Bioinformatics Scientist Degree Apprenticeship Standard, Level 7 End-point Assessment Plan (non-integrated)

Introduction and Overview

This document sets out the requirements for end-point assessment (EPA) for the **Bioinformatics Scientist Level 7 Degree Apprenticeship** standard. It is written for end-point assessment organisations who need to know how the EPA for this apprenticeship must operate. It will also be of general interest to Bioinformatics Scientist apprentices, their employers and training providers.

The structure of this apprenticeship is designed to develop the knowledge, skills, and behaviours required by the Standard to ensure that apprentices are appropriately prepared to undertake the EPA and occupationally competent to perform the Bioinformatics Scientist job role.

The Bioinformatics Scientist Standard will **take 30 months to complete**: with the first 24 months being dedicated to the on-programme training/assessment element – leading to a Master's degree; and the end point assessment undertaken in the final 6 months.

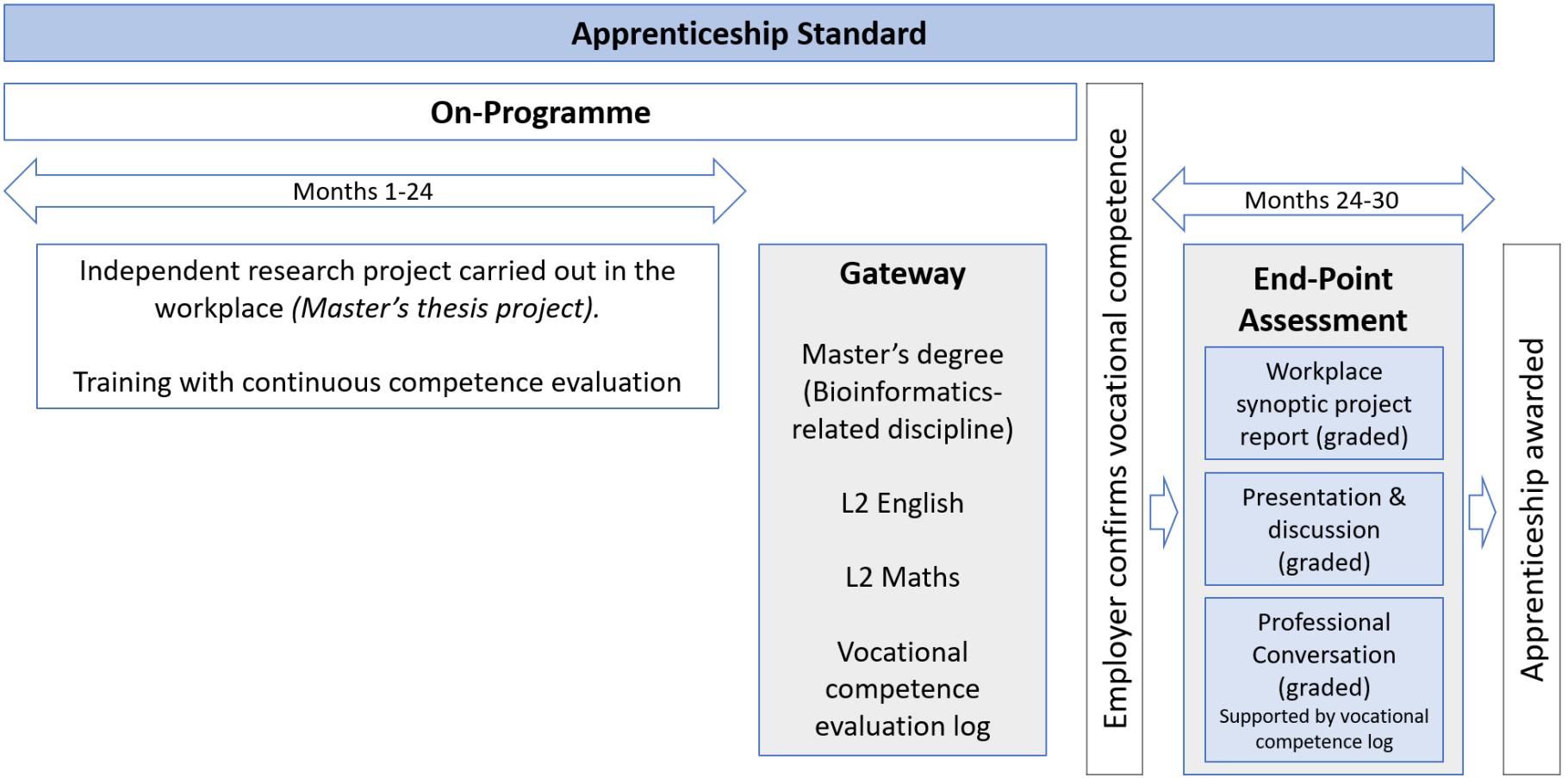
Completion of this Master's degree is a gateway requirement for starting the EPA, along with English and maths at level 2 - achieved either before or during the apprenticeship, and the completion (and sign-off) of the vocational competence evaluation log (log). The employer must confirm that the apprentice has completed the gateway requirements and is ready for the EPA.

The HEI which offers the Master's degree component of the apprenticeship training will be required to be listed on the Register of Apprenticeship Training Providers (RoATP). Those offering the independent end-point assessment for this apprenticeship must be an organisation on the Register of End-Point Assessment Organisations (RoEPAO), which is approved to deliver EPA for this apprenticeship standard.

The EPA consists of 3 distinct assessment methods:

- **A synoptic project report reflecting on the experiences of carrying out independent research in a workplace setting**
- **A presentation of the synoptic project with discussion (Q and A)**
- **A viva-style professional conversation supported by a competency log**.

Apprentices cannot complete the apprenticeship successfully without passing the EPA. Performance in the EPA will determine the apprenticeship grade of fail, pass, or distinction.


Apprenticeship Standard
On-Programme
Months 1-24
Independent research project carried out in the workplace (Master's thesis project).
Training with continuous competence evaluation
Gateway
Master's degree (Bioinformatics-related discipline)
L2 English
L2 Maths
Vocational competence evaluation log
Employer confirms vocational competence
Months 24-30
End-Point Assessment
Workplace synoptic project report (graded)
Presentation & discussion (graded)
Professional Conversation (graded)
Supported by vocational competence log
Apprenticeship awarded

End-point Assessment Gateway

The EPA should only start once the employer is satisfied that the apprentice is consistently performing at or above the level set out in the standard, the pre-requisite gateway requirements for EPA have been met and that they can be evidenced to an EPA organisation. Employers should take advice from their apprentice's training provider(s).

Master's Degree

Apprentices must complete a Master's degree in a subject related to, or aligned with Bioinformatics, which will provide suitable training opportunity for the apprentice to meet the requirements of the standard.

The type of Master's degree (style/mode of delivery) varies between HEIs, and will be part of the choice made by the employer when selecting a provider for this apprenticeship - for example:

- Master of Science (MSc)
- Master of Philosophy (MPhil)
- Master of Research (MRes)
- Master of Science by Research (MSc by Research)
- Master of Studies (MSt)

The range of Master's degree qualifications may be used allowing employers/apprentices the flexibility to tailor the apprenticeship to meet their needs, whilst meeting the minimum requirements of the apprenticeship standard. All will provide access to taught-course material and support to undertake a significant individual research project in the workplace.

Vocational Competency Log (log)

A summary record of on-programme vocational competence evaluation, signed off by a technical expert nominated by the apprentice's employer, must be recorded in a log. This reflects the industry practice of competence management through on-going employer competence evaluation.

A log must list what evidence was used to confirm the apprentice demonstrated competence, where it is recorded, how it was evaluated and by whom against all KSBs in the apprenticeship standard.

There is no need to capture the evidence itself in the log. However, the log must provide a reference to where the evidence is held. Typical evidence may include for example: taught course/module assessment; outcomes from regular HEI/employer supervisory/mentoring meetings; a company workbook; performance review record; certificates of training; and aspects of the workplace synoptic project as assessed during the Master's degree.

This must be signed off by the technical expert and must be provided to the EPAO at gateway in order for EPA to go ahead. The EPAO must provide guidance on what format the log must take and the signatory process.

English and Maths Level 2

Apprentices without level 2 English and maths will need to achieve this level prior to taking the end-point assessment. For those with an education, health and care plan or a legacy statement the apprenticeships English and maths minimum requirement is Entry Level 3 and British Sign Language qualification are an alternative to English qualifications for whom this is their primary language.

Apprentices may achieve these either before or during the apprenticeship, but this achievement must be before completing the EPA.

End-point Assessment Methods, Timescales and Location

EPA methods must be successfully completed during a maximum 6-month period. The EPA assessment consists of 3 distinct assessment methods:

- **A synoptic project report reflecting on the experiences of carrying out independent research in a workplace setting**
- **A presentation of the synoptic project with discussion (Q and A)**
- **A viva-style professional conversation supported by a competency log**.

The table in appendix 1 shows the KSBs that will be assessed by each assessment method.

Requirements for each assessment method are detailed below.

Workplace synoptic project report

A workplace synoptic research project is a substantial piece of work that allows the apprentice to plan, develop and implement an individual scientific work-based project – and forms the basis of the written thesis towards the award of the Master's degree.

As part of the requirements **for the Master's degree**, the apprentice will prepare a written thesis/dissertation to present the research project that has been carried out. Assessment of this thesis will typically focus on the presentation of the candidate's knowledge and skills, illustrated through the technical implementation of a programme of research, analysis of data and the interpretation of results.

For the EPA, the apprentice will be expected to produce the **Workplace synoptic project report** – which is intended to address a broader range of the apprenticeship KSBs – specifically relating to the effective undertaking of research in the industrial workplace.

The apprentice will have to show reflective and critical analysis of appropriate literature and own data and the development of their investigative and work orientated skills – summarising the detail presented in the academic thesis, and presenting this in the broader scientific and operational context of the industry in which the apprentice works. The scope of the project report must cover, but need not be limited to:

1: Planning, Design and Organisation

The approach used to plan and design the programme of research work including recognition of resource implications, legal and regulatory compliance, ethics, risk assessment, and other work-based and stakeholder requirements.

2: Review of Literature

Use of appropriate databases to assess relevant project literature. Critical assessment of original work-based and other literature. How literature knowledge transferred into the experimental plan of work.

3: Project Implementation

A review of the implementation of project work, including competent experimental design, recognition of regulated and good working practices and recording of work and project progress via a reflective record. How such reflection fed back into the planning and implementation process.

4: Results and Conclusions

Appropriate, timely and concise reporting of project work including data analysis and drawing conclusions via written and oral media.

The Workplace Synoptic Project Report must be 6,000 words +/-10%, excluding tables, figures, references and annexes. It must be submitted for grading at least 6 weeks prior to the end of the EPA period. Apprentices should be allowed 20% of their time to work on the Synoptic Project Report, this could be allocated as a block of time or as a weekly allocation depending upon agreement with the employer.

Presentation of the Synoptic Project Report and Discussion (Q and A)

EPAOs must ensure that the presentation and questioning elements of the EPA are conducted in suitably controlled environments i.e. the necessary equipment must be available e.g. computer and power-point facilities (if required by the apprentice). It is anticipated that EPAOs will use the apprentice's employer's premises wherever possible to minimise costs. The assessment may be conducted face-to-face or via an online platform e.g. video-conferencing. EPAOs must ensure appropriate methods to prevent misrepresentation are in place should an online option be used. For example, screen share and 360-degree camera function with an administrator/invigilator.

- EPAOs must schedule the presentation and questioning elements, to give an apprentice a minimum of 4-weeks' notice of the time, date and venue. The apprentice must provide the presentation to the EPAO within 2 weeks of the scheduled presentation date.
- The presentation and the questioning elements must take place in the presence of an independent assessor and can include 1 or more technical experts as requested by the independent end-point assessor, from a list of qualified technical experts - created and maintained by the EPAO. The role of the technical expert is to provide a further independent audience for the apprentice to present to. Prior to the Presentation and Q and A the technical expert will support the independent assessor on the presentation contents in areas that require more up to date expertise.
    - The technical expert in attendance must be independent of the apprentice and the company that they are employed by.
    - Technical experts are expected to be freelancers/contractors.
    - Technical experts may ask questions during the presentation but may not be involved in input to the grading.
- Prior to the Presentation and Q and A, the independent assessor must have reviewed the apprentice's presentation and prepared questions for the questioning element. However, the questions may be modified to take into account the content of the oral presentation. Apprentices must give a presentation covering the material included in the Synoptic Project Report. The presentation must cover all of the major elements included in the Synoptic Project Report.

The presentation must take 20 minutes +/- 2 minute.

- Apprentices can use presentation aides i.e. power-point, video clips, flip chart, work products, notes.
- EPAOs must ensure any reasonable presentational requirements are in place e.g. power-point facilities; apprentice's must make any requirement requests at least 2 weeks prior to the scheduled date for the presentation and questioning.
- EPAOs must produce a question bank of sufficient size to prevent predictability and review them regularly (and at least once a year) to ensure they, and the specifications they contain, are fit for purpose. At the end of the presentation, the independent assessor must ask the apprentice their prepared questions (8 open questions) which should be taken from the question bank; follow up questions are allowed to seek clarification.
- Questioning must be completed during an additional 25-minute period +/- 2 minutes.
- Questions must seek to assess KSBs (as detailed in Appendix 1 for this EPA method) that were not evidenced through the presentation and/or to ensure depth of understanding in order to assess performance against the distinction criteria.
- Apprentices may refer to their notes, presentation or presentation aides when answering the questions.
- The presentation and questioning audio should be recorded electronically.

Viva-style Professional Conversation supported by Competency Log

Apprentices will engage in a one-hour **viva-style Professional Conversation** with the independent assessor drawn from the end-point assessment organisation. The Professional Conversation will be focused on the apprentice's ability to demonstrate that the knowledge, skills and behaviours required by the Standard have been met.

The **Vocational Competency Log** is designed by each individual company in order to record activities and tasks undertaken by the apprentice during the apprenticeship period prior to the EPA gateway. The log ensures that the apprentice has experienced and documented all required KSBs of bioinformatics practice by the apprenticeship. During the Professional Conversation, the apprentice must have the opportunity to refer to the log and evidence referenced within it to evidence their answers. This signed log will be used as the evidence that the employer has confirmed the apprentice has developed all the KSBs defined in the apprenticeship standard.

EPAOs must ensure that the Professional Conversation is conducted in a suitably controlled environment. i.e. quiet room away from workplace, free from distraction and possible outside influences.

It is anticipated that EPAOs will use the apprentice's employer premises wherever possible to minimise costs. The EPAO may employ a technical expert to assist in the Professional Conversation process. The assessment may be conducted face-to-face or via an online platform e.g. video-conferencing. EPAOs must ensure appropriate methods to prevent misrepresentation are in place should an online option be used. For example, screen-share and 360-degree camera function with an administrator/invigilator.

Other Requirements:

- The duration of discussion should be 60 +/- 5 minutes.
- The Vocational Competency Log should form the basis of the Professional Conversation. These may be in a format defined by the apprentice's workplace, but must meet the minimum criteria as detailed above.
- The Apprentice may refer to the Vocational Competency Log during the discussion.
- The EPA Organisation will create a bank of questions designed to assess the KSBs addressed by the Professional Conversation EPA method. Questions will be asked from this question bank and, as described above, the EPAO must produce a question bank of sufficient size to prevent predictability and review them regularly (and at least once a year) to ensure they, and the specifications they contain, are fit for purpose. There will also be the opportunity for the independent assessor to ask follow-up questions.
- The independent assessor must ask the apprentice 9 open questions from the agreed question bank.
- Questions will be 50% competency based and 50% scenario based.

Apprenticeship Grading

Performance in both elements of the EPA will determine the apprenticeship grade of Fail, Pass or Distinction. An apprenticeship Pass represents full competence against the standard. A grade of Distinction means an apprentice is demonstrating competence above the Standard. The grading criteria are mapped to each element of the KSBs in Appendix 1. All three elements of the EPA must be passed in order to achieve professional competence against the Apprenticeship Standard.

The following outlines the combinations of assessment method grades to determine the overall EPA and apprenticeship grade:

FAIL: fail on 1 or more assessment methods

PASS: at least a pass grade in all 3 assessment methods

DISTINCTION: distinction in at least 2 assessment methods

Re-takes/re-sits

Apprentices who fail an EPA method(s) will be offered the opportunity to take a re-sit/retake. The employer will need to agree that a re-sit/re-take is an appropriate course of action. Any EPA component re-sit/re-take must be taken during the maximum 6-month EPA period; otherwise the entire EPA must be retaken. They are not offered to apprentices wishing to move from pass to distinction. Re-sits/re-takes will not be awarded a grade higher than pass, unless the assessment organisation determines there were exceptional circumstances accounting for the fail. Apprentices should have a supportive action plan to prepare for the re-sit/re-take.

The End-point Assessment Organisations

An apprentice's employer must select an EPAO from the Education & Skills Funding Agency (E&SFA) register of apprentice assessment organisations (RoAO), which is approved to deliver EPA for this apprenticeship standard. End-point assessment organisations must use appropriately qualified and experienced staff to conduct EPA. These individuals will be independent assessors who have not been involved in the education or training of the apprentice.

The EPAO, in discussion with the apprentice's employer, must draw up an EPA schedule. It must detail when the **Synoptic Project Report** must be submitted, the date(s) for the **Presentation & Discussion** and **Professional Conversation** and the members of the assessment panel.

Requirements for Independent Assessors, Invigilators and Markers (as applicable)
EPAOs must appoint:

- Administrators/invigilators and markers to administer/invigilate the Synoptic Project Report, Presentation and Discussion (and Q & A), and viva-style Professional Conversation.
- Independent assessors to mark and grade the Synoptic Project , Presentation and Discussion (and Q & A), and viva-style Professional Conversation.
- Quality assurance staff to undertake moderation of EPA.
- Technical experts (as required) to support aspects of the End-point Assessment. Technical experts may be needed to provide the independent assessor with assistance or clarification regarding Synoptic Project Report content or Presentation and Discussion (Q & A) content, where the independent assessor requires more up-to-date expertise on a particular bioinformatics or industry/sector-specific topic.

Technical Experts must meet the following requirements:

- Currently active professional in a Bioinformatics role in the industry (typically pharma, biotech or contract research organisation) with more than 5 years of experience, or if retired they must have worked within the industry in a bioinformatics role in the last 5 years.
- Be independent of an individual apprentice and the company employing the individual apprentice being assessed and must not be involved in the training of the apprentice.

Independent Assessors must meet the following requirements:

- Be independent of the apprentice, their employer and training provider(s) i.e. there must be no conflict of interest.
- Hold or be working towards an assessor qualification e.g. A1 and have had training from their EPAO in terms of good assessment practice, operating the assessment tools and grading.
- Hold a qualification at level 7 or above in a technical discipline aligned to the subject of this apprenticeship standard.
- Have experience in academic assessment at level 7 or above and experience of competency-based assessment
- Undertake a minimum of 1-days' EPAO standardisation training per year.

Quality assurance staff must hold or be working towards quality assurance qualifications. They must be independent of the apprentice, their employer and training provider i.e. there must be no conflict of interest.

Internal Quality Assurance

Internal quality assurance refers to the requirements that EPA organisation must have in place to ensure consistent (reliable) and accurate (valid) assessment decisions. EPA organisations for this EPA must undertake the following:

- Appoint independent assessors that meet the requirements as detailed in this plan – see above.
- Provide training for independent assessors in terms of good assessment practice, operating the assessment tools and grading.
- Have quality assurance systems and procedures that support fair, reliable and consistent assessment across organisation and over time.
- Operate regular standardisation events that enable assessors to attend a minimum of 1 event per year.
- Operate moderation of assessment activity and decisions, through examination of documentation and observation of activity, with a minimum of 10% of each independent assessors' assessments moderated.

Assessment Tools and Materials

EPAOs must produce assessment tools and supporting materials for the EPA that follow best assessment practice, as follows:

- Assessment scheme and sample questions (question bank) for Synoptic Project Report, Presentation and Discussion (Q & A) and Professional Conversation. The EPAO must produce a question bank of sufficient size to prevent predictability and review them regularly (and at least once a year) to ensure they, and the specifications they contain, are fit for purpose.
- Documentation for recording assessment evidence and decisions.
- Guidance for independent assessors on conducting the EPA.
- Guidance for apprentices, their employers and training providers on the EPA.

External Quality Assurance

External quality assurance for this apprenticeship standard will be undertaken by the Institute for Apprenticeships.

Implementation

Affordability: It is anticipated that the EPA will not represent more than 15-20% of the maximum funding band for this apprenticeship.

The following factors should ensure the EPA is affordable:

- Allowing the assessments to be performed in any order.
- Ensuring efficiency of assessment e.g. performing assessments on multiple candidates on the same date(s) where possible.
- Using real work projects rather than simulations.
- Carrying out assessments in employer premises.

Volumes: It is anticipated that there will be approximately 50 starts per year on this apprenticeship.

Link to Professional Registration

The Royal Society of Biology have provided an expedited route for individuals to achieve Chartered status (Chartered Biologist) through this apprenticeship, as the apprenticeship is closely aligned to a number of the Chartered status competencies/attributes.

In order to be considered for Chartered status individuals must have a relevant degree or equivalence at the start of the apprenticeship, and must inform the Royal Society of Biology upon commencement of the apprenticeship of their intention to apply for Chartered status.

Appendix 1 – Mapping the End-Point Assessment to the Bioinformatics Scientist (Level 7) Apprenticeship Standard.

The tables below indicate how Bioinformatics Scientist apprentices are assessed to ensure that they demonstrate full professional competence in relation to the Apprenticeship Standard. The outcomes required are the areas of knowledge, skills, and behaviours specified in the Apprenticeship Standard.
The required methods of end-point assessment are as follows:

- Workplace Synoptic Project Report **(SPR)**
- Presentation of the Synoptic Project Report and Discussion (Q&A) **(P&D)**
- Viva-style Professional Conversation supported by Competency Log **(PC)**

The evidence of learning/professional competence presented is assessed against the assessment criteria as the measure of professional competence required by the Apprenticeship Standard at level 7.

A. Assessing knowledge – Apprentices will need to demonstrate all knowledge to achieve full professional competence.

Knowledge	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
A topic aligned with the life science field, and the core experimental platform/data generating technologies in the chosen field.	SPR	Does not meet the pass criteria	Knowledge of a topic aligned with the life science field, and the core experimental platform/data generating technologies in the chosen field is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been applied in practice.
How research is conducted in bioinformatics and within the broader context of interdisciplinary life sciences.	SPR P&D	Does not meet the pass criteria	Systematic understanding of how research is conducted in bioinformatics and within the broader context of interdisciplinary life sciences is demonstrated	Meets the pass criteria and with evidence that this knowledge has been applied in the context of research design.
The technical limitations and the underlying biological and experimental assumptions that impact on data quality.	PC	Does not meet the pass criteria	Knowledge of the technical limitations and the underlying biological and experimental assumptions that impact on data quality is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been applied in professional practice.
Details of omic-scale/big-data-driven life science making use of core platform technologies.	PC	Does not meet the pass criteria	Knowledge of omic-scale/big-data-driven life science making use of core platform technologies is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been applied in professional practice.

Knowledge	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
The responsibilities of working in production/industry environments managing scientific data – including regulated environments (good practice, GxP) and IP/confidentiality requirements.	SPR	Does not meet the pass criteria	The role is underpinned by a specialised understanding of the responsibilities of working in production/industry environments managing scientific data – including regulated environments (good practice, GxP) and IP/confidentiality requirements.	Meets the pass criteria and evidence that such knowledge has been used to carry out work correctly and professionally.
Current approaches for modelling and warehousing of life science data.	PC	Does not meet the pass criteria	Knowledge of current approaches for modelling and warehousing of life science data is demonstrated.	Meets the pass criteria and with evidence that that such knowledge has been critically applied in practice.
Requirements for responsible, legal or ethical access and use of biological data, including general data protection (GDPR) considerations, identifiable personal genomic & healthcare data, and geographic biodiversity-related data concerns.	SPR	Does not meet the pass criteria	The role is underpinned by a specialised understanding of the requirements for responsible, legal or ethical access and use of biological data, including general data protection (GDPR) considerations, identifiable personal genomic & healthcare data, and geographic biodiversity-related data concerns is shown.	Meets the pass criteria and with evidence that such requirements have been considered and data has been used appropriately and professionally.
Ontologies and their use.	PC	Does not meet the pass criteria	An understanding of ontologies and their use is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been critically applied in practice.
Retrieval and manipulation of biological data, including data mining, from public repositories.	PC	Does not meet the pass criteria	In-depth understanding of methods for retrieval and manipulation of biological data, including data mining, from public repositories is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been critically applied in practice.
Techniques to integrate, interpret, analyse and visualise biological data sets.	PC	Does not meet the pass criteria	Knowledge of techniques to integrate, interpret, analyse and visualise biological data sets is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been critically applied to innovate in practice.
Bioinformatics analysis methodologies and expertise in common bioinformatics software packages, tools and algorithms – including workflow management tools.	PC	Does not meet the pass criteria	In-depth understanding of methods of Bioinformatics analysis and expertise in common bioinformatics software packages, tools and algorithms – including workflow management tools - is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been critically applied in innovative practice.

Knowledge	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
Common bioinformatics programming languages; algorithm design, analysis and testing.	PC	Does not meet the pass criteria	Knowledge of common bioinformatics programming languages; algorithm design, analysis and testing is demonstrated	Meets the pass criteria and evidence that that such knowledge has been applied to innovate in practice.
The use of suitable version control tools, software sustainability practices and open source software repositories.	SPR PC	Does not meet the pass criteria	Knowledge of the use of suitable version control tools, software sustainability practices and open source software repositories is demonstrated	Meets the pass criteria and with evidence that such knowledge has been applied in practice.
Licensing limitations on the use of bioinformatics software and data such as open source, commercial and academic usage restrictions.	SPR	Does not meet the pass criteria	Systematic understanding of licensing limitations on the use of bioinformatics software and data such as open source, commercial and academic usage restrictions is demonstrated	Meets the pass criteria and with evidence that licensing and usage restrictions have been considered and software/data resources used appropriately in professional practice.
Database design and management, including information security considerations and big-data technologies.	SPR PC	Does not meet the pass criteria	In-depth understanding of database design and management, including information security considerations and big-data technologies is demonstrated	Meets the pass criteria and with evidence that such knowledge has been applied to innovate in practice.
Relevant big-data and high performance computing platforms including Linux/Unix, local and remote High Performance Computing (HPC), and cloud computing.	PC	Does not meet the pass criteria	Knowledge of relevant big-data and high performance computing platforms including Linux/Unix, local and remote High Performance Computing (HPC), and cloud computing is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been critically evaluated and applied in practice.
Application of statistics in the contexts of bioinformatics and life science data analysis.	PC	Does not meet the pass criteria	Systematic understanding of the application of statistics in the contexts of bioinformatics and life science data analysis is demonstrated	Meets the pass criteria and with evidence that such knowledge been critically evaluated and applied..
Statistical and mathematical modelling methods, and key scientific and statistical analysis software packages.	PC	Does not meet the pass criteria	In-depth understanding of statistical and mathematical modelling methods, and key scientific and statistical analysis software packages is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been applied to innovate in practice.
General data science approaches to life science problems, such as machine learning and artificial intelligence (AI).	PC	Does not meet the pass criteria	Knowledge of general data science approaches to life science problems, such as machine learning and artificial intelligence (AI) is demonstrated.	Meets the pass criteria and with evidence that such knowledge has been applied in professional practice.

Knowledge	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
The importance of data governance, curation, information architecture and ensuring interoperability.	SPR	Does not meet the pass criteria	Knowledge of the importance of data governance, curation, information architecture and ensuring interoperability is demonstrated	Meets the pass criteria and with evidence that such knowledge has been applied in professional practice.
Differences in the knowledge-base of diverse audiences, and the most appropriate means of effectively communicating scientific and technical information.	P&D	Does not meet the pass criteria	An understanding of the differences in the knowledge-base of diverse audiences, and the most appropriate means of effectively communicating scientific and technical information is evident.	Meets the pass criteria and evidence that knowledge has been used to critically evaluate and adapt practice or innovate for broader impact
Communication models and techniques which can be employed in a collaborative research environment to effect change at individual, team and organisational level eg. active listening skills, teamworking, influencing and negotiation skills.	P&D	Does not meet the pass criteria	Knowledge about communication models and techniques which can be employed in a collaborative research environment to effect change at individual, team and organisational level eg. active listening skills, teamworking, influencing and negotiation skills is evident.	Meets the pass criteria and evidence that knowledge has been used to critically evaluate and adapt practice or innovate for broader impact

B. Assessing skills – Apprentices will need to demonstrate all skills to achieve full professional competence.

Skill	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
Work with multi-disciplinary colleagues to design life-science experiments that will generate data suitable for subsequent bioinformatics analysis.	SPR P&D	Does not meet the pass criteria	Professional practice demonstrates effective working with multi-disciplinary colleagues to design life-science experiments to generate data suitable for bioinformatics analysis	Meets the pass criteria and demonstrates that they are capable of contributing to the enhancement of bioinformatics professional practice that has the potential to have broad ranging and transformational impact
Provide guidance to experimental scientists on data generation methodology and handling to ensure the quality of data produced.	SPR P&D	Does not meet the pass criteria	The capacity to provide guidance to experimental scientists on data generation methodology and handling to ensure data quality is demonstrated	Meets the pass criteria and with evidence that they are capable of contributing to the enhancement of bioinformatics professional practice that has the potential to have broad ranging and transformational impact

Skill	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
Recognise and critically review the format, scope and limitations of different biological data.	PC	Does not meet the pass criteria	Critical thinking skills are demonstrated in the review of different types of biological data	Meets the pass criteria and demonstrates that they are capable of adapting working practices for greater scientific impact.
Define the required metadata to be collected for specific data types and analytical approaches.	PC	Does not meet the pass criteria	Metadata requirements for different data types and analytical approaches can be clearly defined.	Meets the pass criteria and with evidence that suitable approaches have been applied in practice.
Design and implement appropriate data storage formats and associated database structure.	PC	Does not meet the pass criteria	Skills have been demonstrated in the design and implementation of appropriate data storage formats and associated database structure	Meets the pass criteria and demonstrates that they are capable of applying the best methods for greater scientific impact.
Choose appropriate computational infrastructure and database solutions - including internal or external/cloud resources.	PC	Does not meet the pass criteria	Skills have been demonstrated in the selection of appropriate computational infrastructure and database solutions - including internal or external/cloud resources.	Meets the pass criteria and demonstrates that they are capable of applying the best technology for greater scientific impact.
Store and analyse data in accordance with ethical, legal and commercial standards, including checking who has access.	SPR	Does not meet the pass criteria	The ability to appropriately comply with ethical, legal and commercial standards for the storage and analysis of data has been demonstrated.	Meets the pass criteria and with evidence of leadership in compliance in professional practice
Curate biological data using suitable metadata, ontologies and/or controlled vocabularies.	PC	Does not meet the pass criteria	Skills have been demonstrated in the curation of biological data using suitable metadata, ontologies and/or controlled vocabularies.	Meets the pass criteria and demonstrates that they are capable of applying the best methods to maximise the impact of data.
Make use of suitable programming languages and/or workflow tools to automate data handling and curation tasks.	PC	Does not meet the pass criteria	Skills have been demonstrated in the use of suitable programming languages and/or workflow tools to automate data handling and curation tasks.	Meets the pass criteria and demonstrates that they are capable of applying the best technology for greater scientific impact.
Maintain a working knowledge of a range of public data repositories for biological data.	PC	Does not meet the pass criteria	The capacity to maintain a working knowledge of a range of public data repositories for biological data is demonstrated	Meets the pass criteria and with evidence they can apply such knowledge in the selection of data repositories in practice.

Skill	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
Prepare data for submission to appropriate public bioinformatics data repositories as required, being aware of IP and/or ethical and legal issues.	PC	Does not meet the pass criteria	Skills have been demonstrated in the preparation of data for submission to appropriate public bioinformatics data repositories as required, with awareness of IP and/or ethical and legal issues.	Meets the pass criteria and demonstrated by appropriate data submission in practice.
Carry out data pre-processing and quality control (QC) to prepare datasets for bioinformatics analysis.	PC	Does not meet the pass criteria	The ability to carry out data pre-processing and quality control (QC) to prepare datasets for bioinformatics analysis has been demonstrated	Meets the pass criteria and with evidence that they are capable of applying the best methods to maximise the impact of data.
Determine the best method for bioinformatics analysis, including the selection of statistical tests, considering the research question and limitations of the experimental design.	SPR P&D	Does not meet the pass criteria	Critical thinking skills are demonstrated in the selection of the best method for bioinformatics analysis, including the selection of statistical tests, considering the research question and limitations of the experimental design.	Meets the pass criteria and demonstrates that they are capable of applying the best methods for greater scientific impact.
Identify and define appropriate computing infrastructure requirements for the analysis of such biological data.	PC	Does not meet the pass criteria	Skills have been demonstrated in the identification or definition of appropriate computing infrastructure requirements for the analysis of such biological data.	Meets the pass criteria and with evidence that appropriate computing solutions have been used in practice.
Apply a range of current techniques, skills and tools (including programming languages) necessary for computational biology practice – and;	PC	Does not meet the pass criteria	Skills are evident in the application of current techniques, skills and tools (including programming languages) necessary for computational biology practice	Meets the pass criteria and demonstrates that they are capable of applying the best methods for greater scientific impact.
Contribute to (where appropriate, lead) research to develop novel methodology.	SPR	Does not meet the pass criteria	There is evidence of contribution to, or leadership of research or the development of novel methodology	Meets the pass criteria and with evidence that they are capable of innovation, contributing to the enhancement of bioinformatics professional practice.
Build and test analytical pipelines, or write and test new algorithms as necessary for the analysis of biological data.	SPR	Does not meet the pass criteria	Skills have been demonstrated in building and testing analytical pipelines or writing and testing new algorithms as necessary for the analysis of biological data	Meets the pass criteria and with evidence that that they are capable of innovation, contributing to the enhancement of bioinformatics professional practice.

Skill	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
Document all data processing, analysis and implementation of new methods in accordance with good scientific practices and industry requirements for regulatory process and IP.	SPR	Does not meet the pass criteria	The documentation of data processing, analysis and the implementation of new methods is complete and effective, and reflects best practice to a professional standard.	Meets the pass criteria and with evidence of compliance in professional practice.
Interpret the results of bioinformatics analysis in the context of the experimental design and, where necessary, in a broader biological context through integration with complementary (often public) data.	SPR	Does not meet the pass criteria	Skills are evident in the interpretation of the results of bioinformatics analysis in the context of the experimental design and, where necessary, in a broader biological context through integration with complementary (often public) data.	Meets the pass criteria and demonstrates that they are capable of applying the best methods for greater scientific impact.
Obtain data sets from private and/or public resources – considering any legal, privacy or ethical aspects of data use.	SPR	Does not meet the pass criteria	Skills have been demonstrated in obtaining data sets from private and/or public resources – with consideration of legal, privacy or ethical aspects of data use.	Meets the pass criteria and with evidence of compliance in professional practice
Carry out the analysis of biological data using appropriate programmatic methods, statistical and other quantitative and data integration approaches – and visualise results.	PC	Does not meet the pass criteria	There is evidence of effective analysis of biological data or use of appropriate programmatic methods, statistical and other quantitative and data integration approaches – or visualisation of results.	Meets the pass criteria and demonstrates that they are capable of applying the best methods for greater impact.
Communicate and disseminate bioinformatics analysis and results to a range of audiences, including multi-disciplinary scientific colleagues, non-scientific members of management, external collaborators and stakeholders, grant/funding bodies and the public as required.	P&D	Does not meet the pass criteria	Professional practice demonstrates effective communication or dissemination of scientific methods or results.	Meets the pass criteria and with evidence that they are capable of contributing to the enhancement of bioinformatics knowledge that has the potential to have broad ranging and transformational impact
Supervise and mentor colleagues and peers to develop bioinformatics knowledge relevant to their specific life science subject experience.	SPR P&D	Does not meet the pass criteria	Effective supervision or mentoring skills are demonstrated with either colleagues or peers in the workplace.	Meets the pass criteria and with evidence that they are capable of contributing to the enhancement of bioinformatics professional practice that has the potential to have broad ranging and transformational impact

Skill	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
Communicate orally and in writing, and collaborate effectively with interdisciplinary scientific colleagues, and management functions to monitor and manage people, processes or teams.	SPR P&D	Does not meet the pass criteria	Professional practice demonstrates effective communication or collaboration with interdisciplinary scientific colleagues, and management functions to monitor and manage people, processes or teams.	Meets the pass criteria and with evidence that they are capable of contributing to the enhancement of bioinformatics professional practice
Manage their own time through preparation and prioritisation, time management and responsiveness to change.	SPR	Does not meet the pass criteria	Professional practice demonstrates effective self-management of time, responsiveness to change or the balancing of priorities.	Meets the pass criteria and evidenced by continued effective scientific contributions

C. Assessing behaviours – Apprentices will need to demonstrate all behaviours to achieve full professional competence

Behaviour	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
Professional standards in the workplace in relation to: ethics and scientific integrity, legal compliance and intellectual property, respect and confidentiality, and health and safety.	SPR	Does not meet the pass criteria	Professional practice shows evidence of consideration of ethics and scientific integrity, legal compliance and intellectual property, respect and confidentiality, and health and safety to a professional standard	Meets the pass criteria and has also demonstrated that they are capable of innovation in professional practice that has the potential to have broad ranging and transformational impact.
The need to continuously develop their knowledge and skills in relation to scientific developments that influence their work, ensuring they continue to provide relevant analyses, including emerging techniques where appropriate.	SPR P&D	Does not meet the pass criteria	Professional practice demonstrates engagement in continuing professional development of their knowledge and skills in relation to scientific developments that influence their work, preventing them from continuing to provide relevant analyses, including emerging techniques where appropriate.	Meets the pass criteria and has also demonstrated that they are capable of innovation in professional practice that has the potential to have broad ranging and transformational impact.
The ongoing need for awareness of technical advances in the broader scientific field that may present opportunities for personal and / or organisational development.	P&D	Does not meet the pass criteria	Professional practice is informed by an awareness of technical advances in the broader scientific field that may present opportunities for personal and / or organisational development.	Meets the pass criteria and has also demonstrated that they are capable of innovation in professional practice that has the potential to have broad ranging and transformational impact.

Behaviour	Method of assessment	Assessment criteria **Fail**	Assessment criteria **Pass**	Assessment criteria **Distinction**
The wider context (policy, economic, societal, technological, legal, cultural and environmental) in which scientific research operates, recognising the implications for professional practice.	P&D	Does not meet the pass criteria	Professional practice appropriately reflects the wider context in which scientific research operates to a professional standard	Meets the pass criteria and has also demonstrated that they are capable of innovation in professional practice that has the potential to have broad ranging and transformational impact.
The need to be enthusiastic, self-confident, self-aware, empathic, reliable and consistent to operate effectively in the role.	P&D	Does not meet the pass criteria	Professional practice demonstrates the personal qualities of enthusiasm, self-confidence, self-awareness, empathy, reliability and consistency to a professional standard.	Meets the pass criteria and has also demonstrated that they are capable of innovation in professional practice that has the potential to have broad ranging and transformational impact.
The requirement to persevere, have integrity, be prepared to take responsibility, to challenge areas of concern, to lead, mentor and supervise.	SPR	Does not meet the pass criteria	Professional practice demonstrates the personal qualities of perseverance, integrity and a willingness to undertake leadership responsibilities to a professional standard.	Meets the pass criteria and has also demonstrated that they are capable of innovation in professional practice that has the potential to have broad ranging and transformational impact.