Benchmark statement:  
Health care programmes

Phase 1
Prosthetics and orthotics
Subject benchmark statements: Health care programmes

Subject benchmark statements provide a means of describing the nature and characteristics of programmes of study and training in health care. They also represent general expectations about standards for the award of qualifications at a given level and articulate the attributes and capabilities that those possessing such qualifications should be able to demonstrate.

Subject benchmark statements are used for a variety of purposes. Primarily, they are an important external source of reference when new programmes are being designed and developed. They provide general guidance for articulating the learning outcomes associated with the programme but are not a specification of a detailed curriculum. Benchmark statements provide for variety and flexibility in the design of programmes and encourage innovation within an agreed overall conceptual framework.

Subject benchmark statements also provide support in the pursuit of internal quality assurance. They enable the learning outcomes specified for a particular programme to be reviewed and evaluated against agreed general expectations about standards.

Finally, subject benchmark statements are one of a number of external sources of information that are drawn upon for the purposes of academic review* and for making judgements about threshold standards being met. Reviewers do not use subject benchmark statements as a crude checklist for these purposes however. Rather, they are used in conjunction with the relevant programme specifications, the associated documentation of the relevant professional and statutory regulatory bodies, the institution’s own self evaluation documentation, together with primary data in order to enable reviewers to come to a rounded judgement based on a broad range of evidence.

The benchmarking of standards in health care subjects is undertaken by groups of appropriate specialists drawn from higher education institutions, service providers and the professional and statutory regulatory bodies. The statements represent the first attempt to make explicit in published form the general academic characteristics and standards of awards in these subjects in the UK. In due course, the statements will be revised to reflect developments in the subjects and the experiences of institutions, academic review and others that are working with it.

* academic review in this context refers to the Agency’s arrangements for external assurance of quality and standards. Further information regarding these may be found in the Handbook for academic review, which can be found on the Agency’s web site.
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Foreword

This benchmark statement describes the nature and standards of programmes of study in prothetics and orthotics, that leads to awards made by higher education institutions in the United Kingdom (UK) in the subject. It has been developed in collaboration with a number of other health care professions and these are listed below. Although initial work was undertaken in subject specific groups, the analysis of these early drafts identified a number of features which all the subject groups shared. It was, therefore, agreed by each of the specialist benchmark groups that their respective statements could be cast using a common structure. As work progressed it became increasingly apparent that there was considerable overlap within the details of the subject-specific statements and a common health professions framework was emerging. This emerging framework is, accordingly, displayed in each of the subject statements in order to illustrate on the one hand, the shared context upon which the education and training of health care professionals rests and, on the other, the uniquely profession-specific context within which programmes are organised. It is important to emphasise that benchmark statements are not cast in tablets of stone and will need to be revisited in the light of experience and further developments in health care. Moreover, we are confident that the emerging framework has the potential to embrace other health related professions such as social work, dentistry, medicine and other therapies. It is anticipated that further work in a second phase of the project could lead to an overarching health professions framework.

The initial section of this statement sets out the health professions framework under three main headings:

A Expectations of the health professional in providing patient/client services;
B The application of practice in securing, maintaining or improving health and well-being;
C The knowledge, understanding and skills that underpin the education and training of health care professionals.

The main section of this statement, in addition to describing the nature and extent of programmes leading to awards in prosthetics and orthotics, describes the profession-specific expectations and requirements under the same three categories.

The key feature in this statement, as in the associated statements, is the explicit articulation of the academic and practitioner standards associated with the award in prothetics and orthotics. This duality reflects the significance of the academic award as the route to registration for professional practice and formal recognition by the professional and statutory regulatory bodies. The threshold standards set out the expectations of health professionals entering their first post immediately on qualification.

The section on standards accords with the relevant level descriptor for awards in the qualifications frameworks published by the Quality Assurance Agency for Higher Education.

The section on teaching, learning and assessment draws attention to the central role of practice in the design of learning opportunities for students and the importance of ensuring that professional competence developed through practice is adequately assessed and rewarded. It also notes how essential it is that the integration of theory and practice is a planned process within the overall arrangements made for teaching and learning.

The statement acknowledges the need to put the prospective client/patient at the centre of the student’s learning experience and to promote within that experience the importance of team-working and cross-professional collaboration and communication. Implicit in the statement are the opportunities that exist for shared learning across professional boundaries, particularly in the latter stages of training when inter-professional matters can be addressed most productively. It is essential that the opportunities that exist for shared learning in practice are optimised, as well as best use being made of similar opportunities that prevail more obviously in classroom-based activities.

This statement and the associated statements will therefore allow higher education institutions, in partnership with service providers (where appropriate), to make informed curriculum choices about the construction of shared learning experiences. In this context, shared learning is seen as one of a number of means of promoting improved collaborative practice and addressing a range of issues which span professional accountability and professional relationships.

Finally, the statement does not set a national curriculum for programmes leading to awards in prothetics and orthotics. It acknowledges that the requirements of the professional and statutory regulatory body need to be incorporated into the design of programmes. It seeks to encourage higher education institutions and service providers to work collaboratively in the design and delivery of their curricula. Its essential feature is the specification of threshold standards, incorporating academic and practitioner elements, against which higher education institutions are expected, as a minimum, to set their standards for the award.

1 Dietetics, Health Visiting, Midwifery, Nursing, Occupational Therapy, Orthoptics, Physiotherapy, Podiatry (Chiropody), Prosthetics and Orthotics, Radiography, and Speech & Language Therapy.
An emerging health professions framework

The subject specific statements for prothetics and orthotics have been set within the emerging health professions framework outlined below. As indicated in the foreword, this framework developed as a result of the benchmarking work undertaken collaboratively by 11 different health professional groups. Further evolution of the framework is anticipated through a second phase of the project which will address its goodness of fit with a range of other health and social care professions benchmark statements.

A Expectations of the health professional in providing patient/client services

This section articulates the expectations of a registered professional within health and social care services. It describes what is regarded as a minimum range of expectations of a professional that will provide safe and competent practice for patients/clients in a variety of health and social care contexts.

A1 Professional autonomy and accountability

The award holder should be able to:

- maintain the standards and requirements of professional and statutory regulatory bodies;
- adhere to relevant codes of conduct;
- understand the legal and ethical responsibilities of professional practice;
- maintain the principles and practice of patient/client confidentiality;
- practise in accordance with current legislation applicable to health care professionals;
- exercise a professional duty of care to patients/clients/carers;
- recognise the obligation to maintain fitness for practice and the need for continuing professional development;
- contribute to the development and dissemination of evidence-based practice within professional contexts;
- uphold the principles and practice of clinical governance.

A2 Professional relationships

The award holder should be able to:

- participate effectively in inter-professional and multi-agency approaches to health and social care where appropriate;
- recognise professional scope of practice and make referrals where appropriate;
- work, where appropriate, with other health and social care professionals and support staff and patients/carers to maximise health outcomes;
- maintain relationships with patients/carers that are culturally sensitive and respect their rights and special needs.

A3 Personal and professional skills

The award holder should be able to:

- demonstrate the ability to deliver quality patient/client-centred care;
- practise in an anti-discriminatory, anti-oppressive manner;
- draw upon appropriate knowledge and skills in order to make professional judgements, recognising the limits of his/her practice;
- communicate effectively with patients/carers and other relevant parties when providing care;
- assist other health care professionals, support staff and patients/carers in maximising health outcomes;
- prioritise workload and manage time effectively;
- engage in self-directed learning that promotes professional development;
- practise with an appropriate degree of self-protection;
- contribute to the well-being and safety of all people in the work place.
A4 Profession and employer context
The award holder should be able to:

- show an understanding of his/her role within health and social care services;
- demonstrate an understanding of government policies for the provision of health and social care;
- take responsibility for his/her own professional development;
- recognise the value of research and other scholarly activity in relation to the development of the profession and of patient/client care.

B The application of practice in securing, maintaining or improving health and well-being

All health care professionals draw from the knowledge and understanding associated with their particular profession. This knowledge and understanding is acquired from theory and practice. It forms the basis for making professional decisions and judgements about the deployment in practice of a range of appropriate skills and behaviours, with the aim of meeting the health and social care needs both of individual clients/patients and of groups, communities and populations. These decisions and judgements are made in the context of considerable variation in the presentation, the setting and in the characteristics of the client/patient health and social care needs. They often take place against a backdrop of uncertainty and change in the structures and mechanisms of health and social care delivery.

Sound professional practice is essentially a process of problem solving. It is characterised by four major phases:

- the identification and analytical assessment of health and social care needs;
- the formulation of plans and strategies for meeting health and social care needs;
- the performance of appropriate, prioritised health promoting/health educating/caring/diagnostic/therapeutic activities;
- the critical evaluation of the impact of, or response to, these activities.

B1 Identification and assessment of health and social care needs
The award holder should be able to:

- gather relevant information from a wide range of sources including electronic data;
- adopt systematic approaches to analysing and evaluating the information collected;
- communicate effectively with the client/patient, (and his/her relatives/carers), group/community/population, about their health and social care needs;
- use a range of assessment techniques appropriate to the situation and make provisional identification of relevant determinants of health and physical, psychological, social and cultural needs/problems;
- recognise the place and contribution of his/her assessment within the total health care profile/package, through effective communication with other members of the health and social care team.

B2 Formulation of plans and strategies for meeting health and social care needs
The award holder should be able to:

- work with the client/patient, (and his/her relatives/carers), group/community/population, to consider the range of activities that are appropriate/feasible/acceptable, including the possibility of referral to other members of the health and social care team and agencies;
- plan care within the context of holistic health management and the contributions of others;
- use reasoning and problem solving skills to make judgements/decisions in prioritising actions;
- formulate specific management plans for meeting needs/problems, setting these within a timescale and taking account of finite resources;
- record professional judgements and decisions taken;
- synthesise theory and practice.
B3 Practice
The award holder should be able to:

- conduct appropriate activities skilfully and in accordance with best/evidence-based practice;
- contribute to the promotion of social inclusion;
- monitor and review the ongoing effectiveness of the planned activity;
- involve client/patient/members of group/community/population appropriately in ongoing effectiveness of plan;
- maintain records appropriately;
- educate others to enable them to influence the health behaviour of individuals and groups;
- motivate individuals or groups in order to improve awareness, learning and behaviour that contribute to healthy living;
- recognise opportunities to influence health and social policy and practices.

B4 Evaluation
The award holder should be able to:

- measure and evaluate critically the outcomes of professional activities;
- reflect on and review practice;
- participate in audit and other quality assurance procedures;
- contribute to risk management activities.

C Knowledge, understanding and skills that underpin the education and training of health care professionals

The education and training of health care professionals draws from a range of well-established scientific disciplines that provide the underpinning knowledge and understanding for sound practice. Each health care profession will draw from these disciplines differently and to varying extents to meet the requirements of their specialty. It is this contextualisation of knowledge, understanding and skills that is characteristic of the learning in specific health care programmes. Consequently, in this introductory section, the attributes and capabilities expected of the student are expressed at a generalised level.

C1 Knowledge and understanding
The award holder should be able to demonstrate:

- understanding of the key concepts of the disciplines that underpin the education and training of all health care professionals, and detailed knowledge of some of these. The latter would include a broad understanding of:
  - the structure and function of the human body, together with a knowledge of dysfunction and pathology;
  - health and social care philosophy and policy, and its translation into ethical and evidenced based practice;
  - the relevance of the social and psychological sciences to health and healthcare;
  - the role of health care practitioners in the promotion of health and health education;
  - the legislation and professional and statutory codes of conduct that affect health and social care practice.
C2 Skills

Information gathering
The award holder should be able to demonstrate:
- an ability to gather and evaluate evidence and information from a wide range of sources;
- an ability to use methods of enquiry to collect and interpret data in order to provide information that would inform or benefit practice.

Problem solving
The award holder should be able to demonstrate:
- logical and systematic thinking;
- an ability to draw reasoned conclusions and sustainable judgements.

Communication
The award holder should be able to demonstrate:
- effective skills in communicating information, advice, instruction and professional opinion to colleagues, patients, clients, their relatives and carers; and, when necessary, to groups of colleagues or clients.

Numeracy
The award holder should be able to demonstrate:
- ability in understanding, manipulating, interpreting and presenting numerical data.

Information technology
The award holder should be able to demonstrate:
- an ability to engage with technology, particularly the effective and efficient use of information and communication technology.
Benchmark statement for prosthetics and orthotics

Introduction

Prosthetics and orthotics are the clinical professions providing a patient/user focused service for people with a limb loss, congenital absence or functional deficiency requiring an externally applied device by means of a prosthesis or orthosis. Appendix 1 includes definitions of these two terms.

Undergraduate programmes of study leading to the award of a degree in prosthetics and orthotics allow graduates to acquire the necessary knowledge, understanding and skills to provide a clinical service to patients with diverse physical and social needs. The process of continued learning and reflection allows graduates to mature and develop as competent and safe practitioners and establish active links with professional bodies and associations, employers and fellow healthcare professionals.

The curriculum requirements for programmes in prosthetics and orthotics are set down by the statutory regulatory body which also accredits higher education institutions for providing the programmes. The British Association of Prosthetists and Orthotists (BAPO) promotes the clinical and ethical standards of the profession and facilitates continuing professional development.

In the United Kingdom (UK) services are provided by state registered prosthetists and orthotists within the framework of the National Health Service (NHS). Many prosthetists and orthotists are employed by commercial service companies who contract their expertise to the NHS.

At present there are two universities providing degree programmes in prosthetics and orthotics in the UK. This statement relates to the BSc (Honours) degree. Programmes comprise four years of combined theoretical and practical teaching including a full time, supervised, practical year in prosthetic and orthotic clinics. This highlights the highly practical and patient-focused nature of the prosthetic and orthotic profession.

This benchmark statement outlines the nature and extent of undergraduate programmes and describes the attributes and capabilities that undergraduates need to demonstrate to attain the award and achieve professional registration. This statement provides for flexibility in the design of programmes but reflects the essential requirements for planned clinical practice as a component.
Nature and extent of programmes in prosthetics and orthotics

Prosthetics and orthotics provides a patient-/user-focused clinical service for people with a need for a prosthesis and/or orthoses. Prosthetics and orthotics is a profession directed towards the skilled application of a distinctive body of knowledge and understanding based on anatomy, physiology, pathology, biomechanics, engineering principles and prosthetic and orthotic science which is acquired through education and professional development. The prosthetist/orthotist should be able to exercise original thought, have good professional judgement, good practical skills and be able to take responsibility for meeting the needs and requirements of the patient/user. As a competent professional the prosthetist/orthotist subscribes to the maintenance and development of skills and knowledge and is responsible for the quality of care for patients through the implementation of the principles and practice of clinical governance.

The study of prosthetics and orthotics requires a mastery of a theoretical knowledge base applied to clinical practice demonstrating an understanding of patient requirements. Graduates need to acquire the skills and capabilities to be safe, capable, and reflective practitioners.
A Expectations of the prosthetist/orthotist in providing patient/client services

This section seeks to capture the essence of the prosthetist/orthotist as a professional within the health care service.

A1 Professional identity

The award holder should be able to:

- appreciate his/her regulation within the prosthetic and orthotic profession and the legal requirement of continued state registration through the statutory regulatory body, whose main function is protection of the public;
- demonstrate awareness of their professional body, BAPO, and actively participate as full members of the association;
- be aware of the BAPO ‘best practice’ publications for clinical practice and the codes of practice of the statutory regulatory body, and abide by these guidelines in his/her day to day work;
- understand the legal responsibilities and ethical considerations of professional practice within the quality standards that apply to prosthetists and orthotists, including CE marking and other medical devices directives, the International Standards Organisation’s quality management models, BAPO’s Ethical Code and the International Society of Prosthetics and Orthotics (ISPO) publications;
- undertake risk assessments when selecting the components required for a customised prosthesis or orthosis which will meet the individual needs of the patient/user;
- respect the needs, maintain the integrity of the profession according to the guidelines laid down by BAPO and not bring the profession or employer into disrepute;
- have an awareness of the boundaries of practice covered by the prosthetic and orthotic disciplines.

A2 Professional relationships

The award holder should be able to:

- participate effectively and understand his/her role within the multi-disciplinary approach to prosthetic and orthotic rehabilitation;
- generate and maintain professional inter-relationships both within and outside the NHS;
- acknowledge the prosthetist and orthotist scope of practice and be aware of appropriate referral procedures to other disciplines;
- understand the need for and build relationships with other professional, technical and support staff in accordance with accepted practice needs. The relationships between the clinician and the technical staff are vital to allow for the correct fabrication of a prostheses or orthoses;
- generate and maintain effective channels of communication including the Medical Devices Agency, the Supplies and Purchasing Agency, the British Healthcare Trades Association, and the Scottish Central Supplies Agency.

A3 Personal and professional skills

The award holder should be able to:

- understand the support structures available to the new graduate as recommended by BAPO and in particular that at least the first 12 months of postgraduate clinical practice will be supervised by more experienced prosthetists and/or orthotists;
- build on communication skills with prosthetic and orthotic patients/users, taking account of all of their requirements and needs. Particular attention should be paid to comfort, function and cosmesis;
- be able to communicate prosthetic and orthotic objectives to other health care professionals involved in rehabilitation;
- engage in self-directed learning, maintaining their CPD portfolio as laid down by BAPO, and any future regulations of the statutory regulatory body.
A4 Profession and employer context

The award holder should be able to:

- demonstrate an understanding of the historical roots of prosthetic and orthotic health care in the UK with reference to the unusual contracted service element. This would include knowledge of the factors affecting the profession such as the McColl report, audit commission report and their impact on the future development of the prosthetic and orthotic service;

- contribute to and maintain a safe health care environment, be aware of any trust and employer specific infection control procedures, manual handling and safe working practices in both the clinical and workshop environments;

- show understanding of how health promotion is organised around the provision of prostheses and orthoses with particular reference to hygiene, infection control, and the correct management of prosthetic and orthotic care;

- enable the patient to learn about and monitor their medical condition and the effect that any changes may have on the fit of their prosthesis and/or orthoses;

- recognise the value of research into prosthetic and orthotic rehabilitation;

- understand and appreciate his/her potential contributions to the development of the profession.

B The application of practice in securing, maintaining or improving health and well-being in prosthetics/orthotics

All health care professionals draw from established theories, models, frameworks and concepts associated with their particular profession. These form the basis for making decisions and judgements about the range of psychomotor and other skills and behaviours appropriate to meet patient/client needs. Such decisions/judgements are made in the context of considerable variation in clinical presentations, clinical settings and individual client/patient characteristics.

Sound practice in such interventions is characterised by assessing client/patient needs, formulating plans, selecting appropriate care/therapy/clinical procedures, and evaluating the impact of, or response to, the interventions.

The graduate practising prosthetics will be treating patients with all levels of amputation as well as those patients who have congenital limb reduction deformities requiring prosthetic fitting. The graduate practising in orthotics will be treating patients with a large range of functional deficits resulting in the need for external support and or correction.

These patients will often represent complex clinical challenges and although newly qualified graduates will have the basic skills to assess and treat patients, they will need to recognise his/her relative inexperience and refer to more senior colleagues when appropriate. Generally the treatment of patients requiring a prosthesis and or orthosis is delivered within a caring and supportive multi-disciplinary clinical environment, which is patient-focused. The graduate should be aware of the need for empathy with the patient at all stages of their assessment and treatment.

B1 Patient assessment

Gathering information

The award holder should be able to demonstrate the ability to gather information from a wide range of sources to facilitate patient assessment. These will include patient referral documentation, patient hospital files, patient prosthetic and orthotic clinical notes, electronic sources of data and medical/prosthetic and orthotic databases. Graduates should be able to source oral and written information from other members of the multi-disciplinary team (MDT) and appreciate the importance of communicating directly with their patient, taking account of their requirements and needs during the assessment. The graduate should be aware of the importance of assembling all relevant information prior to an episode of care.

Assessment of physical, psychological and cultural needs/problems

The graduate should have an awareness of the psychological and cultural factors affecting his/her patient's rehabilitation. If these factors affect adversely the treatment plan the graduate should be able to recognise the necessity to refer on to other disciplines. The fundamental aspect of the patient assessment carried out by the graduate must be in relation to their physical ability and requirement to use a prosthesis and or orthosis.
To complete this physical assessment the graduate must be able to:

- analyse normal and abnormal gait, locomotive function and movement using both qualitative and quantitative means;
- assess the functional loss or impairment with specific reference to the factors affecting the use of a prosthesis and or orthosis, eg amputation level, congenital abnormality, joint function, sensation, tissue viability and muscle power.

The graduate should be able to take account of patients existing medical conditions, cognitive state and social factors affecting their rehabilitation with a prosthesis and/or orthosis. The graduate should be able to listen to and discuss with patients their expectations and the potential outcomes of treatments. The graduate must be aware of patient weight and potential activity level and the uses that the supplied prosthesis and or orthosis will be subject to. This is a part of the health and safety and risk assessment process of supplying a prosthesis and or orthosis.

**B2 Selection of appropriate interventions/management plans**

The graduate should be aware that not all patients referred for assessment will be suitable for prosthetic and/or orthotic intervention. In these cases an awareness of the access routes of referral to other disciplines is needed to redirect the patient’s rehabilitation appropriately.

In most cases however the patient will be supplied with a prosthesis and/or orthosis and the graduate will be required to consider the specification and prescription of the device to be supplied. This will require knowledge of selection of prosthetic and orthotic components, interface materials, fabrication techniques, biomechanical principles of loading and suspension elements. The graduate must decide upon various elements of the patients care and management plan. This would typically include choice of assessment methodology, prescription criteria, fitting and alignment processes and review mechanisms.

In formulating a prosthetic and/or orthotic prescription the graduates must be aware of health and safety and risk assessment issues, in relation to fabrication and selection of the appropriate prosthetic and or orthotic device. They should follow all relevant technical advice and information from manufacturers and ensure that the patient is informed of all aspects of care and functional capabilities of the device supplied.

**Recording the assessment procedure**

The graduate must ensure that full details of the assessment procedure are recorded in the appropriate clinical and technical files and that technical specifications adhere to relevant quality procedures.

**B3 Application**

This section will cover the process of casting, manufacturing, fitting and supplying a prosthetic and/or orthotic device.

The graduate must be able to capture the appropriate anatomical, three-dimensional body segment shape, volume and alignment. This can be done by a variety of means. Most commonly this would be a plaster of paris cast and measurements, but data capture could be electronically recorded using CAD technology. At this stage the graduate should be considering interface design, material selection, force application, skeletal alignment and biomechanical principals of loading. This biomechanical loading is influenced by active manipulation of the cast both while on the patient and later by adjusting the solid model during the rectification process. The same principles of rectification are applied using the tools available on the CAD systems to the data collected electronically.

Subsequent to this casting procedure the graduate is responsible for ensuring the correct manufacturing processes are carried out as laid down in their technical specification sheets. The device manufactured must match the prescription and remain safe for the patient at all times.

The device must then be fitted to the patient by the graduate, who will ensure that it is customised to provide optimal alignment, fit and function. This is an interactive process between the graduate and the patient whose feedback provides invaluable insight to the effectiveness of the device. Once this process is completed to the satisfaction of the graduate and the user, the device will be finished off ready to be delivered to the patient. At this stage the patient should be given written or oral information regarding the use and care of the prosthetic and or orthotic device supplied.

The graduate will now assess the need to review the progress of the patient in line with their care management plan, adjust the plan as necessary and refer onto other disciplines if appropriate. Any changes to the prescription and technical details must be recorded in the relevant patient file.
B4 Evaluation

The graduate must be aware that the supply, fit and delivery of any prosthetic and orthotic device requires ongoing evaluation. This evaluation process will form part of the review mechanism and will include evaluation of the following:

- body-device interface;
- functional alignment;
- mechanical integrity;
- functional suitability;
- cosmetic appearance;
- patient needs and clinical conditions;
- patient expectations.

Any review process, and resulting outcomes must be recorded in the patient files and communicated to other members of the multi-disciplinary team.

The graduate should be able to recognise the importance of reflecting on his/her clinical practice, seeking peer support and undertaking the process of lifelong learning.

C Subject knowledge, understanding and associated skills

The award holder should be able to demonstrate:

C1 A systematic knowledge and understanding of the key aspects of the theoretical basis of prosthetic and orthotic science

The following areas are essential elements in a programme of study in prosthetic and orthotic science.

**Lower limb prosthetics**
Knowledge of the application of prosthetics to the following amputation levels:

- trans-lumbar amputation, trans-pelvic amputation, hip disarticulation amputation;
- trans-femoral amputation;
- knee disarticulation amputation;
- trans-tibial amputation;
- ankle disarticulation amputation;
- partial foot amputation;
- prosthetics in the management of limb deficiencies present at birth.

**Upper limb prosthetics**
Knowledge of the application of prosthetics to the following amputation levels:

- forequarter amputation;
- shoulder disarticulation amputation;
- trans-humeral amputation;
- elbow disarticulation amputation;
- trans-radial amputation;
- wrist disarticulation amputation;
- partial hand amputation;
- prosthetics in the management of congenital abnormalities.
Lower limb orthotics
Knowledge of the application of orthotics in the following areas of practice:
- footwear (including stock and bespoke);
- foot orthosis;
- ankle-foot orthosis;
- knee orthosis;
- knee-ankle-foot orthosis;
- hip-knee-ankle-foot orthosis;
- hip-knee orthosis;
- hip orthosis.

Spinal orthotics
Knowledge of the application of orthotics to the following areas of practice:
- sacro-iliac orthosis;
- lumbo-sacral orthosis;
- thoracolumbo-sacral orthosis;
- cervicothoracolumbo-sacral orthosis;
- cervico-thoracic orthosis;
- cervical orthosis;
- cranial orthosis.

Upper limb orthotics
Knowledge of the application of orthotics to the following areas of practice:
- finger orthosis;
- hand orthosis;
- wrist-hand orthosis;
- wrist-hand-finger orthosis;
- elbow-wrist-hand orthosis;
- elbow orthosis;
- shoulder-elbow orthosis;
- shoulder-elbow-wrist-hand orthosis;
- shoulder-wrist-elbow orthosis;
- shoulder orthosis.

General understanding
- Knowledge and understanding of patient/client prosthetic and/or orthotic management including
details of patient/client assessment, casting, measuring, rectification, manufacture, fitting, alignment,
supply, review, appropriate care planning and note keeping.
- Expertise in the appropriate role of stock, customisation of stock and custom made prostheses and
orthoses.
- Understanding and awareness of psychology of loss and disability as it affects and influences prosthetic
and orthotic management.
Systematic understanding of the key aspects of the theoretical basis of human anatomy, physiology and pathology in relation to physical disability and rehabilitation

- The human musculoskeletal system (gross anatomy of the lower limbs, upper limbs and trunk: bones, joints, muscles, nerves, vascular supply).
- Physiology of basic body systems (locomotor system, cardiovascular system, nervous system, respiratory system, skin, renal system, endocrine system, embryology).
- Pathophysiology of diseases and conditions relevant to prosthetics and orthotics (locomotor system, cardiovascular system, nervous system, respiratory system, skin, renal system, endocrine system, embryology).
- Basic genetic principles, diseases and conditions relevant to prosthetics and orthotics eg, congenital abnormality, muscular dystrophy.

Systematic understanding of the key aspects of viewing the body as a mechanical system and the theoretical basis of engineering materials and design

- Human tissue mechanics and human movement studies and analysis.
- Biomechanical principles of upper limb and lower limb prosthetics, and of upper limb, lower limb and spinal orthotics.
- Design concepts, processes and applications of materials and manufacturing processes used in the prosthetics and orthotics profession.
- Knowledge of mathematical and statistical concepts which are of use in biologically related disciplines.
- An awareness of the principles of electricity and its use in prosthetics and orthotics.
- A knowledge of materials in terms of composition, structure and properties.

Expertise in the appropriate role of the prosthetist/orthotist as a health care professional

- Understanding of the role of all members of the multidisciplinary team in the prosthetic/orthotic management of a patient/client.
- Understanding of the theory of communication necessary for performance as a prosthetist/orthotist.
- Appropriate moving and handling training to deal with both human beings and inanimate objects.
- Display quality assurance and business awareness in prosthetics and orthotics, as well as professional awareness (including the roles of BAPO and the statutory regulatory body).
- Understanding of the principles of scientific enquiry, and the need for prosthetists and orthotists to be involved in research and evaluation of practice. This would include the use of databases (eg Medline, Recal).
- Critically appraise literature, synthesise and evaluate data related to rehabilitation, and be capable of drawing on established analytical techniques.
- Basic understanding of investigative studies of the human body (eg, MRI, X-ray), and understanding of kinesiology (human movement analysis including kinetics, kinematics and EMG studies).

Knowledge of appropriate procedures in prosthetic and orthotic practice

- Assessment of patient/client for determining functional loss and leading to individual prosthetic/orthotic objectives for an appropriate care programme.
- Awareness of health and safety guidelines.
- Awareness of specification of componentry within quality and manufacturers guidelines.

C2 Skills

Information gathering

- Ability to gather and evaluate evidence and information from a wide range of sources and to draw reasoned conclusions or to reach sustainable judgements leading to evidence-based practice in prosthetics and orthotics.
Benchmark statement: Health care programmes

- Ability to apply the principles of scientific enquiry.
- Ability to evaluate human tissue mechanics.
- Ability to apply skills of kinesiology (human movement analysis including kinetics, kinematics and EMG studies).

Problem solving
- Ability to identify, investigate, analyse and formulate solutions to problems related to prosthetics and orthotics both as an individual and team member.
- Ability to select and predict appropriate care pathways in prosthetics and orthotics, in relation to prognosis.
- Assessment of the factors relevant to the choice of materials for particular uses.
- Use of human tissue mechanics and human movement studies and analysis.
- Application of design concepts to prosthetics and orthotics.
- Ability to assess current practice and initiate changes as required to improve clinical outcomes.
- Critically appraise literature, synthesise and evaluate data related to rehabilitation, and be capable of drawing on established analytical techniques.

Communication
- Effective communication skills and other interpersonal skills necessary for performance as a prosthetist/orthotist as a member of a multi-professional team.

Numeracy
- Application of relevant mathematical and statistical concepts.
- Measurement of normal and pathological body parameters.

Information technology
- Confidence in engaging with technology, including understanding, manipulating and interpreting numerical data in the pursuit of effective prosthetic and orthotic practice.
- Acquired skills will entail the use of IT hardware and software such as word processing, spreadsheets, the internet, CADCAM systems and systems for gait analysis.

Professional skills
- Capacity for self-reflection, including the extent and limitations of the principles and concepts of prosthetics and orthotics.
- Recognition and commitment to continuing professional development, and an ability to reflect on own practice and academic learning.
- The potential impact of trends in prosthetics/orthotics and related fields and the ability to assess current practice and initiate changes as required to improve clinical outcomes.
- Expertise in an appropriate range of skills and procedures in prosthetic and orthotic practice.
- Assessment of patient/client for determining functional loss and leading to individual prosthetic and/or orthotic objectives for an appropriate care programme.
- Tactile skills including measuring, handling and data capture techniques including casting of the patient/client.
- Practical skills involving interaction with componentry, materials and tools.
- Interaction of patient with prosthesis and/or orthosis under health and safety guidelines.
- Customisation of existing componentry, and awareness of specification of componentry within quality and manufacturers guidelines.
- Prescription of prostheses and orthoses, related to patients functional loss and need.
- Appropriate moving and handling training to deal with both human beings and inanimate objects.
- Application of best practice guidelines from BAPO and the statutory regulatory body.
Teaching, learning and assessment

Decisions about the strategies and methods for teaching, learning and assessment are for institutions to determine, but should complement the learning outcomes associated with health profession programmes. It is not for benchmark statements to promulgate any one, or combination of, approaches over others. However, this benchmark statement promotes an integrative approach to the application of theory and practice. It underlines the significance attached to the design of learning opportunities that facilitate the acquisition of professional capabilities and to assessment regimes that ensure these are being both delivered and rewarded to an appropriate standard. Fundamental to the basis upon which students are prepared for their professional career, is the provision of programmes of academic study and practice-based learning which lay the foundation for career-long professional development and lifelong learning to support best professional practice and the maintenance of professional standards.

Teaching and learning in prosthetics/orthotics

In prosthetics and orthotics, treatment episodes are of such duration that short blocks of clinical placement times are inappropriate. Consequently, the final year of programmes should consist of two placements of a minimum six months, one in prosthetics and one in orthotics, at recognised clinical facilities accredited by the universities and led by an approved training officer/supervisor. The training officer/supervisor must be a state registered prosthetist or orthotist who leads the training in their recognised discipline. The six-month clinical placements will be full-time in nature and will expose the students to as wide a range of clinical conditions in prosthetics and orthotics as feasible at the centres. This should include an insight into the workings and interactions of the MDT. The teaching in the initial years should be structured to underpin the areas of knowledge, skills and safety focused on during each of the six month clinical placements.

Assessment

In developing an assessment strategy some key factors should be considered:

• there must be sufficient clearly identified opportunities for students to demonstrate that they have met the threshold in all components of the course;

• it is important that the strategy provides sufficient opportunity for the best students to exhibit the level of innovation and creativity associated with excellence.
Academic and practitioner standards

The following section describes the minimum or threshold standards for an honours degree in prosthetics and orthotics. The standards are cross-referenced to the earlier sections A, B and C describing graduate attributes and capabilities. The standards encapsulate the requirements of the statutory regulatory body and reflect both academic and practitioner elements.

A Working as a professional

The award holder should be able to:

- show an awareness of the boundaries of practice covered by the prosthetic and orthotic disciplines including professional, ethical and legal considerations;
- operate effectively as an individual practitioner whilst recognising the need for multi-disciplinary approaches and the need to build relationships with other professional, technical and support staff;
- generate effective channels of communication with those agencies relevant to the practice of prosthetics and orthotics;
- understand the support structures available to the new graduate as recommended by BAPO;
- establish and maintain effective communication skills with prosthetic and orthotic patients/users and other health care professionals alike;
- work as a reflective practitioner and exercise judgements based on awareness of key issues in prosthetics and orthotics;
- show an awareness and sensitivity to the range of employment, health-related and safety issues encountered in prosthetic and orthotic practice.

B Application of practice

The award holder should be able to:

- assess correctly patient/client needs through drawing on the information gathering, intervention planning and recording procedures described in section B1;
- cast, manufacture, fit and/or supply a prosthetic/orthotic device in accordance with the agreed intervention plan;
- evaluate the outcome of prosthetic and/or orthotic treatment.

C Subject knowledge and understanding

The award holder should be able to:

- show systematic and integrated understanding of the key areas of study including an in-depth prosthetic and orthotic knowledge as specified in section C;
- demonstrate knowledge of the structure and functioning of body systems which are of particular relevance to prosthetic and orthotic practice and of the related patho-physiology and pathology of each system;
- critically evaluate evidence to reach sustainable judgements leading to evidence-based practice in prosthetics and orthotics;
- display an understanding of the mechanical properties and behaviour of materials and devices which will be used in treating patients and of the interaction between device and patient;
- apply the concept of static and dynamic equilibrium to analyse joint forces during walking and movement;
- apply principles of biomechanics to the upper limb and spine and consider the mechanical characteristics of body tissues and the effect of the patient device interface forces on those tissues;
- analyse the walking patterns of normal subjects, amputees and orthotic patients;
- apply the concept of static equilibrium to lower limb prostheses and orthoses to calculate patient device interface forces and pressures;
• communicate effectively with peers and senior colleagues and work effectively as part of a multi-
  professional team, in addition to working as an individual;
• demonstrate a capacity to continuously update knowledge and practice in response to changing
  circumstances and progressive prosthetic and/or orthotic knowledge and techniques;
• display knowledge of mathematical and statistical concepts which are of use in biologically related
  disciplines and be aware of the principles of electricity and its use in prosthetics and orthotics;
• demonstrate knowledge of metals and plastics in terms of composition, structure and properties;
• assess the factors relevant to the choice of materials for particular uses and to appreciate the inter-
  relationships between materials.
Appendix 1

Terms and definitions

The following ‘terms and definitions’ are quoted from the International Standards Document ISO 8549-1:1995.

Prostheses and orthoses

Prosthesis

Prosthetic device: Externally applied device used to replace wholly, or in part, an absent or deficient limb segment.

Note: It includes any such device having a part within the human body for structural or functional purposes.

Orthosis

Orthotic device: Externally applied device used to modify the structural and functional characteristics of the neuro-muscular and skeletal system.

Prosthetics

Science and art involved in treating patients by the use of prostheses.

Orthotics

Science and art involved in treating patients by the use of orthoses.
## Appendix 2

**Prosthetics and orthotics benchmark group membership**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Stephen Andrews</td>
<td>Southmead Hospital, Bristol</td>
</tr>
<tr>
<td>Mrs Elaine Figgins</td>
<td>University of Strathclyde</td>
</tr>
<tr>
<td>Miss Sophie Hill</td>
<td>University of Salford</td>
</tr>
<tr>
<td>Mr Stephen Hutchins (facilitator)</td>
<td>University of Salford</td>
</tr>
<tr>
<td>Dr Derek Jones</td>
<td>University of Strathclyde</td>
</tr>
<tr>
<td>Mr Ian Massey</td>
<td>Rookwood Hospital, Cardiff</td>
</tr>
<tr>
<td>Mrs Mags Miller</td>
<td>RSL Steeper</td>
</tr>
<tr>
<td>Mrs Sandra Sexton</td>
<td>University of Strathclyde</td>
</tr>
</tbody>
</table>
Appendix 3

Benchmark steering group membership

Mrs Margaret Andrews  North East Wales Institute of Higher Education
Mr David Ashcroft  Society of Chiropodists & Podiatrists
Mrs Linda Auty  Leeds Metropolitan University
Miss Lesley Barrowman  National Board for Nursing, Midwifery & Health Visiting for Northern Ireland
Mrs Valerie Beale  Somerset Health Authority
Ms Mary Boyle  National Board for Nursing, Midwifery & Health Visiting for Scotland
Mrs Ann Clarke  Bedford Hospital NHS Trust
Ms Helen Davis  Royal Hallamshire Hospital, Sheffield
Professor Anne de Looy  Queen Margaret University College, Edinburgh
Miss Faye Doris  University of Plymouth
Mr Martin Duckworth  College of St Mark & St John, Plymouth
Mr Brian Ellis  Queen Margaret University College, Edinburgh
Miss Anne Fagan (deceased)  Hospital of St John & St Elizabeth, London
Mrs Janice Gosby  UK Central Council for Nursing, Midwifery & Health Visiting
Ms Valerie Hall  University of Brighton
Mrs Julia Henderson  University of Hertfordshire
Ms Anne Hopkins  University of Wales Swansea
Mr Stephen Hutchins  University of Salford
Mr Tom Langlands  English National Board for Nursing, Midwifery and Health Visiting
Ms June Leishman  University of Abertay, Dundee
Professor Jeffrey Lucas  University of Bradford
Professor Dame Jill Macleod-Clark (co-chair)
Ms Diane Marks-Maran  Thames Valley University
Mrs Susan Montague  University of Hertfordshire
Mrs Christine Mullen  South Manchester University Hospital NHS Trust
Mr Luke O’Byrne  East Berkshire NHS Trust
Mrs Audrey Paterson  Canterbury Christ Church University College
Ms Robyn Phillips  Welsh National Board for Nursing, Midwifery & Health Visiting
Professor Mike Pittilo (co-chair)  Kingston University & St George’s Medical Hospital
Ms Lorna Povey  Wolverhampton Health Care NHS Trust
Mrs Jarina Rashid-Porter  Coventry Healthcare NHS Trust
Mr Gwilym Roberts  College of Occupational Therapists
Ms Jenny Routledge  University of East Anglia
Mr Ian Rutherford  University of Nottingham
Mrs Sandra Sexton  University of Strathclyde
Ms Gail Stephenson  University of Liverpool
Professor Averil Stewart  Queen Margaret University College, Edinburgh
Professor Mary Watkins  University of Plymouth