

# SIAS

Apprenticeship standard

Science Industry Process/Plant Engineer

Degree Apprenticeship Level 6

(ST0473)

Work Based Learning Guide

December 2017



## **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 Science Industry Process/Plant Engineer 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 Science Industry Plant/Process Engineer.

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

## Work Based Learning Guide – Science Industry Process/Plant Engineer

<b>CORE COMPETENCES</b>	
<b>Stnd 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>	Core engineering principles including mathematics and science and their application to relevant area of specialism.
1	An honours degree at Level 6, in a relevant engineering discipline relevant to their job role
2	Develop a theoretical knowledge of the core engineering principles required to progress in the job role and relevant area of specialism
3	The use of mathematics and science for engineers
<b>S2</b>	The product manufacturing process within the science industry.
4	Demonstrate a thorough understanding of the chemical/manufacturing process and the underlying chemical engineering principles and science that is applicable and appropriate to the sector and the sponsoring organisation
5	An understanding of the operating principles for common unit operations and specific units pertaining to the organisation
6	Knowledge of how to read and interpret information from process diagrams and process descriptions
7	Understand the theory and can explain the application of heat transfer, mass transfer and fluid flow to the manufacturing process
8	An understanding of the principles of mass and energy balances and how to calculate heats of reaction and perform energy balances on reactive and non-reactive multi-unit systems
9	Can explain the basic conceptual process design and flow-sheet development
10	Understand the concepts of unit process design, taking into consideration the various approaches to process safety, including the use of environmental impact assessments
11	Understand and demonstrate use of performance measures for manufacturing processes
12	Know how to use analytical data to resolve process problems and define solution strategies
<b>S3</b>	Principles of computer aided design; computer aided engineering and appropriate engineering informatics packages.
13	Understand and explain the principles of Data Management
14	Understand the application of Computer Aided Design (CAD) in science manufacturing processes and engineering applications
15	Understand the use of informatics tools (technical and scientific tools; process simulators; programs for economic analysis) applied to manufacturing processes
<b>S4</b>	Engineering project management procedures and how to incorporate these into the engineering/scientific work environment.

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16	Understand how to use project management tools and techniques, including software packages pertinent to the role and techniques used within the industry
17	Understand and can explain the project management life cycle
18	Know how to communicate to others the requirements of a project to effectively manage stakeholder expectation
19	Know how to influence different types of people when communicating the requirements of a project to effectively manage stakeholder expectation
<b>S5</b>	The internal and external regulatory environment pertinent to the science sector.
20	Understand the internal and external regulatory environment pertinent to the sector and the sponsoring organisation
<b>S6</b>	Industrial finance: capital and operating expenditure, particularly when applied to feasibility studies and comparison of competing tenders.
21	Explain the economics of the manufacturing process
22	Explain the principle elements of a budget and show how to monitor financial performance at a level pertinent to job role
23	Knows the different terms used in financial control including the difference between capital and operating expenditure
24	Explain the principal elements of budgets, capital costs/budgets and how to produce a capital proposal for engineering investment
25	Describe a procurement process used by the sponsoring organisation
<b>S7</b>	The business environment in which the company operates including personal role within the organisation, ethical practice and codes of conduct.
26	Know, understand and comply with the Code of Conduct in your organisation and the appropriate code of professional conduct
27	Informed about the marketplace and business landscape in which the employing organisation operates
28	Knows the main business objectives on the organisation
<b>S8</b>	The principles of process and product safety and sustainability relevant to the sector.
29	Explain the principles of product and process safety relevant to the sector and sponsoring organisation
30	Understand the principles of sustainability relevant to the sector and sponsoring organisation
31	Explain the reasons for and application of safety management systems e.g. Safe Systems of Work, Standard Operating Procedures & Maintenance Procedures and Risk Assessment
32	Explain the nature of major accidents and how hazards and risks are defined and quantified
33	Understand assurance processes and control measures for effective risk management

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34	Understand and explain how to contribute to a positive process safety culture
35	Understand the importance of good process safety leadership principles
36	Know how to achieve continuous improvement in process safety performance
37	Demonstrate the monitoring and reviewing of process safety performance including performance indicators
38	Understand and demonstrate the use of incident reporting and accident investigation process
<b>S9</b>	The principles of quality management processes relevant to the sector e.g. Good Manufacturing Practice (GMP), Quality Control (QC), Quality Assurance (QA).
39	Understand and adhere to the internal & external standards pertinent to the sponsoring company & relevant specialism and sector in which they operate (e.g. Good Manufacturing Practice, ISO 9000, ISO 14000, Good Documentation Practice and Good Engineering Practice)
40	Understand and adhere to the internal & external regulatory requirements pertinent to the sponsoring company, relevant specialism and sector in which they operate (e.g. COMAH, MHRA, FDA, HSE)
<b>CORE REQUIRMENTS: SKILLS</b>	
<b>S10</b>	Ensure the control, within own area of responsibility, of major accident hazards, health & safety, to statutory, mandatory and environmental engineering standards.
41	Demonstrate compliance with foundations of health and safety including responsibility for health and safety under HASWA
42	Use risk assessment & control measures to ensure plant safety
43	Use the appropriate personal protective equipment. typically to protect the head , hands, feet, eye and hearing protection
44	Comply with the site/plant safety and environmental procedures for example: Fire, COSHH, Working at Height, COMAH, Confined Spaces and Permits to Work
45	Comply with regional, national, and international standards and company internal standards
<b>S11</b>	Ensure that targets are met and maintained, within own area of responsibility, whilst complying with defined company procedures and legislative requirements.
46	Ensure that targets set are met and completed effectively in agreed timescales
<b>S12</b>	Prepare for and perform process/plant engineering tasks using the appropriate techniques, procedures and methods.
47	Use the appropriate techniques, procedures and methods and actions to perform engineering tasks
48	Optimise the best economic performance of engineering assets

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<b>S13</b>	Support the evaluation, submission, planning, installation and commissioning of capital, maintenance and revenue projects to improve process performance.
49	Produce project evaluation and performance data
50	Manage and support projects designed to improve process efficiency
51	Contribute to optimisation of the best economic performance of engineering assets in the project
52	Support engineering and process tasks and targets so that they are completed on time, in specification and in accordance to project schedules and budget
<b>S14</b>	Work autonomously to analyse, interpret and evaluate engineering data, presenting the results and problem solving approach clearly and concisely in written and oral form, using technology where appropriate to assist with and evaluate activities.
53	Analyse and interpret data, providing effective solution to technical and engineering problems
54	Ensure data is interrogated and verified before use
55	Present results clearly and concisely in written and oral form
56	Use technology where appropriate to assist with evaluation activities
<b>S15</b>	Apply continuous performance improvement techniques and support existing manufacturing principles to drive effectiveness and efficiency.
57	Use and apply techniques to support the effective improvement of production processes and product quality performance
58	Contribute and support continuous performance improvement projects, applying established manufacturing principles e.g. Lean Manufacturing within the scientific and engineering environment to drive effectiveness and efficiency
<b>S16</b>	Manage and/or support the introduction of new technologies and practices.
59	Support and develop the introduction of new technologies and practices pertinent to the role within the workplace
60	Maintain awareness of innovation in the applicable engineering landscape and use it to inform and support the introduction of new practices and/or technology.
61	Contribute to the assessment of new technologies and practices relevant to the workplace
<b>S17</b>	Use creative thinking and problem solving to challenge assumptions, innovate, make new proposals and build on existing ideas.
62	Demonstrate one or more problem solving techniques
63	Identify problems and their root causes and implement satisfactory solutions
<b>S18</b>	Plan and prioritise process/plant tasks using project planning tools, review and evaluate progress against objectives and investigate alternative scenarios.
64	Manage tasks and projects operating at different timelines and priorities

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65	Demonstrate practical application of project management life cycle
66	Communicate the expectations and progress of the project to stakeholders and other interested parties
<b>CORE REQUIRMENTS: BEHAVIOURS</b>	
<b>S19</b>	Have a safety and quality mind-set that ensures strict compliance and a disciplined, responsible approach to manage, mitigate and manage risk.
<b>S20</b>	Communicate effectively to a scientific and non-scientific audience.
67	Works to the required standard of accuracy, neatness and thoroughness, often makes valued contributions to team quality
68	Respects and encourages the value of others. Work effectively with colleagues, clients, suppliers or the public, and be aware of the needs and concerns of others, especially where related to diversity and equality
69	Usually tactful, considerate and respectful in dealing with others, exercising responsibilities in an ethical manner
70	Understands and adheres to the regulations relating to equality
71	Readily comprehends oral and/or written instructions when first presented and able to present scientific/technical information to a range of audiences
72	Passes on information both verbal and written, in a way that is easily understood to a wider technical team
73	Listens and will question and challenge appropriately to enhance own understanding
74	Able to effectively present personal viewpoint and influence others within the team
75	Receptive to other people's point of view
76	Take part in technical presentations to a scientific audience both within the workplace and external to the area of expertise
77	Participate in community or academic projects to promote science to a non-technical audience (internal/external)
78	Present technical poster, abstract and formal written scientific poster to an appropriate audience (internal/external)
<b>S21</b>	Is reliable and shows integrity and respect for confidentiality on work related and personal matters, including appropriate use of social media and information systems.
79	Understand confidentiality policies within the work place and know how to apply them
80	Appropriate use of social and business media within the workplace and understand application of company policies
81	Adhere to company Information Technology policies including appropriate use of e-mail and professional electronic communication
82	Adhere to document security classification and understand the control requirements for technical/scientific publications, e.g. internal and external reports and presentations
83	Demonstrates a personal commitment to the appropriate code of professional conduct
84	Understands and demonstrates the actions and requirement as a professional engineer

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85	Shows a recognition to the obligations with society, the engineering profession and the environment
<b>S22</b>	Work autonomously and interact effectively within a wide, multi-disciplinary project team, understanding the impact of work on others, especially where related to workplace ethics, diversity and equality.
86	Make useful contribution during wider team discussions and initiates problem solving
87	Demonstrates knowledge and understanding of team/organisation mission and how this fits into the sector
88	Works cooperatively with others to achieve overall team goals and understands how these influence the wider organisation
89	Works autonomously, can be trusted to complete tasks and Identifies obstacles to achieving work assigned and escalates
90	Can be relied on to manage their work with little supervision and leads others
91	Self-motivated and deals with work/learning balance in a positive way
92	Works to the required standard of accuracy, neatness and thoroughness. Often makes valued contributions to team quality
93	Respects and encourages the value of others
94	Usually tactful, considerate and respectful in dealing with others
95	Understands and adheres to the regulations relating to equality
<b>S23</b>	Apply a logical thought process, being able to incorporate the ideas of others and quickly process information.
<b>S24</b>	Handles and responds to change, adjusting to different conditions, technologies, situations and environments.
96	Understand the principles of change management and how they apply to the direct place of work
97	Flexible, willing and able to respond to changes in work situations and/or learn new skills
98	Works hard to implement successful change in areas of responsibility as directed by supervisor
99	Able to demonstrate examples of situations when they have changed practice or personal behaviour
<b>S25</b>	Take responsibility for continuing personal and professional development, demonstrating commitment to learning and self-improvement and support the development of others as appropriate.
100	Recognise areas for self-development and demonstrate personal awareness of strengths and weaknesses
101	Demonstrate self-directed learning to continually develop technical and transferable skills
102	Continually demonstrates efficient use of work time, managing personal time considerately
103	Timekeeping and absence from work complies with company protocols
104	Always prepares in advance, ready to participate in group activities