patient and gaining informed consent. • The relevant procedures and requirements for patient conformance. • Principles, guidance and law with respect to informed consent. • Different forms of patient consent and the contexts in which they are applicable.
1	Ensure patient has up-to-date correction of refractive error, as required.	• Personal role, responsibilities and level of competence for performing assessment and training. • Requirements and protocols for maintenance and calibration of equipment. • Relevant international and national recommendations for performance of investigation, in addition to local protocols. • Requirements for authorisation of request and patient consent. • Causes and forms of vision impairment and their impact on health, wellbeing and social interaction of patients. • Assessment of vision in patients with low vision, including visual acuity, contrast sensitivity and field of vision. • Types of optical, electronic and other low vision aids, and training of patients in their use. • The impact of the working/home environment on the use of vision.
1	Obtain a patient history, including onset, duration and nature of vision loss, and difficulties the patient is experiencing as a consequence of vision loss, confirming this with information in the patient's record as appropriate.	
1	Identify with the patient their needs and goals of vision rehabilitation.	
1	Assess visual acuity for distance and near.	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
1	Assess contrast sensitivity as indicated or required.	• Vision enhancement techniques, including the use of scanning, eccentric viewing and steady eye or page navigation techniques, colour and contrast. • Environmental modifications, including the effective use of lighting, glare control and ergonomic changes. • Rehabilitation for vision impairment, including mobility and daily living skills, emotional support and counselling. • The roles of the wider vision rehabilitation team, social services, voluntary and other agencies that provide support to patients with vision impairment. • When to seek advice and support for patients from other members of the rehabilitation team or other professionals or services as appropriate. • Infection control procedures and their correct application.
1	Assess visual field, including peripheral field loss and for central scotomata, as appropriate.	
1	Identify current use of low vision aids and their effectiveness.	
1	Select, provide and assess effectiveness of low visions aids appropriate to the degree and nature of the patient's vision impairment.	
1	Provide a course of training in the use of the selected low vision aids, and vision enhancement techniques, adapting as needed to the patient's requirements, ability and understanding.	
1	Suggest environmental modifications, including the use of contrast, lighting and ergonomic changes.	
1	Involve relatives, friends and carers to support, encourage and assist in the use of low vision aids, as appropriate.	
1	Identify other patient needs relevant to their vision impairment and seek advice and support for the patient	

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
	from other members of the rehabilitation team or other professionals or services as appropriate.	
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	Take responsibility for keeping your professional, technical and scientific knowledge and skills up to date.	• Identify and evaluate the potential role for new and innovative technologies and scientific advances.
2	Meet commitments and goals in your professional practice using a range of organisational and planning tools.	• Different methods of planning, prioritising and organising and how they can enhance personal effectiveness.
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: o medical ethics o confidentiality o information governance o informed consent o equality and diversity o child protection o elder abuse o use of chaperones

KEY LEARNING OUTCOMES	COMPETENCES	KNOWLEDGE AND UNDERSTANDING
		○ probity ○ fitness to practise ○ personal health and wellbeing.
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 14: APPENDICES

Appendix 1: Contributor List

The BSc curriculum for Physiological Sciences in the Neurosensory Sciences theme has been co-ordinated by the MSC team with valued contributions throughout the development process from the following professionals in each specialism.

Neurosensory Sciences curriculum working group

To 2015

Audiology specialism working group

Amanda Casey	Aston University, Birmingham
Mark Lutman	University of Southampton
Nick Thyer	University of Leeds

Neurophysiology specialism working group

Joanne Horrocks	York Hospitals NHS Foundation Trust
Nigel Hudson	Plymouth Hospitals NHS Trust
Richard Pottinger	St Bartholomew's Hospital, London
Peter Walsh	North Bristol NHS Trust

Ophthalmic and Vision specialism working group

Rosalind Harrison	Burton Hospitals NHS Trust, Staffordshire
Graham Holder	Moorfields Eye Hospital, London
Vikki McBain	Aberdeen Royal Infirmary

In addition, the professionals detailed above who have worked closely with the MSC professional advisors have utilised the skills and knowledge of a wider reference group relevant to their specialism.

The BSc (Hons) curriculum for Physiological Sciences in the Neurosensory Sciences theme has also been circulated to the following professional bodies and societies for their comments and contributions:

AHPO	The Association of Health Professions in Ophthalmology
ANS	The Association of Neurophysiological Scientists
AOSP	Association of Ophthalmic Science Practitioners
BAA	British Academy of Audiology
BARS	The British Association of Retinal Screeners
BriSCEV	British Society for Clinical Electrophysiology of Vision

BSA	British Society of Audiology
BSCN	British Society for Clinical Neurophysiology
IPS	Institute of Physiological Sciences
OIA	The Ophthalmic Imaging Association
RCCP	The Registration Council for Clinical Physiologists

From 2015

Paul Furlong	Lead editor, Aston University

Audiology

Huw Thomas	Sub-editor, Queen Alexandra Hospital, Cosham, Portsmouth and National School of Healthcare Science
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Barry Bardsley	University of Swansea
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Sarah Fancy	Reading
John Fitzgerald	Norwich
Robert Frost	Nottingham
Rob Gardner	Bradford
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Helen Martin	Middlesbrough
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Marc Rayan	Middlesex University

Ophthalmic and Vision Science

Dorothy Thompson	Sub-Editor; Great Ormond Street Hospital
Vikki McBain	Aberdeen Royal Infirmary
James Wolffsohn	Aston University

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 give feedback on the proposed revisions to the scientific content between December 2015 and February 2016.

Appendix 2: BSc (Hons) Healthcare Science Amendments

March 2016

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.

Theme-specific modules
Flexibility has been introduced into the themed modules, specifically the learning outcomes for the 10-week work-based rotation. These now include the learning outcomes of 'Observe and assist where practically possible…'. This allows some flexibility in the knowledge delivery.

Specialist modules (all)
The learning outcomes in the curricula have been revised to reflect wider changes occurring in healthcare, including: the rise of an ageing population with a range of co-morbidities; the increase in the number of patients with dementia; the challenges posed by patients from other cultures who do not speak English as their first language. These all impact on the delivery of safe services and challenge the delivery of patient centred care – particularly across multiprofessional teams.

The taxonomy has been revised to reflect the expected learning progression

Specialist modules: Audiology

1. The module content has been re-ordered so the adult audiological services and hearing aid practice appear as a Year 2 Audiological Science I outcome. Practice delivery remains spread across Years 2 and 3 for flexibility of delivery.
2. Modules in vestibular, paediatrics and tinnitus have been transferred from optional to compulsory modules.

Specialist modules: Neurophysiology

1. The module has been developed to broaden knowledge and exposure to multi-modal evoked response techniques. Clinical competence, however, is not expected across all modalities as an expected outcome. The students need to demonstrate an understanding of the nature and value of multi-modal measurements.

Specialist modules: Ophthalmic and Vision Sciences

1. To achieve comparable academic learning outcomes with other neurosensory curricula by reducing the number of learning outcomes in some modules and reducing the depth of some learning outcomes. Notably:
   - The module has been amended to reduce the emphasis on primary optometric work. This is a level of accomplishment that takes 3yr dedicated optometry or orthoptic degree with clear career path. Is a protected competence under the Opticians Act.
   - Pharmacology content reduced, as prescribing medicines would not be part of the PTP remit. It is now incorporated and more simply covered in Year 1/Year 2 within other sections, e.g. pupil reactions, accommodation etc.
   - Two modules in Year 2, OVS(i) (Pathology) and OVS(iv) (Patient Assessment), are combined to make a more intuitive integrated section worth 50 credits. The objective is to see the techniques in practice first and then follow on with the theory and underpinning knowledge.
   - Module integration introduces all tests in Year 2, and therefore supports work-based experience. Allows the PTP a better overview of how everything fits together in Year 3, and may be more flexible to deliver.
2. Visual electrophysiology is offered as an optional module. Some neurophysiological services perform the visual electrophysiology and this may be offered for both specialisms.

April 2017

The recommended number of assessments per year on p.19 was clarified and a table added to illustrate this. The new version of the curriculum is PTP Neurosensory Sciences Version 1.01 2016.

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 (Neurosensory Sciences)

A	Audiology
AEP	Auditory Evoked Potentials
AC	Alternating Current
ARMD	Age-related Macular Degeneration
BAA	British Academy of Audiology
BAHA	Bone-anchored Hearing Aid
BPPV	Benign Paroxysmal Positional Vertigo
BSA	British Society of Audiology
CSF	Cerebrospinal Fluid
dB	Decibel
DC	Direct Current
EEG	Electroencephalogram
EOG	Electroocular Gram
ERG	Electroretinogram
FM	Frequency Modulated
GWAS	Genome-wide Association Studies
ICF	International Classification of Functioning, Disability and Health
ICG	Indocyanine Green
IOL	Intraocular lens
IV	Intravenous
LVA	Low Vision Assessment
LVL	Low Vision Leaflet
N	Neurophysiology
NS	Neurosensory
OCT	Optical Coherence Tomography
OVS	Ophthalmic and Vision Science

PCR	Polymerase Chain Reaction
PERG	Pattern Electroretinogram
PTA	Pure Tone Audiometry
REM	Real Ear Measurements
RMS	Root Mean Square
RVI	Referral for Visual Impairment
SLO	Scanning Laser Ophthalmoscopy
SOL	Space Occupying Lesion
SLP	Scanning Laser Polarimetry
SOP	Standard Operating Procedure
SSEP	Somatosensory Evoked Potentials
VEP	Visual Evoke Potential
WHO	World Health Organisation

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.

Term	Definition
Learning outcome	A high-level, outcome-based statement that describes what a student will be able to do at the end of the module.
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					
3. Can discuss the procedures used to obtain the results					

Please grade the following areas using the scale below	Below expectations	Borderline	Meets expectations	Above expectations	Unable to comment[1]
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?*					
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?*					

Please grade the following areas using the scale below	**Below expectations**	**Borderline**	**Meets expectations**	**Above expectations**	**Unable to comment[1]**
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:
www.networks.nhs.uk/nhs-networks/msc-framework-curricula/ptp

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).

www.nshcs.org.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 16th November 2016