

# **Laboratory Scientist Degree Apprenticeship Standard, Level 6 End-point Assessment Plan (non-integrated)**

<b>Foreword</b>	<b>3</b>
<b>Introduction</b>	<b>3</b>
<b>A Summary of Life Sciences &amp; Industrial Science Apprentices Assessment</b>	<b>4</b>
<b>End-point Assessment Gateway</b>	<b>5</b>
<i>BSc (Honours) Degree</i>	5
<i>Workplace synoptic project</i>	5
<i>Vocational competence evaluation log</i>	6
<i>English and Maths Level 2</i>	7
<b>The End-point assessment Roles &amp; Responsibilities</b>	<b>7</b>
<b>End-point Assessment Methods</b>	<b>8</b>
<i>Workplace synoptic project primary journal article</i>	8
<i>Presentation of workplace synoptic project primary journal article to EPA Panel</i>	8
<i>Vocational Competence Discussion</i>	10
<b>Grading</b>	<b>11</b>
<b>Professional Body Recognition</b>	<b>12</b>
<b>Assessment Organisations</b>	<b>12</b>
<b>Technical Expert and Independent Assessor Criteria</b>	<b>12</b>
<b>Internal Quality Assurance</b>	<b>14</b>
<b>External Quality Assurance</b>	<b>15</b>
<b>Implementation</b>	<b>15</b>
<b>Appendices</b>	<b>16</b>

## Foreword

This end-point assessment plan for the degree apprenticeship standard for *Laboratory Scientist*, level 6 has been the subject of extensive consultation and designed with input from industry experts who have many years of experience working in the sector and form the Life Sciences & Industrial Science (LS&IS) Trailblazer group. The group includes employers from chemical, primary and secondary pharmaceutical, biotechnology, formulated products, and NHS. Whatever the nature of the organisation, the competence of its people is critical to achieving business aims. This is why our apprenticeships must produce people who are able to work to the industry standard and contribute to their business from day one. This end-point assessment plan will ensure that successful laboratory scientist apprentices have demonstrated that they have the knowledge, understanding, skills and behaviours needed to work in this exciting industry.

## Introduction

This plan describes mandatory end-point assessment for the **Laboratory Scientist Degree Apprenticeship Standard, level 6**.

The document is for training providers, independent assessment organisations, apprentices and employers who need to understand how an apprentice who has been trained for this occupation must be assessed at the end of their apprenticeship.

This document does not cover the on-programme training/assessment and on-going competence evaluation carried out by the employer or their nominated training providers, which is not part of the mandatory end-point assessment.

*Note for clarification:*

*The term assessment is used in this document to describe activities associated with end-point assessment for the apprenticeship award.*

*The term competence evaluation is used to describe activities associated with review of an apprentice's competence by an employer or their nominated training provider.*

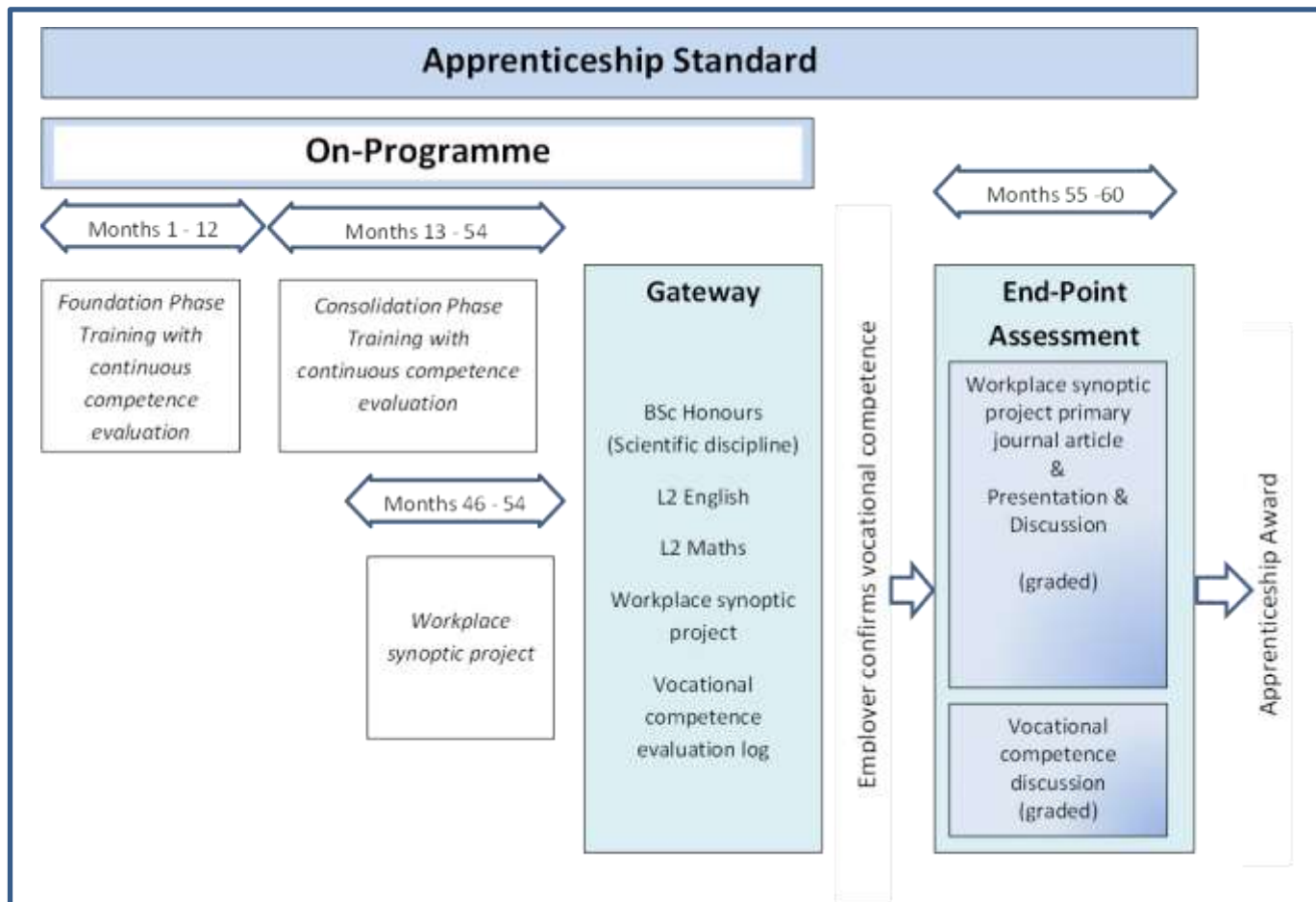
*The term employer is used to refer to the host employer or direct employer, which is the company where the apprentice gains their competency experience. It does not refer to the organisation such as an ATA that has the employment contract with the apprentice.*

*The term technical expert is used to describe an individual nominated by the employer that meets the criteria set by the Trailblazer group.*

*The term independent assessor is used to describe an individual working for the assessment organisation that meets the assessor criteria set by the Trailblazer group.*

## A Summary of the Laboratory Scientist Degree Apprenticeship

### Typical apprentice journey



A Laboratory Scientist apprenticeship will typically require 55 months **on-programme training/assessment** to meet the requirements of the standard. There are two suggested on-programme phases - **foundation and consolidation**, which generate the pre-requisite **gateway** requirements for the **end-point assessment (EPA)**.

The foundation phase, which is typically months 1-12, should focus on developing the apprentice's knowledge, skills and behaviours (KSB), specifically around working safely, complying with internal and external regulations and following quality procedures.

The consolidation phase, which is typically from month 13 up to the completion of all the on-programme requirements, will focus on developing further skills capability supported by further guided learning, enabling the apprentice to eventually work effectively and independently with minimum supervision. The apprentice will work towards a Bachelor's (Honours) degree in an

appropriate scientific discipline. Achievement of this BSc (Honours) degree is a gateway requirement for starting the EPA, along with English and maths at level 2 - achieved either before or during the apprenticeship, the completion of a workplace synoptic project and a vocational competence evaluation log (log). The employer must confirm that the apprentice has completed the gateway requirements and is ready for the EPA.

The EPA must be completed within a 6-month period. It must be conducted by an end-point assessment organisation (EPAO) on the Register of Apprentice Assessment Organisations, which is approved to deliver EPA for this apprenticeship standard. It comprises assessment of:

- workplace synoptic project primary journal article & presentation with questioning
- vocational competence discussion (VCD).

Performance in the EPA will determine the apprenticeship grade – fail, pass or distinction. The apprentice must pass all EPA methods to successfully complete the apprenticeship.

### **Laboratory Scientist work-based learning guide**

The LS&IS Trailblazer employers have developed a Laboratory Scientist work based learning guide. It provides a detailed specification of the KSBs required to achieve occupational competence. It is recommended that an apprenticeship on-programme training plan is mapped to the work based learning guide. It is freely available at [www.siasuk.com](http://www.siasuk.com).

## **End-point Assessment Gateway**

Apprentices must complete the gateway requirements and provide evidence to the EPAO as detailed below before taking the EPA. On completion of the gateway requirements, the employer must confirm the apprentice as ready for the EPA.

### ***BSc (Honours) Degree***

Apprentices must complete a BSc (Honours) degree. For example:

- BSc (Honours) Chemical Science
- BSc (Honours) Applied Bioscience

The range of BSc (Honours) 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.

***Workplace synoptic project***

A workplace synoptic project is a substantial piece of work that will allow the apprentice to plan, develop and implement an individual scientific work-based project. Typical project examples include implementation of a new analytical technique; experimental design to contribute to an R&D project; design of a new synthetic step within a formulation pathway.

All project topics must be approved by the employer and the project plan must be signed off by the employer as complete and submitted to the EPAO at Gateway. The EPAO will review the project plan to ensure that the scope of the completed tasks is sufficient to meet the EPA requirements. If these are found to be insufficient the apprentice will not meet the gateway requirements and will not proceed to EPA.

The apprentice will have to show critical analysis of appropriate literature and own data and the development of investigative and work orientated skills. The scope of the project must cover, but need not be limited to:

***1: Planning, Design and Organisation***

Planning and design of project programme of work including recognition of resource implications, ethics, risk assessment, Control of Substances Hazardous to Health (COSHH) and other work-based and stakeholder requirements.

***2: Review of Literature***

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

***3: Project Implementation***

Competent implementation of project work, including experimental design, recognition of safe working practices and recording of work and project progress via a reflective record. Feedback of reflection into 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 project should be undertaken towards the end of the consolidation phase, once the majority of learning is complete. It must be of sufficient depth and complexity to require a minimum of 100 hours of work with an additional 50 hours for project reporting. However, the apprentice should not limit the scope of their project to meet this requirement. The project should be conducted as part of an apprentice's normal scientific work. The apprentice may choose to use their research project

completed as partial fulfilment of the BSc so long as it meets the criteria described in this plan. Collaboration between the employer and the Higher Education Institution (HEI) is encouraged with mentoring support for the apprentice from both the employer and the HEI.

### ***Vocational competence evaluation 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, a course assessment portfolio, a company workbook, performance review record or certificate of training. During the vocational competence discussion, 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. 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 must hold a minimum of level 2 English and maths, achieved either before or during the apprenticeship, before completing the EPA.

## **The End-point Assessment Roles & Responsibilities**

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.

The EPAO must appoint independent assessors to conduct EPAs, who must meet the requirements as detailed in page 14.

The EPAO, in discussion with the apprentice's employer, must draw up an EPA schedule. It must detail when the primary journal article must be submitted, the date(s) for the presentation & discussion and VCD and the members of the assessment panel.

The EPAO must ensure that the independent assessor conducts the assessments in accordance with this EPA plan.

Independent assessors have responsibility for making assessment decisions for both of the assessment methods.

The presentation and discussion will be conducted in the presence of a panel - comprising of 2 members: a technical expert nominated by the apprentice's employer and an independent assessor; independent assessors are responsible for making the assessment decision, following discussion with the technical expert. The technical expert is present to confirm the authenticity of the apprentice's work, provide guidance to the assessor on workplace policy and practice and provide a realistic environment for a presentation. The technical expert may participate in the discussion and question and answers, but does not participate in the final assessment decision.

With prior approval of the EPAO, the employer may request that no more than one other person attends, such as a representative from the employer, the university or from a professional body. In this instance the representative may act as an observer but may not participate in the discussion or the assessment decision. Quality assurance personnel may also be present at some presentations.

Technical experts will generally be employed by the apprentice's employer. In some instances, the employer, for example an SME, may wish to contract a technical expert from outside their company if they do not have the capacity or capability to provide one.

The VCD will be conducted by the independent assessor only. Quality assurance personnel may also be present to observe at some VCDs.

## **End-point Assessment Methods**

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

- workplace synoptic project primary journal article & presentation with questioning
- vocational competence discussion.

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

The assessment criteria for primary journal article, presentation & questioning, and VCD are detailed in appendix's 2, and 3 respectively.

Requirements for each assessment method are detailed below.

### ***Workplace synoptic project Primary Journal Article***

A scientific paper based on the workplace synoptic project must be prepared by the apprentice at the start of the EPA period and submitted to the EPA panel via the independent assessor by the end of month 2 of the EPA period. It should:



- be in the format and style of a primary journal article
- show the ability to design a work-based independent investigation
- demonstrate innovative/creative-thinking and analytical skills
- cover experimental design, methods, results, data analysis and evaluation, conclusions and recommendations
- provide references to a comprehensive literature review

The article must contain a maximum 3000 words inclusive of abstract, main text, figures, tables and boxes but not including references. It should be submitted as a pdf document.

The article will be reviewed by the independent assessor. The independent assessor may seek clarification from the technical expert on any of the science and technology or business contexts that are referenced in the article. The independent assessor will decide if the article meets the above criteria before the presentation of the primary journal article to EPA panel can be undertaken.

#### ***Presentation of Workplace synoptic project Primary Journal Article to EPA Panel***

The presentation will be made to an assessment panel, followed by questioning.

The presentation must cover, but need not be limited to:

- Scientific approach:
  - experimental design, methods, results, data analysis, challenging assumptions, drawing conclusions & making recommendations

Apprentices are free to select the format for the presentation. The apprentice may choose to use presentation aides, such as PowerPoint, multimedia and video.

The formal presentation will then be followed immediately with a structured discussion. Each apprentice will be formally interviewed by the assessment panel. There will be questions on these themes:

- Scientific approach
- Project management
- Stakeholder management
- Change management
- Their use of personal and professional skills to support delivery of the project.

The independent assessor will select and ask questions from a bank of standardised competency type questions to ensure a consistent approach is adopted. The independent assessor or the technical expert may ask follow up questions to seek clarification where required. The primary journal article, presentation and structured discussion will be collectively assessed against the knowledge, skills and behaviours as outlined in Appendix 3

The presentation will typically last 20 -30 minutes and the discussion 45-60 minutes; together they must be no longer than 90 minutes.

### **Assessment Panel Rules**

The independent assessor must:

- a. plan the panel prior to it taking place.
- b. ensure that the location for the panel is appropriate.
- c. ensure the technical expert has been approved by the assessment organisation.
- d. ensure the presentation and discussion takes place in a room, free from distractions with no other people present except those with prior approval from the EPAO.
- e. ensure they and the technical expert has received the primary journal article 2 weeks before the panel takes place.
- f. ensure the technical expert is fully briefed about the process and the assessment criteria before the panel commences.
- g. ensure any special needs of the apprentice are taken into consideration.
- h. chair the panel.
- i. ensure that the apprentice understands the panel process, the possible outcomes and how it is graded.
- j. ensure that the apprentice is at ease.
- k. ensure that the grading criteria and relevant documentation are to hand before commencing.
- l. capture an audio record of the presentation and discussion.
- m. document the outcomes using the EPAO's standard documentation.
- n. Collect all presentation materials from the apprentice.
- o. ensure the apprentice is not informed of the outcome of the assessment at this stage.
- p. facilitate a review of the completed documentation and a discussion of the observations with the technical expert.
- q. agree with the technical expert that the test specification has been fully covered and the test rules have been followed.
- r. make the final decision about the outcome of the assessment and recommend the grade.
- s. send documentation to the EPAO within the agreed timescale.
- t.

### ***Vocational Competence Discussion***

Apprentices will take part in a vocational competence discussion with an independent assessor. The purpose is to determine the extent to which the apprentice understands the requirements of his/her role as defined by the standard.

There will be a question bank of eight categories of open competence based questions. The categories are:

- Compliance with internal and external regulation
- Ethical practice and codes of conduct
- Meeting internal or external customers' requirements
- Record keeping and data integrity
- Applying quality standards
- Creative thinking & problem solving
- Meeting targets
- Continuous performance improvement

The independent assessor will select one question from each of the categories selected from the EPAO's question bank. The apprentice must answer each question with examples from their own practice. Examples of these questions are as follows:

- Describe what constitutes the quality management system in which your organisation operates and the role you play within that?
- Explain your understanding of continuous improvement within your organisation and illustrate using a relevant example, describing your role and tools used?
- Describe what 'good practice' in relation to compliance with internal and external regulation is applicable to your organisation and how this impacts your role?
- What steps would you need to take on introduction of a new technology or novel process and what are the key considerations within the regulated environment?

The VCD must:

- a. be in the format of a 1:1 discussion with the independent assessor; this may be via video-conferencing.
- b. comprise 8 questions one from each of the 8 categories listed above.
- c. typically last 2 hours up to a maximum of 2 hours and 15 minutes.
- d. take place in a room, free from distractions with no other people present, except quality assurance personnel where required.

- e. be documented and recorded electronically. Where it is not possible to use electronic equipment because of site restrictions this must be agreed in advance with the EPAO and an alternative venue should be used.

The apprentice may bring along their vocational competence evaluation log and evidence referenced in it to refer to during the VCD.

The independent assessor must:

- a. select the VCD questions from the EPAO's question bank prior to it taking place.
- b. ensure that the location for the VCD is appropriate.
- c. ensure any special needs and safeguarding of the apprentice is taken into consideration.
- d. ensure that the apprentice understands the VCD process, the possible outcomes and how it is graded.
- e. ensure that the apprentice is at ease.
- f. provide a written copy of the question for the apprentice to read but not to retain.
- g. allow the apprentice sufficient time at least to consider the question and answer it before moving on to the next question.
- h. that he/she has the grading criteria and relevant documentation to hand before commencing the VCD.
- i. ensure the apprentice is not informed of the outcome of the assessment at this stage.
- j. complete the relevant documentation, including notes of what is discussed, and send it to the assessment organisation within the agreed timescale.
- k. ensure that the assessment organisation is notified of the outcome of the VCD within the agreed timescale.

## Grading

Performance in the EPA will determine the apprenticeship grade – fail, pass or distinction.

A fail will be awarded where the apprentice fails one or more assessment method. A pass will be awarded to individuals that achieve a pass or distinction in both assessment methods. A distinction will be awarded to individuals that achieve a distinction in both assessment methods.

The independent assessor will combine the results from each assessment method to determine the EPA/apprenticeship grade. Both assessment methods will have equal weighting in determining the final grade. Grades will not be confirmed until after moderation.

The assessment criteria for each assessment method are given in Appendices 1 - 3.

**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.

**Professional Body Recognition**

The Trailblazer employers have worked in partnership with professional bodies to define the apprenticeship standard and the EPA plan to ensure that it maps to the requirements for Registered Scientist set by the Science Council. The scope of the standard and the associated EPA plan means that the individual should not require any further training on completion of their apprenticeship to allow them to apply for professional registration as RSci with a professional body. The process for application for professional recognition is available from the Science Council.

**Assessment Organisations**

The EPAO must be on the Education & Skills Funding Agency register of apprentice assessment organisations approved to deliver EPA for this apprenticeship standard. EPAOs must be able to demonstrate the occupational and assessment capacity and capability.

**Assessment Instrument Criteria**

EPAOs should develop their assessment instruments and supporting materials to reflect the apprenticeship standard and the assessment specifications. It is recommended that the work based learning guide is also used as a reference. The assessment organisation must produce the full suite of assessment instruments. The assessment organisation must produce full guidance on the use of each assessment instrument with details of performance standards and assessment criteria.

## Technical Expert and Independent Assessor Criteria

### *Technical Expert Criteria*

The assessment organisation must confirm the technical expert meets the following criteria.

<u>Technical Expert Criteria</u>
✓ Vocationally competent with recent continuing professional development and/or Professionally registered
Plus
✓ experience of current working practices
Plus
✓ Assessment organisation induction

Technical experts must be competent in the occupation that is being assessed. This is shown through the individual having at least 5 years recent work experience in the occupational area and having achieved a qualification at a level equivalent to or higher than the level of the apprenticeship standard being assessed; or by holding professional recognition at a level equivalent to or higher than the registration level of the apprenticeship standard being assessed.

Technical experts must be either working in the appropriate sector itself or they must be able to demonstrate they possess practical and up-to-date knowledge and experience of current working practices appropriate to the sector in which they are carrying out assessment practice. There may be a requirement to hold additional specialist training or security clearance as required by the industry sector e.g. nuclear.

The technical experts must complete an assessment organisation induction to demonstrate working knowledge of the apprenticeship standard and assessment methodology.

**Independent Assessor criteria**

The EPAO must confirm that the independent assessor meets the following criteria.

<b><u>Independent Assessor Criteria</u></b>
✓ Independent of the apprentice, their training provider and employer
✓ Any current UK qualifications for workplace vocational assessors or Workplace Competence Assessor Award
plus
✓ Vocationally competent with recent continuing professional development and/or Professionally registered
plus
✓ Assessment organisation induction

The EPA must clearly deliver an impartial result. For this reason independent assessors appointed by the EPAO must not be linked to the apprentice, or their training provider or employer.

Independent assessors must hold a current UK qualification for workplace vocational assessors or a Workplace Competence Assessor Award.

Independent Assessors must be competent in the occupation they are assessing. This is shown through the individual having achieved a qualification at a level equivalent to or higher than the level of the apprenticeship standard being assessed; or by holding professional recognition at a level equivalent to or higher than the registration level of the apprenticeship standard being assessed.

Individuals must be able to demonstrate they possess up-to-date knowledge of current working practices and process safety or product quality regulations such as The Medicines and Healthcare Products Regulatory Agency (MHRA) or HSE the Control of Major Accident Hazards (COMAH) regulations appropriate to the sector in which they are carrying out assessment practice.

**Independent assessors should:**

- Maintain a continuous, up-to-date and accurate record of their CPD activities this should equate to at least 5 days CPD in the last year
- Demonstrate that their CPD activities are of learning activities relevant to current or future practice
- Seek to ensure that their CPD has benefited the quality of their practice
- Seek to ensure that their CPD has benefited the users of their work

- Present a written profile containing evidence of their CPD on request

There may be a requirement to hold additional specialist training or security clearance as required by the industry sector e.g. nuclear.

Individuals must complete an EPAO induction to demonstrate working knowledge of the apprenticeship standard and assessment methodology.

## Internal quality assurance

The EPAO must have internal quality assurance arrangements that meet the following minimum requirements.

They must moderate Independent assessors' EPA decisions. The EPA grade must not be confirmed until after moderation. As a minimum, 20% of all independent assessors' assessment EPA decisions must be moderated, sampled across different apprentices and employers. Moderation sampling must be higher for in-experienced independent assessors, where moderation has identified inconsistent grading decisions or grading decisions have been disputed.

They must run induction training for technical experts and independent assessors covering the apprenticeship standard and assessment methodology. Other training should be provided to meet individual's identified training needs.

Annual standardisation events must be held for independent assessors to ensure consistency in the assessment practice and decisions.

EPAOs must ensure independent assessors and technical experts meet the qualification and experience requirements detailed above.

## External quality assurance

External quality assurance for the laboratory scientist apprenticeship will be provided by the Institute for Apprenticeships.

## Implementation

The EPA plan has been designed to provide a cost effective assessment approach that meets quality objectives. For this standard there are likely to be small cohorts of apprentices spread nationally, so the assessment model needs to be flexible for delivery in a number of varied settings and contexts. Total annual starts are estimated to be approximately 100 once SASE frameworks are withdrawn. The on-programme qualifications that are required to be completed are already available. It is anticipated that the EPA will cost between 15% -20% of the apprenticeship funding band.



## Appendix 1 -Assessment Method by Element of the Standard – Laboratory Scientist Degree Apprenticeship

<b>KEY:</b>	
<b>Primary Journal Article &amp; Presentation &amp; Discussion</b>	<b>PJ/PD</b>
<b>Vocational Competence Discussion</b>	<b>VCD</b>

<b>KSB</b>	<b>Knowledge</b>	<b>EPA method</b>
1	The underlying scientific principles, principal theories, concepts and terminology of laboratory based experimentation, including laboratory techniques relevant to the specialist discipline.	<b>PJ/PD</b>
2	The ways in which advanced science and technology is developed, established techniques of scientific enquiry and research methodologies.	<b>PJ/PD</b>
3	The theoretical basis for application of the science relevant to one specialist discipline including how to apply this during experimental design and implementation of research programmes.	<b>PJ/PD</b>
4	The requirements for the development and validation of analytical methods and instrumentation, including suitable sampling methods as appropriate to the specialist discipline.	<b>PJ/PD</b>
5	How to use statistical techniques, probability distributions, significance testing & confidence limits, regression & correlation and hypothesis testing to evaluate results, design experiments and draw evidence based conclusions.	<b>PJ/PD</b>
6	How to independently implement new processes according to the literature, data mining results and input from colleagues.	<b>PJ/PD</b>
7	How to initiate, plan, execute and close a project and incorporate the organisation's project management procedures into the scientific work environment working with team members.	<b>PJ/PD</b>
8	The internal and external regulatory environment pertinent to the science sector and area of specialisation, for example Medicines & Healthcare Products Regulatory Authority (MHRA) , Control of Major Accident Hazards (COMAH), Good Laboratory Practice (GLP).	<b>VCD</b>
9	The business environment in which the company operates including personal role within the organisation, ethical practice and codes of conduct.	<b>VCD</b>

10	The requirements of internal or external customers and how to recommend the appropriate workflows, improvements or scientific solutions.	VCD
	<b>Skills</b>	
11	Identify and use the scientific approaches appropriate to one specialist discipline required to solve problems, support new investigations and follow-up experiments in the laboratory.	PJ/PD
12	Appraise scientific experimentation, independently design and implement new processes according to relevant literature and other data sources interrogated using data mining techniques using input from colleagues.	PJ/PD
13	Support appraisal of scientific experimentation with numerical and statistical analysis.	PJ/PD
14	Work autonomously to analyse, interpret and evaluate scientific data and present the results of laboratory work and problem solving clearly and concisely in written and oral form.	PJ/PD
15	Comply with regulations including compliance with business rules pertaining to record keeping, data integrity, traceability & confidentiality.	VCD
16	Promote and ensure the application of quality standards, safe working practices and compliance with risk management systems relevant to the workplace in own work and the work of others.	VCD
17	Use creative thinking and problem solving techniques such as root cause analysis, to challenge assumptions, innovate, make new proposals and build on existing ideas.	VCD
18	Autonomously plan and prioritise tasks, review and evaluate progress against objectives and investigate alternative scenarios.	PJ/PD
19	Contribute to the development of specific technical projects across multi-disciplinary teams.	PJ/PD
20	Ensure that targets are met and maintained, within own area of responsibility, whilst complying with defined company procedures and legislative requirements.	VCD
21	Lead continuous performance improvement within the scientific and technical environment using process mapping & analysis, root cause analysis that is informed by other appropriate lean, six sigma, project and change management principles.	VCD
	<b>Behaviours</b>	
22	Communicates effectively to a scientific and non-scientific audience using oral presentation, scientific debate & technical writing skills.	PJ/PD VCD
23	Demonstrates reliability, integrity and respect for confidentiality on work related and personal matters, including appropriate use of social media and information systems.	PJ/PD

24	Works autonomously and interact effectively including challenging assumptions within a wide, multi-disciplinary project team.	<b>PJ/PD</b>
25	Takes account of the impact of work on others, especially where related to diversity and equality.	<b>PJ/PD</b>
26	Manages time effectively, being able to plan and complete work to schedule.	<b>PJ/PD</b>
27	Responds positively to change management processes and promotes change within work group.	<b>PJ/PD</b>
28	Takes responsibility for continuing personal and professional development, demonstrating commitment to learning and self-improvement and supports the development of others as appropriate.	<b>PJ/PD</b>

## Appendix 2 - Primary Journal Article &amp; Presentation of Primary Journal Article to EPA Panel Assessment Criteria

<b>KSB</b>	<b>Assessment element</b>	<b>Fail</b>	<b>Pass</b>	<b>Distinction</b>
<b>12</b>	Literature review	Literature review lacks evidence and structure, uses outdated results or inappropriate scientific data	A systematic analysis of relevant scientific literature within a justified timeframe	A critical analysis of relevant scientific literature across the field evaluating the evidence of relevance to their research
<b>7 18</b>	Project scope & definition	Lack of clarity on project scope and boundary definition ill defined	Project scope and boundaries clearly defined. Aims and objectives articulated to customer	The project scope and boundaries are defined to allow predicted and unforeseen outcomes to be realised
<b>3 4 6 11 12</b>	Experimental design	Limited understanding of experimental design	Clear explanation of use of experimental design to develop hypothesis and design practical work	Use of statistical techniques to define design space and project positioning within
<b>5 14</b>	Data analysis	Misinterprets data and uses inappropriate statistical tools to analyse data	Well-structured data analysis using at least one appropriate statistical technique such as probability distributions, significance testing & confidence limits, regression & correlation	Systematic data analysis using a range of appropriate advanced statistical technique such as t-test, chi-square test, multivariate analysis, predictive models
<b>5 13 14</b>	Drawing conclusions	Inapposite conclusions based on misinterpretation of literature and data	Reasoned conclusions based on previous literature critiques and appropriate data analysis	Cogent scientific conclusions leading to logical recommendations for future experimentation

<b>1 2 3 11 12</b>	Scientific Approach	Uses inappropriate scientific approach to project	Identifies and uses appropriate scientific approach to project	Scientific approach shows understanding of the relationship of the project to the wider context of the work of the laboratory/business
<b>6 17</b>	Recommendations	Unable to explain recommendations based on conclusions	Recommendations for immediate next steps for project justified with reference to conclusions	Logical recommendations for future new experimentation linked to scientific conclusions
<b>18</b>	Project Management	Little demonstration of project planning and management	Clear project plan showing consideration of resources. Evidence of systematic evaluation of project progress and risk assessment	Effective management of project risk and mitigating actions
<b>24 10</b>	Stakeholder management	Project communication is vague or poor, difficulty conveying meaning to others	Tools used to define project stakeholders internal & external to the project	Clear management of all stakeholders expectations and use of scientific judgement to influence project direction
<b>19 27</b>	Change management	Unable to provide examples of challenging assumptions within a wide, multi-disciplinary project team	Provides two examples of challenging assumptions within a wide, multi-disciplinary project team and promoting change within work group.	Provides two examples of leading change and challenging practice to improve own work and work of others
<b>25</b>	Teamwork	Unable to provide examples of contributing to teamwork and interacting effectively including taking account of the impact of work on others	Provides two examples of building working relationships within a team and interacting effectively including taking account of the impact of work on others	Provides two examples of leading a team to achieve project objectives

<b>26 23</b>	Use of personal/ professional skills	Overall approach to project does not demonstrate use of personal/professional skills and good working practices within the context of the work-based project activity	Overall approach to project demonstrates use of personal/professional skills and good working practices within the context of the work-based project activity	Seeks to influence others to use personal/professional skills and good working practices within the context of the work-based project activity
<b>22 28</b>	Presentation	Unable to effectively present technical project elements and personal viewpoints	Confident, articulate presentation. Able to respond to technical questioning with ability to respect opinion of others	Proactively seeks feedback to improve scientific analysis and personal performance

A pass will be awarded where the apprentice meets pass expectations for all primary journal article and presentation elements.

A distinction will be awarded where the apprentice meets distinction expectations for all primary journal article and presentation elements.

**Appendix 3 -VCD Assessment Criteria**

<b>KSB</b>	<b>Assessment element</b>	<b>Fail</b>	<b>Pass</b>	<b>Distinction</b>
<b>16</b>	Applying quality standards	Cannot explain the application of quality standards within own work or the work of others	Can explain the impact on own role of applying quality standards in the workplace and linkages to safe working practices and compliance with risk management systems  Supports explanation with example from own practice	Can explain how the application of quality standards impacts on the wider business  Supports explanation with example of impact on the business

<p><b>8 15</b></p>	<p>Compliance with internal and external regulation</p>	<p>Cannot explain impact of compliance with internal and external regulation on own role</p>	<p>Can explain impact of compliance with internal and external regulation on own role Supports explanation with example from own practice</p>	<p>Can explain how compliance with internal and external regulation impacts on the wider business Supports explanation with example of impact on the business</p>
<p><b>9</b></p>	<p>Ethical practice and codes of conduct</p>	<p>Cannot explain their organisation's ethical practices and codes of conduct</p>	<p>Explains their organisation's ethical practices and codes of conduct  Provides example from own practice of compliance with organisation's ethical practices and codes of conduct</p>	<p>Explains how compliance with organisation's ethical practices and codes of conduct impacts on the business Supports explanation with example of impact on the wider business</p>
<p><b>10 22</b></p>	<p>Meeting internal or external customers' requirements</p>	<p>Cannot explain how meeting the requirements of internal or external customers impacts on workflows, improvements or scientific solutions</p>	<p>Can explain how meeting the requirements of internal or external customers impacts on workflows, improvements or scientific solutions Supports explanation with example from own practice</p>	<p>Can explain how meeting the requirements of internal or external customers impacts on the business Supports explanation with example of impact on the wider business</p>
<p><b>15</b></p>	<p>Record keeping and data integrity</p>	<p>Cannot explain good practice in record keeping and data integrity. Does not demonstrate understanding of rules pertaining to traceability &amp; confidentiality</p>	<p>Can explain good practice in record keeping and data integrity Shows understanding and use of rules pertaining to traceability &amp; confidentiality Supports explanation with example from own practice</p>	<p>Can explain how good practice in record keeping and data integrity impacts on the wider business Supports explanation with example of impact on the business</p>

<p><b>8 20 26</b></p>	<p>Meeting targets</p>	<p>Cannot explain how complying with defined company procedures and legislative requirements impacts on setting and meeting targets</p>	<p>Can explain how complying with defined company procedures and legislative requirements impacts on setting and meeting targets Supports explanation with example from own practice</p>	<p>Can explain how complying with defined company procedures and legislative requirements impacts on the wider business use of targets setting and performance management Supports explanation with example of impact on the business</p>
<p><b>17</b></p>	<p>Creative thinking &amp; problem solving</p>	<p>Cannot explain own use of problem solving techniques such as root cause analysis</p>	<p>Can explain own use of problem solving techniques such as root cause analysis, to challenge assumptions, innovate, make new proposals and build on existing ideas Supports explanation with example from own practice</p>	<p>Can explain how problem solving techniques such as root cause analysis impacts on the wider business Supports explanation with example of impact on the business</p>
<p><b>21</b></p>	<p>Continuous performance improvement</p>	<p>Cannot explain processes used to lead continuous improvement and own use of change management principles</p>	<p>Can explain processes used to lead continuous improvement and own use of change management principles Supports explanation with example of leading continuous improvement from own practice</p>	<p>Can explain how continuous improvement and change management processes impacts on the wider business Supports explanation with example of impact on the business</p>



**VCD Grading**

Fail = fails to meet pass standard for any discussions area

Pass = achieves pass standard for all discussion areas

Distinction = achieves distinction in all discussion areas