



**MODERNISING SCIENTIFIC CAREERS**

**Practitioner Training Programme**

**BSc (Hons) HEALTHCARE  
SCIENCE**

**CURRICULUM**

**CLINICAL  
PHOTOGRAPHY**

**2014/15**

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## READERSHIP

This Practitioner Training Programme (PTP) BSc (Hons) Healthcare Science curriculum describes an integrated academic and work based undergraduate degree programmes that, together with the work based learning guide, provide the details of each themed PTP in the UK for:

- academic and administrative staff, including external examiners within Higher Education Institutions (HEIs);
- students, host departments and managers of services that employ healthcare science staff;
- work based trainers, including all those involved in supervising, mentoring, coordinating, assessing and delivering PTP education and training;
- Local Education and Training Boards (LETBs) and all healthcare science education and training commissioning organisations in the UK;
- patients and the public;
- Modernising Scientific Careers (MSC) accreditation panels.

A glossary of terms used is provided in the Appendices.

# Section 1: Introduction to Modernising Scientific Careers (MSC) and the Practitioner Training Programme (PTP)

## 1.1 Introduction to Modernising Scientific Careers (MSC)

1. The healthcare science (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 healthcare science 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) [Appendix 3] 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 Education and Training Standards of the Health and Care Professions Council (HCPC) together form the basis for all MSC training curricula which contextualise the Standards of Proficiency set down by the HCPC in a way that is accessible to the profession and the public.
3. The healthcare science workforce and services have traditionally been grouped into three broad areas called divisions, namely: Life Sciences/Clinical Laboratory Sciences, Physical Sciences/Medical Physics and Biomedical Engineering, and Physiological Sciences/Clinical Physiology Sciences. Within each division there are a number of healthcare science 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 five PTP themes within healthcare science, which enables training across a total of 16 healthcare science specialisms.

## 1.2 Introduction to the Practitioner Training Programme (PTP)

4. The BSc (Hons) is designed to provide healthcare science practitioners (HCSP) with a strong science-based, patient-centred clinical training in a specialist area of healthcare science. The overall aim of this HCSP training and education programme is to prepare the student to fulfil the function of a HCSP working in a clinical healthcare science 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 the patient pathways for example a clinic, patient education programme, medical records and other areas of healthcare science. This will give the student a wide appreciation of the many specialisms and a more holistic view of the areas which contribute to high-quality patient centred care.

5. On successful completion of the programme the student should be able to fulfil the role of a Healthcare Science Practitioner. The diagram below depicts the broad framework around which all BSc (Hons) degree programmes in Healthcare Science being implemented as part of the Modernising Scientific Careers (MSC) Programme are structured. Each of the three divisions within the MSC Programme (Life Sciences, Physical Sciences and Biomedical Engineering and Physiological Sciences) have interpreted and adapted this framework. Further refinement has been undertaken by each Higher Education Institution to develop and deliver BSc (Hons) programmes that enable students to meet the learning outcomes of the course.

### HIGH LEVEL FRAMEWORK INTEGRATED BSc (Hons) IN HEALTHCARE SCIENCE

<b>Year 3 Application to Practice</b>	Professional Practice [10]	Scientific Basis of Healthcare Science Specialism [60]		Practice Based Project [30]	Work-based Training <b>25 weeks</b> [20]	<b>*46 wks</b>
	Generic Curriculum	Specialism Specific Curriculum				
<b>Year 2 Techniques &amp; Methods</b>	Professional Practice [10]	Research Methods [10]	Scientific Basis of Healthcare Science [60]	Principles of Scientific Measurement [30]	Work-based Training <b>15 weeks</b> [10]	<b>*40 wks</b>
	Generic Curriculum	Division/Theme Specific Curriculum			Discipline	
<b>Year 1 Scientific Basics</b>	Professional Practice [10]	Scientific Basis of Healthcare Science - Integrated Module across Body Systems will usually include informatics, maths and statistics [60]		Scientific Basis of Healthcare Science [50]	Work-based Training <b>10 weeks</b>	<b>*36 wks</b>
	Generic Curriculum		Division/Theme Specific Curriculum			

**Extended Academic Year \*estimated duration [XX] = number of credits**

	Generic Modules: common to all divisions of Healthcare Science
	Division/Theme Specific Modules: Life Sciences; Medical Physics Technology; Clinical Engineering; Cardiovascular, Respiratory and Sleep Sciences; Neurosensory Sciences
	Specialist Modules: specific to a specialism

6. Once in employment as a Healthcare Science Practitioner a range of career development options will be available including in-post through a structured programme of CPD, provided by Accredited Specialist Scientific Practice.

### 1.3 Practitioner Training Programme Outcomes: 2014/15

7. Graduates of the BSc (Hons) will possess the essential knowledge, skills, experience and attributes required of a newly qualified Healthcare Science Practitioner (HCSP). Graduates 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 and all HCSP will work in roles that will have an

impact on patient care and outcomes, therefore all learning should be in the context of the patient and patient centred care.

On completion of the BSc (Hons) all graduates should be able to demonstrate the following.

### **Professional Practice**

- Professional practice that meets the professional standards of conduct, performance and ethics defined by *Good Scientific Practice* and the regulator (HCPC), and is safe, lawful and effective, and within the scope of practice for the role undertaken, while maintaining fitness to practise;
- 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;
- 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;
- The ability to work, where appropriate, in partnership with other professionals, often as part of a multidisciplinary team, supporting staff, service users and their relatives and carers while maintaining confidentiality;
- The ability to work with public, service users, patients and their carers as partners in their care, embracing and valuing diversity;
- 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;
- A conceptual understanding that enables the student 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 healthcare science;
- Apply problem-solving skills, evaluate evidence, arguments and assumptions, to reach sound judgements and to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences;

### **Scientific and Clinical Practice**

- 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 healthcare science;
- The ability to apply scientific method and approaches to analytical techniques, healthcare science research, development and innovation;
- Performance of technical investigations/skills and technical reporting of quality assured tests, investigations and interventions on patients/samples safely and skilfully, adhering to applicable legislation and in compliance with local, national and international guidelines;
- Provision of therapeutic interventions, some of which may be specialist, in a number of specialisms;

- 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 healthcare science;
- High quality clinical and scientific practice that applies basic, core scientific knowledge, skills and experience in a healthcare setting, places the patient and the 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**

- 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 healthcare science);
- 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;
- An understanding of the strengths, weaknesses and opportunities for further development of healthcare and healthcare science 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**

- Scientific and clinical leadership based on the continual advancement of their knowledge, skills and understanding through the independent learning required for continuing professional development.



## **Section 2: Entry Routes, Award Title, Delivery, Accreditation of Prior Learning**

### **2.1 Entry Routes**

8. Entry to BSc (Hons) Healthcare Science programmes will be the responsibility of the HEI. However, employers and patients are expected to be part of the selection process. Whilst the majority of students are expected to be recruited directly there is provision for current in-service, employed members of the healthcare science workforce to enter a BSc (Hons) programmes with the support of their employer.

### **2.2 Progression, Compensation, Condonation**

9. Whilst 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 conditions set out below are required as part of the MSC BSc (Hons) degree programme accreditation process irrespective of the HEI's own academic regulations.
10. All modules are mandatory; no condonation, compensation 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. Where students 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 they can progress with minimum delay.

### **2.3 Award Titles**

11. The title of the degree programme should be consistent with current MSC terminology. The award titles are:

Certificate in Higher Education in Healthcare Science  
Diploma in Higher Education in Healthcare Science  
BSc (Hons) Healthcare Science (Specialism)

If this presents an HEI with a specific difficulty they should contact the DH MSC team for further advice and guidance at [mscenquires@dh.gsi.gov.uk](mailto:mscenquires@dh.gsi.gov.uk).

### **2.4 Mode of Delivery: Full-time or Part-time**

### **2.5 Relevant Quality Assurance Agency (QAA) Code(s) of Practice**

12. HEIs should adhere to the current QAA Code of Practice for the Assurance of Academic Quality and Standards in Higher Education. At the time of preparing this document the QAA is in the final stages of a major review of the Code of Practice and is expected to publish 'The UK Quality Code for Higher

Education'. Further details can be found on the QAA website:  
<http://www.qaa.ac.uk/Pages/default.aspx>

## 2.6 Awarding Body

13. While the full programme could be delivered and awarded by a single university provider, equally a collaborative partnership between a number of universities may be preferable. It would be expected that where collaborative provision is proposed a memorandum of agreement or understanding is in place. The delivery arrangements must be clearly defined, including the academic and logistical responsibilities of each partner and the financial arrangements between the university and its partner. The awarding university must satisfy itself that the partner is able to discharge its responsibilities satisfactorily and will be responsible for the quality assurance of the programme.

## 2.7 Accreditation of Prior Learning

14. A process for Accreditation of Prior Learning (APL) that conforms to the guidelines below must be defined by each HEI provider. This must clearly define the minimum and maximum level of APL that will be awarded, the timing, costs and process, and align to statutory requirements for healthcare science. Good practice supports the view that such prior learning should only be used once, double counting is not recommended.

QAA 'Higher education credit framework for England: guidance on academic credit arrangements in higher education in England', August 2008

<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>

QAA 'Guidelines on the accreditation of prior learning', September 2004

<http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/Guidelines-on-the-accreditation-of-prior-learning-September-2004.aspx>

HCPC 'Standards of education and training', September 2009

<http://www.hpc-uk.org/aboutregistration/standards/sets/>

## 2.8 Programme Delivery and Monitoring

15. It is expected that all BSc (Hons) Healthcare Science programmes should be an integral part of the faculty/school and that opportunities for inter-professional learning are maximised. There should be an appropriate balance between academic staff and visiting specialist staff to ensure teaching reflects current NHS practice

## Section 3: The BSc (Hons) Healthcare Science Curriculum

### 3.1 Purpose

16. The purpose of the BSc (Hons) curriculum is to clearly set out the expectations of graduates from the programme, including the academic skills, knowledge and understanding that each student will be expected to gain, develop and apply during work based training. Set within an integrated academic and work based programme the expectations of all BSc (Hons) programmes should be read alongside the work based learning guides.

Additionally, the purpose is to signal the importance of providers being aware of the current structure, strategic direction and priorities of healthcare delivery patients and their care and ensure that the patient and service provided by healthcare science is at the centre of all learning, assessment and work based practice is equally important.

### 3.2 Curriculum Development and Maintenance

17. Curriculum development began in 2010 and has been led by the Modernising Scientific Careers (MSC) team working with NHS and higher education colleagues and patients. Since 2012 the NSHCS has also contributed to curriculum development and maintenance via the professional leads and each of the NSHCS themed boards. Professional bodies have been represented in some curriculum working groups and have also been invited to provide feedback as the work developed, either directly or via the NSHCS themed boards.

All programmes have also been reviewed and approved by Health Education England via the Healthcare Science Professional Board Education and Training Working Group. External feedback from a review undertaken in 2012 by the Institute of Education has been incorporated into all programmes from 2013 onwards. All of the latest versions of the BSc (Hons) Healthcare Science programmes and work based learning guides can be found on the NHS Networks website by following the link: <http://www.networks.nhs.uk/nhs-networks/msc-framework-curricula>

All MSC curricula will be subject to regular review, with all stakeholders given the opportunity to contribute to each review. This process is currently being set out in an MSC long-term curriculum maintenance plan.

18. BSc (Hons) Healthcare Science programmes leading to an academic award must be aligned to current NHS policy and strategy, and at the time of writing this guide should consider the recommendations of:
- *The Future of the Healthcare Science Workforce (2008)*
  - *Modernising Scientific Careers: The Next Steps, a consultation (2008)*
  - *Modernising Scientific Careers: The UK Way Forward (2010)*
  - *Strategy for UK Life Sciences (December 2011)*
  - *Strategy for UK Life Sciences One Year On (2012)*

- *Innovation Health and Wealth, Accelerating Adoption and Diffusion in the NHS (December 2011)*
- *NHS Education and Training Outcomes Framework:*  
<http://www.dh.gov.uk/health/2012/01/forum-response/>
- *NHS Constitution*  
[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_132958.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_132958.pdf)
- *NHS Constitution handbook*  
[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_132959.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_132959.pdf)
- *NHS Commissioning Board planning guidance*  
<http://www.commissioningboard.nhs.uk/files/2012/12/everyonecounts-planning.pdf>
- *NHS Mandate*  
<https://www.wp.dh.gov.uk/publications/files/2012/11/mandate.pdf>
- *HEE Design to Delivery that will give you the statutory basis and duties of HEE*  
[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/documents/digitalasset/dh\\_132087.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_132087.pdf)

HEIs should ensure they keep abreast of future strategic direction and policy.

### 3.3 MSC Accreditation

19. All BSc (Hons) Healthcare Science programmes must hold MSC Accreditation to confirm that the degree programme delivered by an HEI meets the requirements of the MSC Scientist Training Programme outlined in *Modernising Scientific Careers: The UK Way Forward* (DH, 2010). This accreditation process is currently the responsibility of the MSC Accreditation team, with advice given by the Health Education England Healthcare Science Professional Board (HEE HCSPB) and its Education and Training Working Group (HEE HCSPB ETWG).

### 3.4 Programme Delivery

20. HEIs are expected to ensure that all teaching, learning and assessment is up to date and informed by research to ensure that at graduation, Healthcare Science Practitioners meet the Framework for Higher Education Qualifications (FHEQ) descriptor at level 6 (<http://www.qaa.ac.uk/>). By undertaking a research project students should become aware of the major contribution the healthcare science workforce makes to research and innovation to benefit patients and the delivery of healthcare.
21. The key principles of programme delivery include:
  - programmes must deliver all of the BSc (Hons) MSC learning outcomes and indicative content, which the HEE HCSPB Education and Training Working Group has advised meets the requirements of *Modernising Scientific Careers: The UK Way Forward*;
  - wherever possible, delivery of the principles and knowledge underpinning practice should occur before the work based learning;

- programmes must meet current NHS education quality metrics and current Health and Care Professions Council (HCPC) Standards of Education and Training;
- the NSHCS, host departments, patients and the public should be involved in the design, implementation, delivery and review;
- assessment programmes must be fair, valid and reliable, and clearly articulated for all modules, and the timing and content should consider and complement the work based assessment programme;
- a robust student support and mentoring system must be in place and arrangements to support students in difficulty, including the support services in place clearly defined;
- 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 international standing that is relevant to the practice of healthcare science and the NHS;

22. The Professional Practice and Good Scientific Practice underpin the BSc (Hons) spanning the academic and work based programme. Key professional practice learning outcomes are included in the BSc (Hons) programme and it is important that the programme embeds the standards of professionalism set out in Good Scientific Practice in all aspects of the delivery and assessment of the programme. Students should be encouraged to develop a range of skills to support their professional life, and continuing professional development spanning communication, leadership, personal reflection, duty of care, duty of candour, critical reflection, giving and receiving feedback, career planning, commitment to lifelong learning.
23. HEIs should ensure that all staff involved in each BSc (Hons) programme have read and are aware of the requirements of *Good Scientific Practice*, a copy of which can be found in the Appendices.

### 3.5 Teaching and Learning

24. It is expected that a blended learning approach will be adopted, based on a model of student-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 expected that a broad range of teaching and learning activities will be utilised, appropriate to the learning outcomes. Students should be enabled to gain the skills necessary to develop the skills to begin to manage their own learning, and to exercise initiative and personal and professional responsibility. The learning strategy matrix and proformas outlined in 'Liberating Learning'<sup>1</sup> describe a range of activities that may be appropriate to this BSc (Hons) programme; they are likely to include:
- Library study

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<sup>1</sup> 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).

- Case study/discussions
- Debate
- Discussion forum
- Expert briefings
- Individual tutoring
- Interactive lectures
- Personal critical reflection and action planning
- Problem-based learning
- Role play
- Student-led and tutor-led seminars
- Skills teaching
- Simulation
- Self-assessment
- Self-directed learning activities
- Team projects
- Tutor-led small group learning

25. It is also expected that e-learning and m-learning<sup>2</sup> opportunities will be available to enable students to be active participants in a range of learning activities. Work based learning will also contribute to the academic educational experience of the students, for example seminars, journal clubs, local, national and international scientific and education meetings.

All contributors to the BSc (Hons) should have up-to-date knowledge of the requirements of the programme, current healthcare science and education practice.

### 3.6 Interprofessional Learning

26. Opportunities to enable interprofessional and interdisciplinary learning, within and outside healthcare science, should be a fundamental part of each programme.

### 3.7 Patient and Public Involvement

27. The HEI programme team should 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.

Descriptions of BSc (Hons) programmes need to make clear and explicit links to new models of service delivery, care and patient pathways. 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 healthcare science workforce to ensure students are aware that their actions

<sup>2</sup> JISC TechDis: see <http://www.jisctechdis.ac.uk/technologymatters/mobilelearning> for further information with respect to mobile (m) learning.

have an impact on the patient and the patient's family. The responsibility of all staff in the NHS to maximise quality and productivity and efficiency and to continually strive to improve services should be stressed. Equally important is the ability of graduates from the STP to communicate with the general public with respect to healthcare science, leading to a better educated public that is encouraged to take responsibility for its own health and wellbeing and has a greater understanding of the role that science plays in society.

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## Section 4: Assessment<sup>3</sup>

### 4.1 Purpose of Assessment

28. The purpose of assessment is to enable the student to demonstrate that they have the requisite knowledge, skills, attitudes and beliefs to work as a Healthcare Science Practitioner and, meet standards of education and training, professional skills, conduct performance and ethics to provide reassurance to the public and the appropriate regulatory body.
29. The BSc (Hons) Healthcare Science assessment programme should support assessment for learning, and in particular:<sup>4</sup>
- 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–student);
  - facilitate the development of self-assessment and reflection in learning;
  - involve students 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 student needs.
30. 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) Healthcare Science should also be cognisant of and complement the work based assessment programme which is defined by the National School of Healthcare Science and must be part of all MSC accredited BSc (Hons) programmes.
31. The assessment programme should be designed to enable the student to obtain regular constructive feedback on progress and achievement. It should encourage critical reflection and action planning, identifying both strengths and areas for development and improvement.
32. The approach to assessment should include and be overseen by a central coordinating leadership group or assessment-focused group who oversee, advise and scrutinise assessment across modules and years in order to build a consistent approach to assessment across the whole programme, involving

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<sup>3</sup> Quality Assurance Agency *Code of Practice*.

<sup>4</sup> 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](http://www.reap.ac.uk/public/Papers/Principles_of_good_assessment_and_feedback.pdf) (accessed 2.12.09).



module/programme leaders as appropriate. The 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.

#### **4.2 Key areas that must be covered by the Assessment Strategy include:**

- A clear statement of accountabilities, including the governance structure for assessment;
- The balance between formative and summative assessment;
- 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 students;
- 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 student feedback will be maximised including time lines and importance of developing student centred feedback;
- The arrangements for assessment of students with a disability;
- 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 to the assessment programme.

## **Section 5: Student Supervision, Support and Mentoring**

- 33.** The student supervision, support and mentoring systems will span the academic and work based elements of the programme and the relationship between the two systems must be clear to students, work based staff and HEI staff. The student supervision, support and mentoring system must be designed to encourage safe and effective practice, independent adult learning, appropriate professional conduct of the student, the safety of the patient and quality assurance of all work activities of each student. 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 student support services.

### **5.1 Fitness to Practise**

- 34.** The HEI must have a clear policy with respect to Fitness to Practise, which must clearly articulate how staff and students are made aware of the policy and how the policy is implemented. Alongside this must be a clear policy on how student 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 Fitness to Practise policy and accurate records maintained within the HEI.

## **Section 6: Annual Monitoring of Progress, Equality and Diversity, Curriculum Review and Updating**

35. All full-time students will usually be expected to complete the requirements for the BSc (Hons) Healthcare Science award within three years after initial registration in accordance with the regulations of each HEI.

### **6.1 Annual Monitoring of Progress**

36. The programme governance must include annual monitoring of progress that considers the outcome of the review of each module (including student 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.

### **6.2 Equality and Diversity**

37. All programmes should reference and be able to demonstrate evidence of adherence to the Disability Discrimination Act 1995 (DDA) which was extended to education in September 2002, following amendments introduced by the Special Educational Needs and Disability Act (SENDA) 2001. Additionally evidence should be demonstrated to show adherence to the Disability Discrimination Act (2005) which includes the Disability Equality Duty and the QAA Code of Practice on Students with Disabilities should be available. All degree programmes should also include evidence of adherence to the 2010 Equality Act and any superseding legislation with respect to equality.
38. As part of this commitment to equality staff should be committed to inspiring and supporting all those who work, train and provide training in healthcare science 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 anybody else on the grounds of ethnic origin, nationality, age, disability, gender, sexual orientation, race or religion. This reflects not only the letter but also the spirit of equality legislation, taking into account current equality legislation and good practice.

Key legislation includes:

- Race Relations Act 1976 and the Race Relations Amendment Act (RRAA) 2000
- Disability Discrimination Act 1995 and subsequent amendments
- Sex Discrimination Act 1975 and 1986, and the 1983 and 1986 Regulations
- Equal Pay Act 1970 and the Equal Pay (Amendment) Regulations 1983 and 1986
- Human Rights Act 1998
- Employment and Equality (Sexual Orientation) Regulations 2003

- Employment and Equality (Religion or Belief) Regulations 2003
- Gender Recognition Act 2004
- Employment Equality (Age) Regulations 2011.

### **6.3 Curriculum Review and Updating**

- 39.** The review and updating of all BSc (Hons) Healthcare Science curriculum will be part of the long-term MSC curriculum maintenance programme currently being developed.

If you have any feedback with respect to this programme please contact:  
msc.hee@nhs.net

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## Section 7: Relationships and Partnerships

### 7.1 National School of Healthcare Science

40. The National School of Healthcare Science (NSHCS) functions within the West Midlands Postgraduate Deanery. The NSHCS provides a national coordinating and oversight function to support the delivery of work based training for STP and PTP programmes. It is responsible for:

- quality assurance work based training environments in NHS premises;
- identification of programme issues which may need to be addressed and resolved and reporting these as part of agreed MSC governance arrangements;
- liaising with each provider of MSC accredited BSc programmes to ensure the integration and coordination needed to deliver the academic and work based programmes;
- liaising with LETBs on local issues and problems and their resolution;
- working with HEIs and if requested work place training departments to provide support as appropriate;
- organising 'Train the Trainer' programmes for HEIs which colleagues in HEI will roll out and quality assure to work based trainers;
- providing advice and support to MSC accredited BSc programmes as necessary;
- accreditation of work based training environments;
- overarching review to ensure common standards of delivery and content and recommending on-going training activities to support the continuing professional development of work based trainers.

The School can be contacted on the following email [nshcs@Westmidlands.nhs.uk](mailto:nshcs@Westmidlands.nhs.uk) and at [www.nshcs.org.uk](http://www.nshcs.org.uk).

### 7.2 The Academy for Healthcare Science

41. The Academy for Healthcare Science (AHCS) provides the professional voice for the healthcare science workforce. 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 healthcare science and scientific services;
- act as the overarching body for professional issues related to education, training and development in the UK health system including the provisions of UK wide quality assurance across education and training arrangements;
- provide the infrastructure to support the professional regulation/registration of the healthcare science workforce including:

- establishing a system of professional accreditation of education and training programmes for the regulation/registration of the healthcare science workforce;
- setting the professional standards for the delivery of accredited registers as required by CHRE (to be renamed the Professional Standards Authority for Health and Social Care) to ensure consistency and coherence across all MSC programmes;
- taking the central role in the sponsorship of the voluntary registers to achieve 'accredited' status as set out by CHRE (to be renamed the Professional Standards Authority for Health and Social Care);
- becoming an HPC education provider for the statutory regulation of clinical scientists;
- establishing a system for equivalence across the whole of the healthcare science workforce.

<http://www.academyforhealthcarescience.co.uk/>

## Section 8: Professional Practice

Professional practice spans the whole of the three-year training programme, underpinning both work based training and the MSc in Clinical Science and is described in the document Good Scientific Practice. This document sets out the principles and values on which good practice undertaken by the Healthcare Science workforce is founded. Wherever possible teaching should be contextualised to patients and patient care recognising that the work of all members of the healthcare science workforce have an impact on patients and their care.

*Good Scientific Practice* sets out for the profession and the public the standards of behaviour and practice that must be achieved and maintained in the delivery of work activities, the provision of care and personal conduct.

*Good Scientific Practice* uses as a benchmark the Health Professions Council (HPC) Standards of Proficiency and Standards of Conduct, Performance and Ethics, but expresses these within the context of the specialities within Healthcare Science, recognising that three groups of the workforce, Biomedical Scientists, Clinical Scientists and Hearing Aid Dispensers are regulated by the HPC. The aim is that the standards are accessible to the profession and understandable by the public.

*Good Scientific Practice* represents standards and values that apply throughout an individual's career in healthcare science at any level of practice. The standards will be contextualised by the role within Healthcare Science that an individual undertakes. This means that the standards must be interpreted based on the role that an individual performs. For example, in supervised roles where individuals work within defined procedures, rather than autonomously, some standards will need to be interpreted appropriately for the context of the specific role. There will, however, always be a requirement for an individual to work within the limits of their scope of practice and competence.

Students and trainees will be expected to be working towards meeting the expectations set out in this document. However, if an individual is undertaking further training and development following qualification from a professional training programme, he or she will be expected to be able to meet the standards in this document within their scope of practice.

The standards have been used to support curriculum development and will be used to underpin the process of judging individual equivalence, particularly for emerging specialisms.

The standards have been divided into five domains. The domains of *Good Scientific Practice* detailed in section 2 are:

1. Professional Practice
2. Scientific Practice
3. Clinical Practice
4. Research and development
5. Clinical Leadership

Further details including the content of each domain can be found in Appendix 3.

Within the BSc (Hons) Healthcare Science Clinical Photography the key outcomes show below are for all students across all modules are shown below.

### **Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Respect and understand individuals' beliefs and ways of coping with illness.
2. Communicate effectively in academic writing of an appropriate format, using correct referencing for scientific and technical reports and essays.
3. Use a range of study skills including time management, organisational skills, using the library, search engines, self-directed learning, critical analysis and avoiding plagiarism.
4. Identify and employ suitable research sources as a basis for written work and conceptual development in practical projects.
5. Use correct terminology when discussing scientific issues.
6. Work safely in relevant areas with due regard to patient, public, staff and self.
7. Adhere to trust/employer infection control policy at all times.
8. Communicate appropriately with the patient in a professional and considerate manner.
9. Recognise the unique challenges and care required when dealing with cardiac patients.
10. Recognise clinically urgent situations and respond accordingly.
11. Present complex scientific principles in simple terms in both oral and written formats.
12. Consistently operate within a sphere of personal competence and level of authority.
13. Manage the physical and practical requirements.
14. Manage personal workload and objectives to achieve quality of care.
15. Actively seek accurate and validated information from all available sources.
16. Work in partnership with colleagues, other professionals, patients and their carers to maximise patient care.
17. Engage with continuing professional development activities.



## Section 9: BSc (Hons) Healthcare Science (Clinical Photography)

An overview of the programme is shown in diagrams 1 below.

**Diagram 1: Route Map showing how the high-level framework has been interpreted for Clinical Photography**

	Year 1 Scientific Basics	Year 2 Techniques and Methods	Year 3 Application to Practice
<p>Route map of BSc (Hons) in Clinical Photography. In Year 1, students follow a generic curriculum which spans all BSc (Hons) Healthcare Science programmes (blue) together and progress to the wider application of Clinical Photography across healthcare science and the wider clinical environment.(yellow). In the latter stages of Year 2, students start to specialise (orange) and by Year 3, the majority of the curriculum is focused on their chosen specialism.</p>	Professional Practice [10]	Professional Practice [10]	Professional Practice [10]
	Scientific Basis of Healthcare Science - integrated module across Body Systems [60]	Research Methods [10]	Current Debates in Clinical Photography [30]
	Introduction to Clinical Photography including <b>10 weeks</b> of work based training [20]	Scientific & Clinical Imaging [30]	Practice Based Research Project [30]
	Informatics, Maths & Statistics [10]	Imaging Practice & Production [30]	Non-clinical photography and design [30]
	Managing Digital Images in a Clinical Environment [20]	Clinical Photography Theory & Practice [30]	Work based Training [20]
		Work based Training [10]	

### Credits

<b>Generic</b>	<b>70</b>	<b>20</b>	<b>10</b>
<b>Division/Theme</b>	<b>50</b>	<b>60</b>	<b>0</b>
<b>Specialism</b>	<b>0</b>	<b>100</b>	<b>110</b>
<b>Total</b>	<b>120</b>	<b>120</b>	<b>120</b>

## Section 10 Generic Modules

This section covers the three generic modules that will be studied by all Healthcare Science students:

- Professional Practice
- Scientific Basis of Healthcare Science
- Research Methods

### Years 1- 3: Generic Module Professional Practice [10 credits in each year]

The overall aim of this module is to ensure that the student has the underpinning knowledge and gains the accompanying skills and attitudes to work as a Healthcare Science Practitioner.

#### Learning Outcomes: Knowledge and Understanding

On successful completion of this module the student will:

1. Understand the structure and management of health and social care services and the management of local healthcare systems in the United Kingdom.
2. Know the current quality improvement structure and processes within the NHS.
3. Understand the need to ensure that the needs and wishes of the patient are central to their care.
4. Know the importance of prioritising the patient's wishes encompassing their beliefs, concerns, expectations and needs.
5. Understand the importance of developing and maintaining the patient-professional partnership.
6. Understand the procedures relevant to the use of chaperones.
7. Understand current child protection regulations relevant to practice as a Healthcare Science Practitioner.
8. Understand the patient and carer perspective with respect to the NHS, diversity of the patient experience, healthcare, illness and disability, including an understanding of the impact of life threatening and critical conditions.
9. Know how health inequalities impact on the quality of care provided by the NHS at national and local level.
10. Know the importance of promoting patient centred care.
11. Know the importance of promoting self-care by the patient.
12. Know and understand the principles that underpin effective verbal and written communication including; verbal and non-verbal communication, communication with patients across the age spectrum, communication with users of the NHS who do not have English as a first language and communication with people with disabilities.
13. Know the importance of the concept of shared leadership and the associated personal qualities and behaviours that promote shared leadership.

14. Know the importance of feedback and frameworks for giving and receiving feedback.
15. Know the underpinning principles of effective team work.
16. Understand the importance of integration across professions, cross division, specialism and boundary working.
17. Know and understand the principles, guidance and laws regarding medical ethics and confidentiality.
18. Know the guidelines and processes for gaining consent.
19. Understand the necessity of obtaining valid consent from the patient.
20. Know the best practice requirements for record keeping within the NHS including accuracy of information recording within patient records.
21. Understand the framework that underpins data security practice in the NHS.
22. Understand the legal framework within which healthcare is provided across the UK including its devolved administrations.
23. Understand the basic principles of infection control and the importance of current infection control measures within the work-base.
24. Know the protocols and practice of basic life support.
25. Understand the need for regulations with respect to patient safety and safe systems within the work-base.
26. Define Standard Operating Procedure, Protocol and Guidelines and understand the purpose of and difference between each document.
27. Know the processes for the distribution of documentation for example the Department of Health (DH), Central Alerting System (CAS), Medical Device Alerts (MDA).
28. Understand the regulations and current procedures in place with respect to equipment safety.
29. Know the common causes of error and understand the critical incident reporting process.
30. Recognise the cause of error and the importance of a no blame culture.
31. Know and understand the legal requirements with respect to equality and diversity.
32. Recognise and accept the responsibilities and roles of the Healthcare Science Practitioner in relation to other healthcare professionals.
33. Know the importance of good time management and the techniques underpinning good time management and organisational skills.
34. Understand the importance of maintaining own health and well being.
35. Understand local guidelines for responding to unacceptable behaviour by patients, carers, relatives, peers and colleagues including harassment, bullying and violent behaviour.
36. Know the core theories of learning particularly those applied to the adult learner and the independent adult learner.
37. Know and understand the theory of reflective practice.
38. Understand the importance of public engagement in science and its role in health and society.
39. Know a history taking, clinical examination framework and process of differential diagnosis and how the information is used to develop clinical management plans.
40. Explain the importance of innovation across healthcare science in particular in the improvement of quality and patient care.

### **Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Demonstrate practice that considers the perspective of the patient and, if appropriate, the carer of the patient.
2. Establish and maintain the patient-professional partnership.
3. Promote patient well-being and self-care.
4. Contribute to quality improvement in the work place.
5. Contribute to productivity initiatives within the work-base including service improvement.
6. Recognise the need for, and accept change working across different provider landscapes as required.
7. Develop and demonstrate self awareness, self management, self development.
8. Act with integrity at all times.
9. Demonstrate accurate record keeping.
10. Demonstrate the ability to adhere to current data security regulations.
11. Work with others, develop and maintain relationships and networks.
12. Accept the responsibility and role of the Healthcare Science Practitioner in relation to other healthcare professionals.
13. Communicate effectively and sensitively with patients, relatives and carers across the age spectrum utilising clear explanations/descriptions.
14. Listen to others and take other viewpoints into consideration.
15. Communicate succinctly and effectively with other professionals as appropriate.
16. Demonstrate the ability to communicate information about the work of the healthcare science workforce to the public.
17. Demonstrate the ability to give effective feedback.
18. Apply appropriately the principles, guidance and laws regarding medical ethics and confidentiality.
19. Demonstrate the ability to gain informed consent.
20. Ensure that personal practice is always provided in line with the legal framework.
21. Work within appropriate equality and diversity frameworks at all times.
22. Apply current regulations with respect to patient safety and safe systems within the work-base including child protection and the use of chaperones.
23. Demonstrate basic life support skills.
24. Demonstrate the ability to work in accordance with a range of Standard Operating Procedures, Guidelines and Protocols.
25. Work within teams, encouraging and valuing contributions from all members of the team.
26. Work to ensure that the team are aware of risks and work together to minimise risk and take actions that always promote patient safety.
27. Work well in a variety of different teams and team settings, and contribute to discussion on the team's role in patient safety.

28. Observe the role of the multi-disciplinary team in patient care.
29. Demonstrate adherence to current infection control regulations at all times.
30. Demonstrate adherence to the regulations and current procedures in place with respect to equipment safety.
31. Recognise the causes of error and learn from them, realising the importance of honesty and effective apology.
32. Recognise the desirability of monitoring performance, learning from mistakes and adopting a no blame culture in order to ensure high standards of care and optimise patient safety.
33. Maintain own health and well-being.
34. Demonstrate the ability to prioritise and organise academic and work based tasks in order to optimise own work and the work of the department.
35. Develop skills of an independent learner and demonstrate a commitment to Continuing Professional Development.
36. Apply skills of reflection to continually improve performance, acknowledging and acting on feedback.
37. Demonstrate application of new healthcare science developments.
38. Demonstrate ability to problem solve.

### **Indicative Content**

- Structure and management of health and social care services in the UK
- Patient-professional partnerships
- Patient and carer perspectives and the diversity of the patient experience
- Use of chaperones
- Current child protection regulations relevant to practice as a Healthcare Science Practitioner
- Health inequalities
- Disability including learning disabilities
- Patient wellbeing and self care
- High Quality Care for All
- Evidence based practice
- Audit
- Service Improvement
- Leadership and management within the NHS
- Verbal and non-verbal effective communication
- Effective written communication
- Communication with colleagues and cooperation
- Communication within patients across the age spectrum
- Time management and decision making
- Principles of medical ethics and confidentiality
- Valid consent
- Equality and diversity
- Legal framework for practice including fitness to practice
- Safety - prioritisation of patient safety in practice
- Safety - team working and patient safety
- Safety - equipment management
- Safety - safety testing

- Standard Operating Procedures, Guidelines and Protocols
- Basic life support
- Infection control
- Complaints
- Scientific error including critical incident reporting
- Personal health and behaviour
- Local guidelines for responding to unacceptable behaviour by patients, carers, relatives, peers and colleagues including harassment, bullying and violent behaviour
- Principles of quality and safety improvement including quality audit, quality assurance and quality management
- Equipment safety
- Health and well-being
- Continuing Professional Development
- Reflective practice
- Independent adult learning
- Clinical skills, differential diagnosis and clinical management plans

**Year 1:**  
**Generic Module**  
**Scientific Basis of Healthcare Science**  
**[60 credits]**

The overall aim of this module is to ensure that the student has the underpinning knowledge of anatomy, physiology, pharmacology, pathology, biochemistry, immunology, epidemiology, public health medicine, genetics, microbiology and the psychosocial dimensions of health to provide the foundations for study in any of the three divisions of healthcare science namely Physical Sciences and Biomedical Engineering, Life Sciences, and Physiological Sciences.

**Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Understand the chemical, cellular and tissue level of organisation of the body.
2. Describe the anatomy, physiology and pathology of the body across the Integumentary, Skeletal, Nervous, Cardiovascular (including blood, blood vessels and lymphatic system), Respiratory, Endocrine, Renal, Gastrointestinal (including nutrition), Urinary and Reproductive systems - see footnote.
3. Know the structure and function of the cell.
4. Know the process by which embryonic development occurs from conception to birth.
5. Explain the main principles and core concepts of clinical genetics and genomics and discuss in the context of patients referred to services provided by your division/specialism.
6. Know the cellular, tissue and systems responses to disease including cell death, inflammation, neoplasia, hypertrophy, hyperplasia, tissue

- responses to injury and repair.
7. Understand the basic principles of histology including microscopic and staining techniques.
  8. Describe the pathophysiology of disease development in common diseases across the body systems.
  9. Understand the basic principles of microbiology including natural defences, infection control, bacteria, recognition of extracellular pathogens, virus types and structures, viral infection and replication.
  10. Understand the basic principles of immunology.
  11. Understand the basic principles of biochemistry and metabolism.
  12. Know the factors that affect the health of the population and how these may be addressed.
  13. Know how factors affecting health may contribute to inequalities in health between populations.
  14. Understand basic mathematical concepts.
  15. Understand basic epidemiological and statistical concepts and how these contribute to evidence-based medicine.
  16. Know the basis of health protection including principles of surveillance, infectious disease control and emergency planning; a basic understanding of how epidemiology is used in planning health services; how epidemiology relates to individual patients and how chronic disease may impact on a patient.
  17. Explain the principles of screening programmes in healthcare and be aware of current screening programmes in a relevant Division.
  18. Examine patients' responses to illness and treatment and consider the impact of psychological and social factors, including culture, on health and health-related behaviour.
  19. Know the difference between pharmacology, clinical pharmacology, therapeutics and prescribing and medicine management.
  20. Understand the basic principles of pharmacology, pharmacokinetics and therapeutics including drug names and classifications, definitions of terms and basic mechanisms.
  21. Know the basic principles of physics that underpin healthcare science e.g. ultrasound, radiation, chromatography.
  22. Know how reference ranges are generated and their limitations.
  23. Understand how the body changes from birth to old age.
  24. Understand the role of genomics in medicine.
  25. Be aware of potential new developments in the field of healthcare science.

*Footnote: This module should be taught at an introductory level with learning developed further in division and specialism specific modules*

### **Indicative Content**

- Basic principles of
  - The Cell
  - Molecular Biology (Enzymes, Proteins, Metabolism)
  - Biochemistry
  - Microbiology/Infection Control

- Immunology
- Pharmacology, Therapeutics, Pharmacokinetics
- Genomics and its application in healthcare
- Epidemiology
- Public Health Medicine
- Introduction to Anatomy, Physiology and Pathology across body systems
- Cellular, tissue and systems responses to disease
- Pathophysiology of disease development in common diseases across the body systems
- Health Protection
- Introduction to screening in healthcare e.g. what is screening and when is a screening programme justified and the organisation of screening
- Basic principles of physics including Ultrasound, Radiation, Chromatography
- Introduction to Physics, Medical Physics and Clinical Engineering
- Response to illness, health beliefs, psychology and sociology of health and illness
- Behavioural change
- Reference ranges
- Basic principles of mathematics and statistics
- Basic principles of Epidemiology
- Basic principles of Pharmacology and prescribing

## **Year 2:**

### **Generic Module**

#### **Research Methods**

**[10 credits]**

The overall aim of this module is to ensure that the student has the underpinning knowledge of the importance of research, development and innovation across the NHS - and in healthcare science in particular - and to provide the underpinning knowledge for the final year research project.

#### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Know the role of the healthcare science workforce in undertaking cutting edge translational research for patient benefit.
2. Know the role of the healthcare science workforce in innovation within the NHS.
3. Know the difference between research, audit and service improvement.
4. Know the importance of research and innovation across the NHS and in healthcare science in particular to improve quality and patient care.
5. Know the importance of audit within the NHS and the role of audit in contributing to improvements in patient care.
6. Know the processes that underpin clinical trials and their potential value, risks and benefits.
7. Understand how established methods of research and audit are used to interpret and apply new knowledge in the NHS and healthcare science.
8. Know the current ethical and legal frameworks within which human and



- animal research can be conducted in the UK.
9. Know the research governance framework for health and social care research and relevant key supporting legislation e.g. the Data Protection Act.
  10. Know the basic principles of Intellectual Property regulation.
  11. Know the principles of literature searching.
  12. Know the processes involved in undertaking a literature review.
  13. Know the process of undertaking a systematic review.
  14. Understand the value of reference manager systems.
  15. Understand the role of peer review.
  16. Know the basic principles of quantitative and qualitative study design.
  17. Know the importance of user involvement in research.
  18. Develop the basic skills in statistics from Year 1 and understand common statistical techniques for dealing with quantitative and qualitative data including sample size determination, application of statistics to parametric and non-parametric data.
  19. Know the role of statutory and advisory regulatory bodies e.g. National Institute for Health and Clinical Excellence (NICE).
  20. Understand the concept of evidence based practice.
  21. Know a range of dissemination methods for the output of research, audit and service improvement findings and understand the advantages and disadvantages of each method.
  22. Know the processes for quality assurance in research, audit and service improvement.

### **Learning Outcomes: Practical Skills**

On successful completion of this module the student will:

1. Begin to develop critical analytical skills.
2. Evaluate and apply research findings.
3. Work within ethical frameworks.
4. Formulate a research question.
5. Undertake a literature review.
6. Explain the output from a literature review to a non-scientific and scientific audience.
7. Prepare a written report.

### **Indicative Content**

- Literature searching
- Referencing (Vancouver, Harvard etc)
- Reference Manager software
- Ethical framework for human and animal research
- Research governance framework
- Difference between audit, research, service improvement
- Quantitative research methods
- Qualitative research methods including questionnaire design, focus groups
- Intellectual Property
- Roles and responsibilities of a researcher

- Basic statistical techniques to deal with parametric and non-parametric data
- Sample size and power calculations
- Hypothesis testing
- Type 1 and 2 error
- Dissemination methods for research, audit and service improvement output
- Quality assurance of research, audit and service review

**Division: Physical Sciences and Biomedical Engineering**

**Theme: Medical Physics**

**Specialism: Clinical Photography**

**Year 1**

**Introduction to Clinical Photography including 10 weeks of work based training [20]**

The aim of this module is to introduce students to the scientific, technical and creative concepts that underpin the use of photographic image making as a tool for visual communication in the clinical setting. The module includes both the theoretical study and practical application of elements common across photography practice including: lighting, exposure, camera controls; lenses, optics and basic digital image formation and processing; composition, design and visual communication.

In this module students will begin to develop and demonstrate the knowledge, skills, behaviours and attitudes needed to work safely as a Healthcare Science Practitioner promoting patient centred, high quality care as defined in Good Scientific Practice (see Appendix). Students will have the opportunity to build on and apply their learning from the academic environment including practical sessions, clinical skills/studio sessions reflecting on each experience as part of continual personal development.

#### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Discuss the role of Clinical Photography in healthcare science and the wider healthcare setting including the guidance and legislation with respect to informed consent, patient confidentiality and patient centred care.
2. Describe the key historical innovations in photographic technologies and discuss their influence on the development of imaging in support of healthcare science, clinical practice and contemporary culture.
3. Describe the properties of the electromagnetic spectrum and discuss the nature of visible light, the human visual system, the formation of colour and the effect of variations in light sources on the photographic image.
4. Describe the principles by which images are formed through an optical pathway and discuss the influence on the image of commonly utilised and specialist lenses.

5. Discuss the design, utilisation and appropriateness of the various digital camera formats available to the clinical photographer.
6. Describe the principles underpinning exposure in photography and discuss the creative and technical effects on image formation of the key components.
7. Discuss the elements of photographic composition commonly utilised to create meaning through denotation and connotation.

### **Learning Outcomes: Associated Work Based Learning**

High level description of the work based learning that accompanies this academic module. Further details of the work based programme can be found in the work based learning guide including the Clinical Experiential Learning, Competences and Applied Knowledge and Understanding.

On successful completion of this module the student will be able to:

1. Perform, under direct supervision, a set of standardised rhinoplasty photographs of a patient in accordance with local health and safety regulations.
2. Observe and assist qualified staff during Ophthalmic Imaging in an Ophthalmic and Vision setting.
3. Perform, under direct supervision, the image workflow procedures from the point of receiving the request through to uploading the photographs.
4. Perform, under direct supervision, the procedures for ensuring accurate colour management throughout the image workflow.
5. Collect, analyse and interpret patient data within a work based context.
6. Adhere to appropriate standards of professional practice as defined in Good Scientific Practice.

### **Learning Outcomes: Associated Personal Qualities/Behaviours (Professionalism)**

On successful completion of this module the student will be able to:

1. Select, analyse and critique images.
2. Take informed consent for clinical photography.
3. Make appropriate use of chaperones.
4. Recognise the cultural aspects of clinical photography.

### **Indicative Content**

- Role of Clinical Photography in healthcare science and the wider healthcare setting.
- Ethical issues
  - Informed patient consent
  - Additional and subsequent use of images.
- National standards and guidelines and protocols/ procedures in medical photography.

- The use of chaperones.
- Any additional relevant issues at the time of module delivery.
- Historical developments in photographic technologies from the camera obscura, through the invention of colour photography to the transition to digital technology
- The history of photography and its role in clinical practice
- Cameras, their construction, mechanisms, formats and key features appropriate to clinical photography
- Light and the electromagnetic spectrum, principles of colour photography, spectral sensitivity in scientific photography.
- The human visual system and the formation of images, including lens optics, simple and complex lenses and their selection and appropriateness, perspective, speed and distortion
- Light sources and their properties, including daylight, tungsten, flash, and mixed lighting situations, colour temperature and colour balance.
- Exposure, principles of calculating, shutter speed/sensitivity/aperture relationships, depth of focus and depth of field.
- Communication through the photographic image; composition and framing; line, tone and colour; form, space and timing; connotation and denotation.
- Introduction to the cultural aspects of photography and clinical photography.

**Division: Physical Sciences and Biomedical Engineering**  
**Theme: Medical Physics**  
**Specialism: Clinical Photography**  
**Informatics, Maths and Statistics**  
**Credits: [10]**

The overall aim of this module is to ensure that the student has the underpinning knowledge of medical informatics, mathematics and statistics required for the work base.

#### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Analyse and interpret data within a work-based context.
2. Manipulate and present medical information by the use of spreadsheets, databases and presentation software.
3. Use of number, algebra, trigonometry, exponential, graphs and linear relationships to solve medical problems.

#### **Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Use data securely, respect confidentiality and maintain consent in the use of data.

2. Manipulate, analyse and present clinical data appropriately.
3. Apply appropriate mathematical and statistical techniques to clinical data.
4. Demonstrate effective communication skills, supported by the appropriate presentation of data.

## Indicative Content

### Informatics

- Informatics and clinical practice
- Clinical coding and terminology
- Clinical information systems and applications
- Healthcare computer systems
- Database management
- Data protection, Caldicott, information governance
- Database
  - Work with a medical image database
  - Understand the basic principles of database
  - Interrogate and produce reports
  - Evaluate and amend the database
- Spreadsheet
  - Creating worksheets, names, ranges, addresses
  - Copying, formatting, deleting, moving, text, data, series
  - Using and creating a wide variety of charts, graphs and graphics (e.g. log linear graphs, 3 Dimensional (3D) bar charts)
- Presentation software
  - Create a short presentation
  - Apply appropriate techniques and slides for presentation
  - Evaluate and amend the presentation
- Networking and messaging standards, e.g. Digital Imaging and Communications in Medicine (DICOM), Health Level 7 (HL7)

### Mathematics and Statistics

- *Numerical representation and scientific calculator use*: standard form, negative numbers, percentages, accuracy and precision, conversion of units of measure
- *Algebra*: review of basic concepts
- *Graphs*: linear and non-linear graphs in the x-y plane, plotting a graph of the function, solving equations using graphs, solving simultaneous equations graphically
- *Logarithmic expressions*: indices, laws of indices, laws of logs, combinations of logs, natural logs and base 10 logs, solving equations with logarithms, properties and graph of ln and Log function
- *Angles and Trigonometry*: degrees, radians, trigonometry ratios (sine, cosine, tangent), solving trigonometric equations, maxima and minima, graphs and waves generated by trigonometry
- *Exponential Functions*: exponential expressions, exponential function and its' graph, solving equations involving exponential terms using a graphical method

- *Types of Data:* Discrete and continuous data
- *Summarising data graphically:* dot plot, stem and leaf, box and whisker, grouped frequency distribution, histogram, cumulative frequency distribution, cumulative frequency polygon, bar chart, one and two
- *Summarising data numerically:* mean, median, mode, samples, when to use various averages, standard deviation, error, inter quartile range, box and whisker plots, variance, range, measures of skewness
- *Normal distribution:* mean, standard deviation, areas under the curve, standard normal transformation, solution of problems
- *Simple probability. Samples and Population Distributions:* reasons for sampling sample size, random sampling, biased sampling, quota sampling, systematic sampling and stratified sampling, relationship to normal distribution, primary and secondary data

**Division: Physical Sciences and Biomedical Engineering**

**Theme: Medical Physics**

**Specialism: Clinical Photography**

**Year 1**

**Digital Photography Image Management in a Clinical Environment**

**Credits: [20]**

This module introduces students to the theory and practices associated with the production and management of digital photographic images. This includes developing a core understanding of the nature of the digital image, how it is captured, stored and managed through a chain of processes to a variety of outputs. It also places this knowledge within the contexts of data-protection, confidentiality and security associated with the healthcare environment.

#### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Describe the nature and structure of the digital photographic image.
2. Discuss the range of technologies associated with the capture, storage and retrieval, processing and output of digital images within the healthcare setting.
3. Discuss the range of file formats associated with digital images in the healthcare setting and their advantages and disadvantages.
4. Identify and discuss the range of options for managing the digital image workflow from capture to output.
5. Discuss the role of colour management, identifying the tools available to support its use in the healthcare setting.
6. Describe and explain the need for data security and confidentiality of clinical images including encryption and distribution

#### **Learning Outcomes: Associated Personal Qualities/Behaviours (Professionalism)**

On successful completion of this module the student will be able to:

1. Select, analyse and critique images.
2. Maintain structured, accurate records
3. Handle images with respect for their privacy and confidentiality

### **Indicative Content**

- Structure of the digital image
- Sensors, scanners and camera settings
- Understanding histograms
- File formats (including Digital Imaging and Communications in Medicine (DICOM)) and compression
- Image quality, resolution, image size, artefacts
- Colour management, colour spaces, profiling and colour workflow
- Image processing and post-production, principles, practice and software options
- Image workflow including; database options, indexing, Exchangeable Image File (EXIF) data and metadata management, storage, retrieval and electronic access
- Data integrity, confidentiality and security in the clinical setting
- Encryption and distribution of clinical images

**Division: Physical Sciences and Biomedical Engineering**

**Theme: Medical Physics**

**Specialism: Clinical Photography**

**Year 2**

**Scientific and Clinical Imaging**

**Credits: [30]**

This module builds on the theories of light, image formation and attributes, and management introduced in Year 1. It also introduces the student to the range of imaging technologies used to support diagnostics and patient care, teaching and research within the scientific and healthcare settings.

### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Identify the regions of the electromagnetic spectrum commonly used in scientific and clinical imaging, evaluating the properties underpinning their use and value in these contexts.
2. Describe the technologies used in imaging science and medicine and discuss their value to diagnosis, teaching and research.
3. Identify the technologies commonly used to manage the imaging process from capture through to display.
4. Describe the process of applied colour management, identifying the steps in the imaging chain where colour management plays a significant role.
5. Discuss the use of metadata in the management of digital images.
6. Identify the issues associated with image integrity, security, preservation and ownership and discuss the importance of these within the healthcare science environment.

## **Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Actively seek accurate and validate information from all available sources.
2. Select and apply appropriate analysis or assessment techniques and tools.
3. Use and develop analytical skills.
4. Demonstrate problem solving.
5. Use clear written and verbal communication.
6. Communicate complex ideas in simple terms.

### **Indicative Content**

- Introduction to clinical, paramedical and forensic photography and imaging.
- The properties of illumination/radiation systems and their use in applied photography and medical imaging; aspects of health physics.
- Applied imaging techniques using non-visible and ionising radiation;
  - infrared photography and thermography; photomacrography, photomicrography and microscopical techniques; Scanning Electron Microscopy, confocal microscopy
  - 3D photography and stereo photography
  - ophthalmic imaging; fundus cameras, optical coherence tomography, scanning laser ophthalmoscopy, scanning laser polarimetry, ultrasonography, imaging of the anterior segment, measurement of ocular structures
  - introduction to medical imaging systems, including radiography, computed tomography, magnetic resonance imaging; ultrasonography; endoscopy
  - specialist optical systems for data capture including extreme wide angle and telephotography;
  - photogrammetry and remote sensing.

### **Imaging Technologies**

- Properties of light.
- Geometric Optics & Lenses
- Image Sensors and image formation
- Sampling and quantisation
- Sampling theory
- Digital image representation
- Transfer characteristics of devices
- Colour management in the digital imaging chain
- Cameras and Scanners
- Output technologies
- Calibration of digital devices
- Tone reproduction in digital systems
- Image storage devices and file formats



- Introduction to Image Processing
  - Image Compression
  - Image integrity
  - Image security
  - Image registration including 3D photography with medical imaging datasets

**Division: Physical Sciences and Biomedical Engineering**  
**Theme: Medical Physics**  
**Specialism: Clinical Photography**  
**Year 2**  
**Image Practice and Production**  
**Credits: [30]**

This module develops the students' ability to adapt and apply the photographic knowledge and skills introduced at Year 1 to a range of technically challenging objects, settings and environments. It requires the students to integrate technical skills with visual research to produce contemporary work. It introduces the principles of design and desktop publishing in which non-clinical photography output is commonly presented. It also introduces concepts of narrative, linear and non-linear production.

**Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Discuss contemporary styling in image design in a range of settings
2. Justify the selection of professional photographic techniques and equipment, applying these selections to the production of a range of assignments and critically appraising the results.
3. Explain the basic principles of graphic design and desktop-publishing.
4. Discuss the fundamentals of video production from pre-production through to post-production.
5. Discuss linear and non-linear multi-media production in the contemporary digital media environment.
6. Explain the basis of a range of methods to deliver photographic outputs including professional digital printing and screen media.

**Learning Outcomes: Associated Personal Qualities/Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Use professional working practices.
2. Work with an ethos of independent working practice.
3. Work as part of a design/production team respecting the roles of others within the team
4. Critically analyse historical and contemporary imaging media.
5. Develop the practice of critical self-appraisal.

6. Discuss work and respond to criticism in an informed way.

**Indicative Content**

- Visual research: contemporary image design and production with references to commercial and art practice
- Photographic equipment and selection;
  - Cameras in a range of formats
  - Lenses, prime, variable focal length, wide and telephoto
  - Lighting, studio and location
  - Background control, studio and location
- Lighting techniques addressing issues of:
  - Materials
  - Form
  - Mood, atmosphere
  - Human and inanimate subjects
- Graphic design and desktop publishing
  - Design principles and practice for print, screen and digital media
  - Principles of scientific poster design and printing
  - Working in the design team and working with art direction
- Video
  - Equipment selection
  - Pre-production planning, scripting and storyboarding
  - Production – utilizing photographic skills
  - Audio recording
  - Post-production techniques and editing
- Narrative constructions and non-linear story-telling
  - Techniques
  - Programs

Students are required to utilise visual research, married to technique to produce a coherent portfolio of work

## Section 11: Specialist Modules for Clinical Photography

### Interpretation of the high level framework for Clinical Photography

<b>Year 3</b> <i>Application to Practice</i>	Professional Practice [10]	Current Debates in Clinical Photography [30]	Non-clinical photography & Design [30]	Practice Based Research Project [30]	Work based Training <b>25 weeks</b> [20]	
	Generic Curriculum	Specialism Specific Curriculum				
<b>Year 2</b> <i>Techniques and Methods</i>	Professional Practice [10]	Research Methods [10]	Scientific & Clinical Imaging [30]	Imaging Practice & Production [30]	Clinical Photography Theory & Practice [30]	Work based Training <b>15 weeks</b> [10]
	Generic Curriculum		Division/Theme Curriculum		Specialism Specific Curriculum	
<b>Year 1</b> <i>Scientific Basics</i>	Professional Practice [10]	Scientific Basis of Healthcare [60]		Introduction to Clinical Photography Incl. <b>10 weeks</b> work based training [20]	Informatics, Maths & Statistics [10]	Managing Digital Images in a Clinical Environment [20]
	Generic Curriculum			Division/Theme Curriculum		

[xx] = credits

	Generic Modules: Common to all divisions of Healthcare Science
	Division/Theme Specific Modules: Life Sciences; Medical Physics, Clinical Photography and Clinical Engineering; Cardiovascular, Respiratory and Sleep Sciences; Neurosensory Sciences
	Specialist Modules: Specific to a specialism

**Division: Physical Sciences and Biomedical Engineering**  
**Theme: Medical Physics**  
**Specialism: Clinical Photography**  
**Year 2**  
**Specialist Module:**  
**Clinical Photography Theory and Practice**  
**Credits: [30]**

The aim of this module is to enable the students to apply their photographic knowledge and skills to the clinical setting and introduce the specific techniques, which underpin the value of photography in support of patient care, clinical teaching and research. It also builds on the students' knowledge of anatomy and physiology, introducing them to the pathophysiology of commonly photographed conditions and the clinical vocabulary.

### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Identify the variables encountered in clinical photography in a range of settings.
2. Undertake a range of standardised clinical photography techniques in various simulated clinical settings including in controlled studio and non-studio environments
3. Identify the limitations of standardised representational photography and adapt strategies to manage occasions when a non-standardised approach may be required.
4. Describe the pathophysiological processes of a range of commonly photographed conditions, identifying the key signs the photographer needs to recognise.
5. Describe the specific requirements for photography of children and vulnerable adults, particularly in respect to cases of suspected abuse.

### **Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Use interpersonal and communication abilities used to set up and maintain an appropriate atmosphere where patients can be photographed effectively.
2. Apply emotional intelligence, compassion and empathy in the management of patients.
3. Critically evaluate and apply relevant theoretical knowledge to clinical practice.
4. Reflect on own practice and put lessons learnt into practice
5. Reference medical texts and literature and develop ease in the use of clinical terminology.

### **Indicative Content**

- Standard representational photography
- Medical photography within the specialities of:
  - Dermatology
  - Paediatrics
  - Ophthalmology
  - Surgery
  - Dentistry
- Clinical photography both within the studio and on location in wards/clinics; non-clinical.
- Accurate recording of photographic sessions
  - Image quality procedures and control
  - Image storage and management
- Location; positioning and lighting techniques for different parts of the body; photographic techniques for the major specialities (e.g. dermatology, ophthalmology, dental, paediatrics, surgery); photography of surgical procedures; control of backgrounds
- Issues for the photography of children
  - non-accidental injury photography.
- Use of scales
- Specimen photography
- Anatomy and physiology applicable to medical photography
- The language of medical science, the roots of words, descriptive metaphors and synonyms
- Clinical symptoms and pathogenesis of selected diseases
- Person to person communications including empathy, congruence, unconditional positive regard, positive
- Application and development of communication in a practice setting: facilitation skills, consultation skills, compassion, emotional intelligence
- Reflecting on practice
- Professional codes of conduct, boundaries, negligence and cooperation.

**Division: Physical Sciences and Biomedical Engineering**  
**Theme: Medical Physics**  
**Specialism: Clinical Photography**  
**Year 3:**  
**Research Project in Clinical Photography**  
**Credits: [30]**

The overall aim of this module is for the student to undertake a research or audit project that provides an opportunity to demonstrate the knowledge, skills and experience gained in the Research Methods module in Year 2. Whilst the research project can be in any area related to imaging systems relevant to clinical photography it is expected that there will be a high technical content to the work. Projects based on the production of a portfolio of visual material will require both visual and technical excellence.

### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Work with a supervisor to propose a research or audit hypothesis/question.
2. Critically review the literature and use a reference manager system.
3. Refine a research/audit question.
4. Design a research protocol to test a hypothesis/question.

### **Learning Outcomes: Practical Skills**

On successful completion of this module the student will:

1. Undertake a research/audit project from conception to completion.
2. Gain the necessary ethical, audit and/or R&D approval.
3. Assemble a body of data and analyse the data using appropriate statistical techniques.
4. Prepare a written project report and analyse the findings and identify strengths and weaknesses of the research/audit project.
5. Prepare and present a poster.

### **Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Further develop critical analytical skills.
2. Evaluate and apply evidence.
3. Work within an ethical framework.
4. Demonstrate effective time management and organisation.

### **Indicative Content**

- One or more pieces of work for which the student is responsible. These should involve originality in the sense that the outcome is not predictable and/or known in detail
- Examples could include
  - Evaluation of method new to department
  - Investigation to improve performance of a method
  - Evaluation of new/modified quality assurance of a method
  - Audit of method performance across a range of departments
  - Critical analysis of evidence-base underpinning a specified procedure
  - Audit of users to assess functionality, range, and/or quality of services provided

**Division: Physical Sciences and Biomedical Engineering**  
**Theme: Medical Physics**  
**Specialism: Clinical Photography**  
**Year 3**  
**Specialist Module**  
**Non-clinical photography and design**  
**Credits: [30]**

This module develops students knowledge of design principles and practices for print, screen and multimedia production within the healthcare environment. It also allows the students' the opportunity to develop the advanced techniques required to creatively fulfil non-clinical assignments in photography and multi-media production.

#### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Critically evaluate a client brief, research source materials and create appropriate photographic solutions to meet the client brief
2. Critically evaluate a photography brief in order to produce non-clinical/ PR images to a high technical standard suitable for use in clinical environments.
3. Discuss the strengths and weaknesses of different professional image media in meeting a client brief
4. Produce and evaluate complex multi-media content, which conveys a healthcare or health education message.

#### **Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Use interpersonal and communication skills to discuss a client brief with the client and members of the design team
2. Consider the appropriate choice of media to meet the client brief
3. Use practical skills to enhance design for print, screen and video.
4. Accept and give feedback in order to ensure output meets professional standards and the client brief.
5. Critically evaluate and apply relevant theoretical knowledge to non-clinical/Public Relations/promotional photography in the healthcare environment
6. Reflect on own practice and put lessons learnt into practice

#### **Indicative Content**

- Photography and design for different healthcare settings including:
  - Patient information

- Teaching literature for patients, students, healthcare professionals and the public
- Non-clinical/Public Relations/promotional material/corporate image
- Computer based learning
- Internet
- Video
- Project management
  - Defining the client brief
  - The design process
  - Documentation
  - Time management

**Division: Physical Sciences and Biomedical Engineering**  
**Theme: Medical Physics**  
**Specialism: Clinical Photography**  
**Year 3**  
**Current Debates in Clinical Photography**  
**[30]**

This module aims to explore and evaluate a range of issues, legal and moral frameworks that influence the production and use of clinical photographs, and the perception of the subject within society.

**Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Discuss and analyse the major legal aspects of medical photographic practice within a clinical environment.
2. Discuss and justify the process and procedures to ensure effective image management within the legislative frameworks to ensure patient confidentiality.
3. Discuss the social, cultural and religious issues associated with clinical photography.
4. Identify and discuss some of the disease related issues likely to impact on patient management in clinical photography.

**Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Use interpersonal and communication abilities used to ensure that clinical practice is carried out to current legal and ethical requirements
2. Apply emotional intelligence, compassion and empathy in the management of patients, carers and other clinical staff when dealing with difficult clinical situations.



3. Critically evaluate and apply relevant theoretical knowledge to clinical practice.
4. Reflect on own practice and put lessons learnt into practice

### **Indicative Content**

- Safeguarding
- Ethical theory
- Declaration of Helsinki and the Belmont Report
- Moral and legal rights
- Social, cultural and religious issues relating to photography and disease
- Impact of pathophysiological processes on patient management
- Informed consent, patient confidentiality, access to patient information
- Policy for the management of medical images
- Sharing clinical photographs with other services, e.g. police
- Medico-legal photography
- Implications of raw formats and image manipulation
- Management of cameras in the clinical environment
- R&D processes in the NHS with respect to medical imaging
- Data protection, Caldicott
- Copyright and intellectual property
- Social media and the use of the internet

**Division: Physical Sciences and Biomedical Engineering**  
**Theme: Medical Physics**  
**Specialism: Clinical Photography**  
**Years 2 and 3**  
**Specialist Module: Work based practice**  
**Credits: [30]**

### **Learning Outcomes: Knowledge and Understanding**

On successful completion of this module the student will:

1. Discuss and justify the use of appropriate photographic technique to use in a broad range of clinical settings.
2. Critically evaluate a range of specialist photographic techniques including 3D photography and ophthalmic imaging.
3. Discuss and evaluate the production and manipulation of digital images.
4. Discuss and evaluate the production and editing of video.
5. Critically review and evaluate protocols in relation to the core skills including Clinical Photography and digital image workflow, communication skills, management and quality assurance when delivering Medical Illustration services.
6. Produce a Professional portfolio which cumulatively records / provides evidence of:- skills, knowledge and understanding, ability to use reflective practice and personal and professional development.
7. Discuss the impact Clinical Photography on the clinical delivery of healthcare and resultant affect on patient outcomes so that effective and

- efficient planning of service delivery can be determined.
8. Critically review the ethical implications of legislation, regulations and guidance on the management of medical images, informed consent and data protection.
  9. Critically review the use of ICT to store and manage images securely

### **Learning Outcomes: Associated Work Based Learning**

High level description of the work based learning that accompanies this academic module. Further details of the work based programme can be found in the work based learning guide including the Clinical Experiential Learning, Competences and Applied Knowledge and Understanding.

On successful completion of this module the student will be able to:

#### **Standardised Representational Photography**

1. Make clinical photographic recordings of patients in a range of clinical settings including adults and children\*.
2. Demonstrate the correct procedure for storing, labelling and archiving clinical photographs.
3. Adhere to appropriate standards of professional practice as defined in Good Scientific Practice.

#### **Introduction to clinical specialties and locations**

1. Produce retinal photographs in a range of patients, including the use of mydriatic equipment.
2. Produce Optical Coherence Tomography (OCT) recordings in a range of patients.
3. Produce photographs of morbid or surgical gross specimens.
4. Undertake intra-oral photography and produce photographs of the teeth in a range of patients.
5. Observe and assist during the photography of a surgical procedure.
6. Adhere to appropriate standards of professional practice as defined in Good Scientific Practice.

#### **Non-clinical Photography and Design**

1. Photograph a cheque presentation for a newsletter or website.
2. Produce a studio portrait as a high-quality print.
3. Scan flat and transparent originals and produce high-quality, colour-corrected digital files and prints.
4. Photograph a small item of equipment in a studio setting, suitable for publication.
5. Photograph a large item of equipment on location in a clinical environment.
6. Design a scientific poster using a combination of text, photographs, graphs, scans
7. Create a case report presentation for projection describing a clinical condition that you have photographed.

8. Adhere to local and national moral, ethical and legal guidance in respect of copyright and consent.
9. Keep accurate records and adhere to data security principles, guidance and the law.
10. Adhere to appropriate standards of professional practice as defined in Good Scientific Practice.

#### **Video Production**

1. Record video of the dynamic aspects of a clinical condition with the consent of the patient.
2. Plan for more complex productions, taking on and assisting in a range of different production roles
3. Shoot and edit clinical recordings.
4. Adhere to appropriate standards of professional practice as defined in Good Scientific Practice.

#### **Learning Outcomes: Associated Personal Qualities and Behaviours (Professionalism)**

On successful completion of this module the student will:

1. Behave in a professional manner in matters of attendance, appearance, maintaining confidentiality and infection control.
2. Respect and understand individuals' beliefs and ways of coping with illness.
3. Value social diversity and its relationship to service provision in healthcare.
4. Demonstrate the ability to work safely within each environment.
5. Demonstrate the ability to treat patients with respect.
6. Communicate effectively with the healthcare environment and clinical team and develop appropriate interpersonal skills.
7. Seek to adapt their communication style to meet the varying needs of different peers, colleagues and patients in different contexts.
8. Adopt a range of techniques to overcome barriers to communication.
9. Develop and maintain professional relationships and effective team working.
10. Discuss and demonstrate safe and effective practice in a healthcare environment.
11. Begin to develop a balance between reflective practice and active exploration in personal learning.
12. Take responsibility for personal learning.

## APPENDIX 1: GOOD SCIENTIFIC PRACTICE



### Good Scientific Practice

#### Section 1: The purpose of this document

There are three key components to the Healthcare Science workforce in the UK:

1. Healthcare Science Associates and Assistants who perform a diverse range of task based roles with appropriate levels of supervision.
2. Healthcare Science Practitioners have a defined role in delivering and reporting quality assured investigations and interventions for patients, on samples or on equipment in a healthcare science specialty, for example Cardiac Physiology, Blood Sciences or Nuclear Medicine. They also provide direct patient care and more senior Healthcare Science Practitioners develop roles in specialist practice and management.
3. Healthcare Scientists are staff that have clinical and specialist expertise in a specific clinical discipline, underpinned by broader knowledge and experience within a healthcare science theme. Healthcare scientists undertake complex scientific and clinical roles, defining and choosing investigative and clinical options, and making key judgements about complex facts and clinical situations. Many work directly with patients. They are involved, often in lead roles, in innovation and improvement, research and development and education and training. Some pursue explicit joint academic career pathways, which combined clinical practice and academic activity in research, innovation and education.

This document sets out the principles and values on which good practice undertaken by the Healthcare Science workforce is founded.

*Good Scientific Practice* sets out for the profession and the public the standards of behaviour and practice that must be achieved and maintained in the delivery of work activities, the provision of care and personal conduct.

*Good Scientific Practice* uses as a benchmark the Health Professions Council (HPC) Standards of Proficiency and Standards of Conduct, Performance and Ethics, but expresses these within the context of the specialities within Healthcare Science, recognising that three groups of the workforce, Biomedical Scientists, Clinical Scientists and Hearing Aid Dispensers are regulated by the HPC. The aim is that the standards are accessible to the profession and understandable by the public.

*Good Scientific Practice* represents standards and values that apply throughout an individual's career in healthcare science at any level of practice. The standards will be contextualised by the role within Healthcare Science that an individual undertakes. This means that the standards must be

interpreted based on the role that an individual performs. For example, in supervised roles where individuals work within defined procedures, rather than autonomously, some standards will need to be interpreted appropriately for the context of the specific role. There will, however, always be a requirement for an individual to work within the limits of their scope of practice and competence.

Students and trainees will be expected to be working towards meeting the expectations set out in this document. However, if an individual is undertaking further training and development following qualification from a professional training programme, he or she will be expected to be able to meet the standards in this document within their scope of practice.

The standards have been used to support curriculum development and will be used to underpin the process of judging individual equivalence, particularly for emerging specialisms.

The standards have been divided into five domains. The domains of *Good Scientific Practice* detailed in section 2 are:

1. Professional Practice
2. Scientific Practice
3. Clinical Practice
4. Research and development
5. Clinical Leadership

## **Section 2: The domains of Good Scientific Practice**

### **Domain 1: Professional Practice**

All patients and service users are entitled to good standards of professional practice and probity from the Healthcare Science workforce including the observance of professional codes of conduct and ethics. In maintaining your fitness to practice as a part of the Healthcare Science workforce, you must:

#### **1.1 Professional Practice**

- 1.1.1 Make the patient your first concern
- 1.1.2 Exercise your professional duty of care
- 1.1.3 Work within the agreed scope of practice for lawful, safe and effective healthcare science
- 1.1.4 Keep your professional, scientific, technical knowledge and skills up to date
- 1.1.5 Engage fully in evidence based practice
- 1.1.6 Draw on appropriate skills and knowledge in order to make professional judgements
- 1.1.7 Work within the limits of your personal competence

- 1.1.8 Act without delay on concerns raised by patients or carers or if you have good reason to believe that you or a colleague may be putting people at risk
- 1.1.9 Never discriminate unfairly against patients, carers or colleagues
- 1.1.10 Treat each patient as an individual, respect their dignity and confidentiality and uphold the rights, values and autonomy of every service user, including their role in the diagnostic and therapeutic process and in maintaining health and well-being.
- 1.1.11 Respond constructively to the outcome of audit, appraisals and performance reviews, undertaking further training where necessary

## **1.2 Probity**

- 1.2.1 Make sure that your conduct at all times justifies the trust of patients, carers and colleagues and maintains the public's trust in the scientific profession
- 1.2.2 Inform the appropriate regulatory body without delay if, at any time, you have accepted a caution, been charged with or found guilty of a criminal offence, or if any finding has been made against you as a result of fitness to practice procedures, or if you are suspended from a scientific post, or if you have any restrictions placed on your scientific, clinical or technical practice
- 1.2.3 Be open, honest and act with integrity at all times, including but not limited to: writing reports, signing documents, providing information about your qualifications, experience, and position in the scientific community, and providing written and verbal information to any formal enquiry or litigation, including that relating to the limits of your scientific knowledge and experience
- 1.2.4 Take all reasonable steps to verify information in reports and documents, including research
- 1.2.5 Work within the Standards of Conduct, Performance and Ethics set by your profession

## **1.3 Working with colleagues**

- 1.3.1 Work with other professionals, support staff, service users, carers and relatives in the ways that best serve patients' interests
- 1.3.2 Work effectively as a member of a multi-disciplinary team
- 1.3.3 Consult and take advice from colleagues where appropriate
- 1.3.4 Be readily accessible when you are on duty
- 1.3.5 Respect the skills and contributions of your colleagues
- 1.3.6 Participate in regular reviews of team performance.

## **1.4 Training and developing others**

- 1.4.1 Contribute to the education and training of colleagues
- 1.4.2 If you have responsibilities for teaching, develop the skills, attitudes and practices of a competent teacher
- 1.4.3 Ensure that junior colleagues and students are properly supervised

- 1.4.4 Support colleagues who have difficulties with performance, conduct or health
- 1.4.5 Share information with colleagues to protect patient safety
- 1.4.6 Provide work-based development for colleagues to enhance/improve skills and knowledge

## **Domain 2: Scientific Practice**

As a part of the Healthcare Science workforce, you will keep your scientific and technical knowledge and skills up to date to effectively:

### **2.1 Scientific Practice**

- 2.1.1 Develop investigative strategies/procedures/processes that take account of relevant clinical and other sources of information
- 2.1.2 Provide scientific advice to ensure the safe and effective delivery of services
- 2.1.3 Undertake scientific investigations using qualitative and quantitative methods to aid the screening, diagnosis, prognosis, monitoring and/or treatment of health and disorders appropriate to the discipline
- 2.1.4 Investigate and monitor disease processes and normal states
- 2.1.5 Provide clear reports using appropriate methods of analysing, summarising and displaying information
- 2.1.6 Critically evaluate data, draw conclusions from it, formulate actions and recommend further investigations where appropriate

### **2.2 Technical Practice**

- 2.2.1 Provide technical advice to ensure the safe and effective delivery of services
- 2.2.2 Plan, take part in and act on the outcome of regular and systematic audit
- 2.2.3 Work within the principles and practice of instruments, equipment and methodology used in the relevant scope of practice
- 2.2.4 Demonstrate practical skills in the essentials of measurement, data generation and analysis
- 2.2.5 Assess and evaluate new technologies prior to their routine use
- 2.2.6 Identify and manage sources of risk in the workplace, including specimens, raw materials, clinical and special waste, equipment, radiation and electricity.
- 2.2.7 Apply principles of good practice in health and safety to all aspects of the workplace
- 2.2.8 Apply correct methods of disinfection, sterilisation and decontamination and deal with waste and spillages correctly.
- 2.2.9 Demonstrate appropriate level of skill in the use of information and communications technology

### **2.3 Quality**

- 2.3.1 Set, maintain and apply quality standards, control and assurance techniques for interventions across all clinical, scientific and technological activities
- 2.3.2 Make judgements on the effectiveness of processes and procedures
- 2.3.3 Participate in quality assurance programmes
- 2.3.4 Maintain an effective audit trail and work towards continuous improvement

### **Domain 3: Clinical Practice**

As a part of the Healthcare Science workforce, you will keep your clinical skills up to date and undertake the clinical duties appropriate to your role in order to effectively:

#### **3.1 Clinical Practice**

- 3.1.1 Ensure that you and the staff you supervise understand the need for and obtain relevant consent before undertaking any investigation, examination, provision of treatment, or involvement of patients and carers in teaching or research
- 3.1.2 Ensure that you and the staff you supervise maintain confidentiality of patient information and records in line with published guidance
- 3.1.3 Ensure that you and your staff understand the wider clinical consequences of decisions made on your actions or advice
- 3.1.4 Demonstrate expertise in the wider clinical situation that applies to patients who present in your discipline
- 3.1.5 Maintain up to date knowledge of the clinical evidence base that underpins the services that you provide and/or supervise and ensure that these services are in line with the best clinical evidence
- 3.1.6 Plan and determine the range of clinical/scientific investigations or products required to meet diagnostic, therapeutic, rehabilitative or treatment needs of patients, taking account of the complete clinical picture
- 3.1.7 Plan and agree investigative strategies and clinical protocols for the optimal diagnosis, monitoring and therapy of patients with a range of disorders
- 3.1.8 Ensure that detailed clinical assessments are undertaken and recorded using appropriate techniques and equipment and that the outcomes of these investigations are reviewed regularly with users of the service
- 3.1.9 Ensure the provision of expert interpretation of complex and or specialist data across your discipline in the context of clinical questions posed
- 3.1.10 Undertake and record a detailed clinical assessment using appropriate techniques and equipment
- 3.1.11 Provide specialised clinical investigation and/or analysis appropriate to your discipline
- 3.1.12 Provide interpretation of complex and/or specialist data in the context of the clinical question posed



- 3.1.13 Provide clinical advice based on results obtained, including a diagnostic or therapeutic opinion for further action to be taken by the individual directly responsible for the care of the patient
- 3.1.14 Provide expert clinical advice to stakeholders in order to optimise the efficiency and effectiveness of clinical investigation of individuals and groups of patients
- 3.1.15 Prioritise the delivery of investigations, services or treatment based on clinical need of patients
- 3.1.16 Represent your discipline in multidisciplinary clinical meetings to discuss patient outcomes and the appropriateness of services provided
- 3.1.17 Ensure that regular and systematic clinical audit is undertaken and be responsible for modifying services based on audit findings.

## **3.2 Investigation and reporting**

- 3.2.1 Plan and conduct scientific, technical, diagnostic, monitoring, treatment and therapeutic procedures with professional skill and ensuring the safety of patients, the public and staff
- 3.2.2 Perform investigations and procedures/design products to assist with the management, diagnosis, treatment, rehabilitation or planning in relation to the range of patient conditions/equipment within a specialist scope of practice
- 3.2.3 Monitor and report on progress of patient conditions/use of technology and the need for further interventions.
- 3.2.4 Interpret and report on a range of investigations or procedures associated with the management of patient conditions/equipment

## **Domain 4: Research, Development and Innovation**

As part of the Healthcare Science workforce, research, development and innovation are key to your role. It is essential in helping the NHS address the challenges of the ageing population, chronic disease, health inequalities and rising public expectations of the NHS. In your role, you will undertake the research, development and innovation appropriate to your role in order to effectively:

### **4.1 Research, Development and Innovation**

- 4.1.1 Search and critically appraise scientific literature and other sources of information
- 4.1.2 Engage in evidence-based practice, participate in audit procedures and critically search for, appraise and identify innovative approaches to practice and delivery of healthcare
- 4.1.3 Apply a range of research methodologies and initiate and participate in collaborative research
- 4.1.4 Manage research and development within a governance framework
- 4.1.5 Develop, evaluate, validate and verify new scientific, technical, diagnostic, monitoring, treatment and therapeutic procedures and,

- where indicated by the evidence, adapt and embed them in routine practice
- 4.1.6 Evaluate research and other available evidence to inform own practice in order to ensure that it remains at the leading edge of innovation.
  - 4.1.7 Interpret data in the prevailing clinical context
  - 4.1.8 Perform experimental work, produce and present results
  - 4.1.9 Present data, research findings and innovative approaches to practice to peers in appropriate forms
  - 4.1.10 Support the wider healthcare team in the spread and adoption of innovative technologies and practice

## **Domain 5: Clinical Leadership**

All patients and service users have a right to expect that Healthcare Science services efficiently and effectively managed to meet service needs. As a leader in Healthcare Science, you will seek to effectively:

### **5.1 Leadership**

- 5.1.1 Maintain responsibility when delegating healthcare activities and provide support as needed
- 5.1.2 Respect the skills and contributions of your colleagues
- 5.1.3 Protect patients from risk or harm presented by another person's conduct, performance or health
- 5.1.4 Treat your colleagues fairly and with respect
- 5.1.5 Make suitable arrangements to ensure that roles and responsibilities are covered when you are absent, including handover at sufficient level of detail to competent colleagues
- 5.1.6 Ensure that patients, carers and colleagues understand the role and responsibilities of each member of the team
- 5.1.7 Ensure that systems are in place through which colleagues can raise concerns and take steps to act on those concerns if justified
- 5.1.8 Ensure regular reviews of team performance and take steps to develop and strengthen the team
- 5.1.9 Take steps to remedy any deficiencies in team performance
- 5.1.10 Refer patients to appropriate health professionals
- 5.1.11 Identify and take appropriate action to meet the development needs of those for whom you have management, supervision or training responsibilities
- 5.1.12 Act as an ambassador for the Healthcare Science community

*Good Scientific Practice AHCS V.2 Final*

## APPENDIX 2 CONTRIBUTOR LIST

Development of the PTP curriculum for the BSc Healthcare Science (Hons) and integrated Work Based programme for Clinical Photography has been coordinated by the Modernising Scientific Careers team working with the Institute of Medical Illustrators working with the National School of Healthcare Science, NHS and Higher Education colleagues.

The professionals who have contributed to the development of this PTP Programme since 2011 include:

David	Bishop	University College London
Jason	Candlin	Heatherwood and Wexham Park Hospitals, Berkshire
Paul	Crompton	Cardiff and Vale University Local Health Board
Carol	Fleming	Bradford Teaching Hospitals NHS Foundation Trust
Andrew	Johnson	Birmingham Children's Hospital, Birmingham
Marie	Jones	Salisbury District Hospital, Salisbury
Kathy	McFall	Greater Glasgow and Clyde NHS Trust
Jerry	Naylor	Addenbrookes Hospital, Cambridge
Becky	Smith	Moorfields Hospital NHS Foundation Trust, London
Jane	Tovey	University Hospitals Birmingham NHS Foundation Trust
Nick	White	Royal Sussex County Hospital NHS Trust
Barbara	Wood	Patient Representative, London

Professional bodies and societies were invited to review the BSc (Hons) Healthcare Science (Clinical Photography) and their feedback has shaped the final publication:

Institute of Medical Illustrators

### **Modernising Scientific Careers Professional Advisors**

Dr Derek Pearson

### **National School of Healthcare Science Professional Lead**

Dr Chris Gibson

# **APPENDIX 3: BSc (Hons) LEARNING GUIDE AMENDMENTS**

## **BSc Healthcare Science (Clinical Photography)**

For any queries regarding this change please email: [msc.hee@nhs.net](mailto:msc.hee@nhs.net)

## APPENDIX 4: GLOSSARY

Term	Definition
<b>Clinical Experiential Learning</b>	The cyclical process linking concrete experience with abstract conceptualisation through reflection and planning.
<b>Clinical Experiential Learning Outcomes</b>	The activities that the student will undertake to enable and facilitate their learning in the workplace.
<b>Competence</b>	The ability of an individual to perform a role consistently to required standards combining knowledge, understanding, skills and behaviour.
<b>Competence statements</b>	Active and outcome-based statements that provide a further breakdown of the Learning Outcomes –reflecting what the student will be able to do in the workplace at the end of the programme. Each competence should linked back to the numbered Learning Outcomes.
<b>Component</b>	An indication of the type of module within a learning guide ie; rotational, specialist or elective
<b>Curricula</b>	An outline of the expected educational outcomes across a subject area The learning that is expected to take place during the Scientist Training Programme described in terms of knowledge, skills and attitudes,
<b>Division</b>	A high level description of an area of practice within healthcare science. There are three divisions: Life Sciences, Physical Sciences and Biomedical Engineering and Physiological Sciences.
<b>Domains of Learning</b>	Cognitive (knowledge and intellectual skills), affective (feelings and attitudes), interpersonal (behaviour and relationships with others) and psychomotor (physical skills)
<b>Feedback</b>	Specific information about the comparison between a student’s observed performance and a standard, given with the intent to improve the student’s performance ( <i>van de Ridder JMM, Stokking KM, McGaghie WCand ten Cate OT. What is feedback in clinical education? Medical Education 2008: 42: 189– 19)7</i>
<b>Good Scientific Practice</b>	Non-statutory guidance on the minimum requirements for good practice for the healthcare science workforce.
<b>Host Department</b>	The department which is responsible for the 3-year training programme and which the training officer is based.
<b>Job</b>	A specific definition of the work activities, requirements, skills required to undertake work activities within a local context. This differs from a role – see below.
<b>Key Learning Outcome</b>	A defined learning outcome linked to relevant competence(s) within the workplace Learning Guide
<b>Knowledge and Understanding</b>	The knowledge and understanding that must be applied in the work place to achieve the stated competence.
<b>Learning Framework</b>	The specification for work based learning contained within

	the Learning Guide
<b>Learning Module</b>	A distinct set of learning outcomes and competences that form part of a programme. Modules may be rotational, specialist, elective or professional practice and can be combined to meet the needs of specific programmes
<b>Learning Outcome</b>	A high level, outcome based statement that describes what a student will be able to do at the end of the module
<b>Mentoring</b>	Mentoring is <i>a process in which a trainer (mentor) is responsible for overseeing the career and development of the student.</i> The emphasis is therefore on the relationship (rather than the activity).
<b>Module Aim</b>	The overall objective of a work based learning 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
<b>Module Scope</b>	A statement within work based learning modules that defines the range/limits/ of the learning undertaken by the student in a module – patients/investigations/equipment/modalities etc)
<b>National Occupational Standards</b>	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 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, behaviour and skills.
<b>Practical Skill</b>	A cognitive, psychomotor, physical or communicative ability that supports performance of required role.
<b>Programme</b>	The package of learning, teaching assessment and quality assurance leading to an award.
<b>Provider</b>	An organisation that delivers required training and learning activities, to specified quality assurance requirements
<b>Role</b>	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.
<b>Specialism</b>	A focused area of practice within a theme of healthcare science.
<b>Trainer</b>	A qualified individual who provides learning and development support for students
<b>Theme</b>	A cluster of related specialisms within a division of healthcare science.
<b>Work based learning</b>	Learning that takes place in a real work setting and involves the application of academic learning to real work activities
<b>Work Performance</b>	The requirements of satisfactory and consistent

	demonstration of competence in specified functions for a work role.
<b>Work place</b>	A real work setting in which the student can apply learning.

## **APPENDIX 5: FURTHER INFORMATION**

### **NHS Networks**

An open network to share curricula produced for the Modernising Scientific Careers programme. Join this network to get updates whenever there is new content.

<http://www.networks.nhs.uk/nhs-networks/msc-framework-curricula/>

Details of the Practitioner Training Programme including MSc Clinical Science Curricula, Work Based Learning Guides.

<http://www.networks.nhs.uk/nhs-networks/msc-framework-curricula/ptp>

### **Chief Scientific Officer (CSO)**

Source of information and news including the CSO Bulletin, latest press releases, publications and consultations.

<http://www.dh.gov.uk/health/category/chief-scientific-officer/>

### **National School of Healthcare Science (NSHCS)**

The National School of Healthcare Science is an important part of the new system for healthcare science training established through Modernising Scientific Careers. This new system was set up to ensure that patients benefit from the scientific and technical advances by ensuring that healthcare science staff have the knowledge and skills to put these advances into practice.

[www.nshcs.org.uk](http://www.nshcs.org.uk)

### **Academy for Healthcare Science (AHCS)**

The Academy for Healthcare Science (AHCS) is a UK wide organisation bringing together a diverse and specialised scientific community working within the National Health Service (NHS) and other associated organisations (e.g. the Health Protection Agency, NHS Blood and Transplant), Health and Social Care Northern Ireland (HSCNI) and the academic and independent healthcare sector.

<http://www.academyforhealthcarescience.co.uk/>

### **Health and Care Professions Council (HCPC)**

The HPC are a regulator set up to protect the public. They keep a register of health professionals who meet the HPC standards for their training, professional skills, behaviour and health.

<http://www.hpc-uk.org/>

*Last Accessed 29<sup>th</sup> September 2012*