

# SIAS

Apprenticeship standard

## Laboratory Scientist

### Work Based Learning Guide

September 2015



## Purpose of document

This work based learning guide contains the detailed specification of the skills, knowledge and behaviours required to achieve occupational competence in the development phase of the Laboratory Scientist Higher/Degree Apprenticeship.

The work based learning guide has been developed by employers and will be maintained to reflect any future changes that are needed to maintain world class levels of quality and ensure that the credibility and consistency of the apprenticeship outcome is maintained. The apprenticeship outcome is described in Apprenticeship standard Laboratory Scientist.

The mandatory assessment process that leads to the apprenticeship award is available from [info@siasuk.com](mailto:info@siasuk.com).

## Work Based Learning Guide – Laboratory Scientist

<b>CORE COMPETENCES</b>	
<b>Std Ref</b>	Competences that need to be achieved by anyone being trained for the occupation. All elements within the core competencies are mandatory.
<b>CORE REQUIREMENTS: KNOWLEDGE</b>	
<b>S1</b>	<b>Apply knowledge of underlying scientific principles in laboratory based experimentation and implement new processes according to the literature or input from colleagues.</b>
<b>S2</b>	<b>Demonstrate and explain the principles of laboratory techniques and scientific experimentation to contribute to the development of scientific technical projects.</b>
<b>S3</b>	<b>Develop and apply a theoretical knowledge of the advanced science and technology required to progress in the job role and relevant area of specialism.</b>
1	On completion, apprentices will hold a Higher National Diploma or Foundation Degree qualification recognised by the Science Council at minimum Level 5, or where appropriate an honours degree at Level 6, in a discipline relevant to their job role. Details of suitable qualifications can be obtained from the Science Council ( <a href="http://www.sciencecouncil.org/Rsci">http://www.sciencecouncil.org/Rsci</a> )
<b>S4</b>	<b>Demonstrate working knowledge of project management procedures and the ability to incorporate these into the scientific work environment working with team members.</b>
2	Competent in project management tools and techniques, including software packages pertinent to the role and techniques used within the industry
3	Demonstrate practical application of project management life cycle approaches including, but not limited to, project identification, conducting scientific research to analyse options, experimental design, interpretation of results, drawing conclusion and recommendations that achieve the project aim
4	Manage the communication requirements of project management including the tools for stakeholder management
<b>S5</b>	<b>Understand the internal and external regulatory environment pertinent to the sector and the sponsoring organisation and comply with regulations including compliance with business rules pertaining to record keeping, traceability &amp; confidentiality.</b>
5	Demonstrate and adhere to the internal regulations pertinent to the sponsoring company & relative specialism in which they operate (e.g. Good Laboratory Practice, Good Manufacturing Practice, Good Documentation Practice, Good Clinical Practice, ISO17025)
6	Understand and adhere to the external regulatory requirements pertinent to the sponsoring company, relative specialism and region in which they operate (e.g. COMAH, MHRA, FDA, ONR, Animal Scientific Procedures Act 1986 and Directive 2010/63/EU (ETS123 Guidelines))
<b>S6</b>	<b>Understand the business environment in which the company operates including personal role within the organisation, ethical practice and codes of conduct.</b>
7	Understand the wider business environment (customers, competitors etc.) in which the organisation operates and how the roles of different departments or functions interact to deliver overall business objectives
8	Understand own role within the organisation and how it impacts/influences the business; demonstrate understanding and compliance with relevant codes of conduct and ethical practice (e.g. GLP, environmental considerations, professional body code of conduct, company code of conduct)
<b>S7</b>	<b>Identify and understand the requirements of internal or external customers and recommend the appropriate workflows, improvements or scientific</b>

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	<b>solutions.</b>
9	Identify customer’s underlying needs (internal/external) and determine whether these needs can be addressed by a scientific approach
10	Identify operational constraints which could affect the scientific approach to meeting a customer’s requirements
11	Identify and develop hypothesis from relevant scientific information to address customer needs and agree appropriate performance criteria with the customer
12	Demonstrate professional interaction with customers, using solicited feedback for self-directed learning and personal improvement
<b>CORE REQUIRMENTS: SKILLS</b>	
<b>S8</b>	<b>Prepare for and perform laboratory tasks using the appropriate scientific techniques, procedures and methods of relevance to the activities of the laboratory.</b>
13	Understand and apply a variety of documents such as Standard Operating Procedures and Test Methods in line with company policy
14	Prepare for, and perform, laboratory experiments, tests or tasks following specified methodologies to provide reliable, accurate data for example <ul style="list-style-type: none"> <li>• Spectroscopic/optical techniques</li> <li>• Cell-based immunoassays</li> <li>• Solution chemistry</li> <li>• Electrochemical/thermal/separation techniques</li> <li>• Analytical methods/Chromatography</li> <li>• Biochemical techniques</li> <li>• Computer modelling/digital design technologies</li> <li>• Radiochemical &amp; Radiometric Techniques</li> </ul>
15	Using advanced laboratory techniques relevant to job role be able to describe the theory, application and challenge assumptions
16	Demonstrate technical competence in the use of specified instruments and equipment, where appropriate developing subject matter expertise with a suitable technology
17	Understand and demonstrate appropriate sampling procedures and relevant sampling techniques
18	Demonstrate theoretical and practical understanding of maintenance procedures, report faults and seek diagnostic advice to maintain equipment and facilities in good working order, including calibration where required
19	Demonstrate an understanding of the relevant good laboratory documentation practices keeping accurate records of laboratory work undertaken, analysis of results and conclusions drawn
20	Contribute to the preparation of scientific and technical reports to a level commensurate with the expectations of the job role
21	Understand the principles behind valid analytical measurements, method performance characteristics, uncertainties in analytical results and method verification/validation

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<b>S9</b>	<b>Work safely within a laboratory environment, maintaining excellent housekeeping whilst following appropriate safety, environment and risk management systems.</b>
<b>9a</b>	<b>General workplace Health and Safety</b>
22	Demonstrate and comply with foundations of health and safety including responsibility for workplace safety under ‘Health & Safety at Work Act’
23	Understand the procedures for first aid relevant to your workplace
24	Demonstrate and comply with risk assessment & control measures including ‘Control of Substances Hazardous to Health’ risk assessments, Material Hazards and Safety Data Sheets including potent materials and controlled substances, where appropriate
25	Demonstrate appropriate use of personal protective equipment i.e. face mask, fume hoods
26	Understand and practice fire and electrical safety procedures in the workplace
27	Understand and practice safe manual handling and repetitive activities, including correct use of Display Screen Equipment
28	Demonstrate and comply with site and local emergency procedures, relevant organisation safety policies and procedures
<b>9b</b>	<b>Laboratory Safety &amp; Housekeeping</b>
29	Work safely in a laboratory and maintain excellent housekeeping, in accordance with organisation operating procedures
30	Identify potential safety hazards and recommend solutions to improve safety standards, report incidents and near misses
31	Order and control stocks of laboratory materials and equipment where required
32	Perform internal auditing in support of local health and safety policies, raise and allocate corrective actions and close designated tasks to time
33	Understand, follow and write local risk assessments for work carried out within own laboratory space
34	Demonstrate and comply with laboratory health and safety and compliance with legal, regulatory, ethical requirements
<b>9c</b>	<b>Environmental Management</b>
35	Understand and apply procedures for the management and control of laboratory waste, handling and disposal of chemical and biological substances
36	Understand environmental risk assessments (impact assessment)
37	Understand and apply the concepts of resource efficiency to energy, water and waste
<b>S10</b>	<b>Promote and ensure the application of quality standards relevant to the workplace.</b>
38	Understand, follow and promote company quality procedures to meet the requirements of quality standards relevant to the workplace
39	Recognise when something has not been carried out correctly within the laboratory environment, promote behaviour amongst colleagues and explain the impact this could have
40	Perform internal auditing in support of local quality policies, raise and allocate corrective actions and close designated tasks to time

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41	Complete documentation proficiently including relevant calculations including understanding error reporting and correction techniques
42	Competent in laboratory investigations, including reporting out of specification results, and be able to recommend applicable corrective and preventative actions to address the investigation
43	Understand the benefits and requirements of accreditation of an analytical service provision e.g. ISO 17025, both for routine (proven and accredited) methods and for methods under development, where applicable.
<b>S11</b>	<b>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.</b>
44	Use statistics in experimental designs to enable the effective measurement of the experimental variables and their interaction
45	Practical demonstration of one or more problem solving techniques
46	Demonstrate the use of advanced statistical analysis techniques for evaluation of results and data presentation to a technical audience
47	Demonstrate identification of sources of error and how they can be reduced e.g. human error
48	Demonstrate the use of standard and non-standard software packages and applications
49	Understand and demonstrate the application of the principles of Laboratory Information Management systems digital or paper based
50	Understand and apply basic root cause analysis
51	Challenge routine practices and address non-routine problems with appropriate sampling and instrumentation, within defined areas
52	Identify and critically evaluate relevant scientific information from appropriate technical resources e.g. databases, scientific literature, and challenge assumptions in order to contribute to novel solutions
<b>S12</b>	<b>Lead continuous performance improvement within the scientific and technical environment.</b>
53	Participate in improving systems and processes within your work environment or demonstrate where you have personally improved and become more efficient
54	Active member and/or project lead of a continuous improvement project that delivers recognised efficiencies within own workspace
55	Understand how workplace organisation techniques can be applied to improve workflow of the laboratory
56	Demonstrate one or more continuous improvement techniques eg <ul style="list-style-type: none"> <li>• Workplace organisation techniques</li> <li>• Management strategies such as 'Lean' or 'Six Sigma'</li> <li>• Accreditation (eg ISO, UKAS), external audits</li> <li>• Reduction of 'waste'</li> <li>• Internal auditing process</li> </ul>

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<b>S13</b>	<b>Use creative thinking and problem solving to challenge assumptions, innovate, make new proposals and build on existing ideas.</b>
57	Propose new or unusual approaches to existing problems, testing the hypothesis with critical evaluation of the results
58	From research apply learned models and concepts to analyse situations, contribute to ideation
59	Challenge underlying assumptions and established ways of working
<b>S14</b>	<b>Plan and prioritise tasks, review and evaluate progress against objectives and investigate alternative scenarios.</b>
60	Break down departmental goals or organisational objectives in to a manageable personal action plan aligned with the business vision
61	Identify important personal and workgroup results that need to be achieved on a week-by-week basis
62	Continuously monitor personal progress against objectives, revisit plans and suggest alternative tasks to achieve objectives
63	Drive project contingency planning
<b>CORE REQUIRMENTS: BEHAVIOURS</b>	
<b>S15</b>	<b>Communicate effectively using a full range of skills: speaking to a scientific and non-scientific audience, active listening, professional writing, professional body language, scientific presentation.</b>
64	Readily comprehends oral and/or written instructions when first presented and able to present scientific/technical information to a range of audiences
65	Passes on information both verbal and written, in a way that is easily understood to a wider technical team
66	Listens and will question and challenge appropriately to enhance own understanding
67	Able to effectively present personal viewpoint and influence others within the team
68	Receptive to other people's point of view
69	Take part in technical presentations to a scientific audience both within the workplace and external to the area of expertise
70	Participate in community or academic projects to promote science to a non-technical audience (internal/external)
71	Present technical poster, abstract and formal written scientific poster to an appropriate audience (internal/external)
<b>S16</b>	<b>Demonstrate reliability, integrity and respect for confidentiality on work related and personal matters, including appropriate use of social media and information systems.</b>
72	Understand confidentiality policies within the work place and know how to apply them
73	Appropriate use of social and business media within the workplace and understand application of company policies
74	Adhere to company Information Technology policies including appropriate use of e-mail and professional electronic communication
75	Adhere to document security classification and understand the control requirements for technical/scientific publications, e.g. internal and external reports and presentations

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<b>S17</b>	<b>Work autonomously and interact effectively within a wide, multi-disciplinary project team.</b>
76	Make useful contribution during wider team discussions and initiates problem solving
77	Demonstrates knowledge and understanding of team organisation/mission and how this fits into the sector
78	Works cooperatively with others to achieve overall team goals and understands how these influence the wider organisation
79	Works autonomously, can be trusted to complete tasks and Identifies obstacles to achieving work assigned and escalates
80	Can be relied on to manage their work with little supervision and leads others
81	Self-motivated and deals with work/learning balance in a positive way
<b>S18</b>	<b>Understand the impact of work on others, especially where related to diversity and equality.</b>
82	Works to the required standard of accuracy, neatness and thoroughness. Often makes valued contributions to team quality.
83	Respects and encourages the value of others.
84	Usually tactful, considerate and respectful in dealing with others.
85	Understands and adheres to the regulations relating to equality
<b>S19</b>	<b>Manage time effectively, being able to plan and complete work to schedule.</b>
86	Continually demonstrates efficient use of work time, managing personal time considerately
87	Timekeeping and absence from work complies with company protocols
88	Always prepares in advance, ready to participate in group activities
<b>S20</b>	<b>Able to handle change and respond to change management processes.</b>
89	Understand the principles of change management and how they apply to the direct place of work
90	Flexible, willing and able to respond to changes in work situations and/or learn new skill
91	Works hard to implement successful change in areas of responsibility as directed by supervisor
92	Able to demonstrate examples of situations when they have changed practice or personal behaviour
<b>S21</b>	<b>Take responsibility for personal development, demonstrating commitment to learning and self-improvement.</b>
93	Recognise areas for self-development and demonstrate personal awareness of strengths and weaknesses
94	Demonstrate self-directed learning to continually develop technical and transferable skills



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Stnd Ref.	<b>SPECIALISMS</b>	
	In addition to the core competences specialisms specific to a work context need to be achieved by anyone being trained for a job role in that work context.	
	<b>A</b>	<b>Laboratory Scientist – Analytical Science</b>
1,2,3	A1	Understand the theoretical basis for applied analytical science including how to apply analytical methods during design and implementation of analytical programmes, as appropriate
8	A2	Prepare for and perform analytical tasks using the appropriate scientific techniques, procedures and analytical methods of relevance to the activities of the laboratory
11, 13	A3	Identify and use scientific approaches required to solve problems, support new investigations and follow-up experiments in the laboratory for routine and non-routine analytical tasks
8	A4	Understand the requirements for the development and validation of analytical methods and instrumentation, including understanding of suitable analytical sampling methods
	<b>B</b>	<b>Laboratory Scientist – Chemical Science</b>
1,2,3	B1	Understand the theoretical basis for applied chemistry including how to apply physical, organic or inorganic chemistry during design and implementation of research programmes, as appropriate
8	B2	Prepare for and perform laboratory tasks using the appropriate chemistry techniques, procedures and methods of relevance to the activities of the chemistry laboratory
11, 13	B3	Identify and use appropriate chemistry approaches required to solve problems, support new investigations and follow-up experiments in the laboratory for routine and non-routine tasks
	<b>C</b>	<b>Laboratory Scientist – Research &amp; Development</b>
1,2,3	C1	Understand the theoretical basis for formulated product design including how to apply scientific methods during design and implementation of research programmes, as appropriate
8	C2	Prepare for and perform laboratory tasks using the appropriate scientific techniques, procedures and methods of relevance to the activities of the formulation development laboratory
11, 13	C3	Identify and use scientific approaches required to solve problems, support new investigations and follow-up experiments in the laboratory for routine and non-routine, and new tasks
	<b>D</b>	<b>Laboratory Scientist – Life Sciences</b>
1,2,3	D1	Understand the theoretical basis for applied microbiology and biotechnology including how to apply scientific methods during design and implementation of research programmes where appropriate
8	D2	Prepare for and perform laboratory tasks using the appropriate scientific & microbial techniques, procedures and methods of relevance to the activities of biotechnology laboratories
11, 13	D3	Identify and use scientific approaches required to solve problems, support new investigations and follow-up experiments in the laboratory for routine and non-routine, and new tasks

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### Behaviours Evaluation Assessment Criteria – Laboratory Scientist

	<b>Does not meet Expectation</b> <i>Apprentice failed to demonstrate an acceptable level of behaviour. Improvement is required</i>	<b>Meets Expectation</b> <i>Apprentice demonstrated acceptable level of behaviour and meets the minimum level of behaviour expected</i>	<b>Exceeds Expectation</b> <i>Apprentice demonstrated consistent and positive behaviours in this area that reflect those expected of outstanding apprentices</i>
<b>Personal Responsibility:</b>	<i>Demonstrate personal responsibility towards safety and quality management systems</i>		
Assessment criteria	Little evidence of personal responsibility to safety and quality systems	Good personal responsibility towards safety and quality systems and recommends changes where appropriate	Exhibits high standards of personal responsibility toward safety and quality systems  Seeks to influence the behaviour of others
	Tries to play down incidents in which they are involved	Responds positively to suggestions for own improvements in personal responsibility for safety and quality issues	Actively monitor the safety and quality of self and others, challenging and making suggestions where appropriate
<b>Communication:</b>	<i>Communicate effectively using a full range of skills: speaking; listening; writing; body language; presentation; technical reports;</i>		
Assessment criteria	Misinterprets or is slow to comprehend oral and/or written instructions	Able to understand and present scientific/technical information to a range of audiences	Able to understand and explain complex information in a variety of formats and to a range technical and non-scientific audiences  Scientific or technical publication (internally/externally)
	Communications are vague or poorly written or spoken  Difficulty conveying meaning to others	Passes on information both verbal and written, in a way that is easily understood to a range of colleagues	Is able to adapt both verbal and written communication to be understood by different audiences (e.g. peer, supervisor, senior manager, and visitor).

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	<b>Does not meet Expectation</b> <i>Apprentice failed to demonstrate an acceptable level of behaviour. Improvement is required</i>	<b>Meets Expectation</b> <i>Apprentice demonstrated acceptable level of behaviour and meets the minimum level of behaviour expected</i>	<b>Exceeds Expectation</b> <i>Apprentice demonstrated consistent and positive behaviours in this area that reflect those expected of outstanding apprentices</i>
			External technical and non-technical reports/presentation/publication.
	Will not ask questions and demonstrates little willingness to listen	Listens and will question and challenge appropriately to enhance own understanding	Actively listens and challenges appropriately, in a range of internal/external audiences, to enhance own and others understanding  Supports and acknowledges contributions from others
	Unable to effectively present personal viewpoint	Able to effectively present personal viewpoint	Able to influence others to see personal viewpoint
	Unwilling to see other people's point of view	Receptive to other people's point of view	Ability to reason from different points of view
<b>Teamwork &amp; Leadership</b>	<i>Works and interacts effectively within a team</i>		
Assessment criteria	Unwilling to contribute during team discussions / problem solving	Makes a useful contribution during team discussions / problem solving	Contributes and willing to lead team based discussions / problem solving
	Can reduce morale and enthusiasm within the team	A good team member gets on well with colleagues at professional level building working relationships within team	Builds working relationships between team and other groups. Seeks to diffuse conflict situations where they arise
	Exhibits negative behaviour concerning team/organisational mission	Demonstrates knowledge and understanding of team organisation/mission	A strong team player helps bind the team together to achieve team mission/vision
	Does not accept responsibility for own impact on team performance	Works cooperatively with others to achieve overall team goals	Puts team goals in line with personal achievement and recognition, actively contributes to achievements of others

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	<b>Does not meet Expectation</b> <i>Apprentice failed to demonstrate an acceptable level of behaviour. Improvement is required</i>	<b>Meets Expectation</b> <i>Apprentice demonstrated acceptable level of behaviour and meets the minimum level of behaviour expected</i>	<b>Exceeds Expectation</b> <i>Apprentice demonstrated consistent and positive behaviours in this area that reflect those expected of outstanding apprentices</i>
	Does not take responsibility for work of others	Mentors colleagues to achieve technical objectives with successful feedback	Mentors colleagues and actively seeks feedback on scientific leadership style
<b>Independence and Responsibility:</b>	<i>Work independently and take responsibility for initiating and completing tasks</i>		
Assessment criteria	Inclined to wait for direction on work tasks  Regularly needs to be told what to do or how to do it	Looks ahead and progresses work in areas of the job role, does not need to be told what to do next, completes tasks to timeframe required  Will seek to resolve obstacles to achieving work assigned themselves before escalating	Demonstrates creative thinking to resolve obstacles and recommends improvements to existing processes and systems based on personal experience
	Supervision required to progress work	Holds themselves accountable for their own performance	Proactively seeks feedback to improve self performance and mentors others and supports mentees performance
	Over reliance on supervisor for motivation	Self-motivated and deals with work/learning balance in a positive way	Maintains motivation and encourages others to do the same
<b>Impact of work:</b>	<i>Understand impact of work on others, especially where related to diversity and equality</i>		
Assessment criteria	Others feel the need to recheck their work or have to finish off the job after them. Work rarely makes a contribution to team quality	Has a reputation within the work group for doing work right first time, every time. Consistently makes valued contributions to team quality	Encourages right first time and quality in others

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	<b>Does not meet Expectation</b> <i>Apprentice failed to demonstrate an acceptable level of behaviour. Improvement is required</i>	<b>Meets Expectation</b> <i>Apprentice demonstrated acceptable level of behaviour and meets the minimum level of behaviour expected</i>	<b>Exceeds Expectation</b> <i>Apprentice demonstrated consistent and positive behaviours in this area that reflect those expected of outstanding apprentices</i>
	Little respect for the values of others	Respects the value of others	Actively encourages work group to respect the values of others
	Has difficulty being tactful, considerate and respectful in dealing with others	Usually tactful, considerate and respectful in dealing with others	Always tactful, considerate and respectful in dealing with others
<b>Time management</b>	<i>Accepts responsibility for managing own time and workload within a given plan to complete work to schedule</i>		
Assessment criteria	Does not deliver consistently, can waste time on non-essentials or can overcommit to deliverables	Continually demonstrates efficient use of work time and strives for improved productivity	Takes responsibility for managing time of others, is able to prioritise and doesn't over commit
	Unreliable timekeeping and absence from work	Timekeeping and absence from work complies with company protocols	Encourages others to comply with company timekeeping protocols
	Not fully prepared in advance holds up group activities	Prepares in advance ready to participate in group activities	Encourages others to prepare in advance for group activities
<b>Change Management:</b>	<i>Ability to handle change and respond to change management processes</i>		
Assessment criteria	Has difficulty adjusting to changes in workload or assignments	Is flexible, willing and able to respond to changes in work situations and/or learn new skill	Capable of supporting others with change in work situations and / or learning new skill
	Resists change or innovation or takes a "wait and see" approach.	Works hard to implement successful change in areas of responsibility as directed by supervisor.	Recommends changes to improve own work and work of others and implements as agreed with supervisor.

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	<p align="center"><b>Does not meet Expectation</b>  <i>Apprentice failed to demonstrate an acceptable level of behaviour.                      Improvement is required</i></p>	<p align="center"><b>Meets Expectation</b>  <i>Apprentice demonstrated acceptable level of behaviour and meets the minimum level of behaviour expected</i></p>	<p align="center"><b>Exceeds Expectation</b>  <i>Apprentice demonstrated consistent and positive behaviours in this area that reflect those expected of outstanding apprentices</i></p>
	<p>Does not value own contribution</p>	<p>Able to demonstrate examples of situations when they have changed practice or personal behaviour</p>	<p>Evidence of influencing/leading change and challenging practice or personal behaviour in others</p>